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## EXPLANATORY NOTE

for Master's Thesis

topic: **ECOLOGICAL MANAGEMENT INTRODUCTION AT AN  
 ENTERPRISE (LLC "SE BORDNETZE-UKRAINE"  
 AS A CASE STUDY)**

Submitted by: sixth year student group IBUm-62

Specialism (field of study) 073 Management

"Management of innovation activity"

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## ANNOTATION

*Frimpong K.J. Ecological management introduction at an enterprise (LLC “SE Bordnetze-Ukraine” as a case study).*

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The master’s thesis talks about the relations between ecology, preserving the environment and how the activities of enterprises affect the environment. The activities of the company from the manufacturing stage to the stage where the products are ready for sale are addressed. SE Bordnetze – Ukraine holds the ISO/TS 16949 certificate which proves it practices quality management but it doesn’t have the ISO 14001 to prove it practices ecological management. The company is compliant to the laws and regulations of the state but it doesn’t follow all the necessary systems of standards needed to operate in the automotive industry. The master thesis concludes by drawing out the steps in which SE Bordnetze – Ukraine can adopt the ISO 14001 for better results both in environmental performance and the company’s performance. It is recommended for the company to adopt the latest version of the environmental management system.

*Keywords: Ecological management, Environmental management system, ISO 14001, Environmental policy, automotive industry, wiring harness.*

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## INTRODUCTION

**Actuality of theme.** In fact, human capacity has increased as a result of scientific and technological progress, and led to large-scale intervention into the nature, without taking into account the negative effects that have affected the environment. If previously humanity was exposed to local and regional ecological crises, the current situation threatens the global ecological collapse, because people violate the eco-system functioning and Earth's Biosphere on a planetary scale. Therefore, the analysis of socio-environmental problems has shown that it is impossible to separate the issue of economic development from the state of environment, since degradation of the environment is a serious obstacle not only for economic development, but also for the prospects of society development as a whole.

At the present stage, an increasingly important role in solving environmental problems is given directly to the objects of the economic market – the enterprises that are responsible for their production activities. Therefore, the system of ecological management is applied primarily at the level of enterprises and allows them to solve environmental problems. Creation and implementation of such a system at the enterprise allows maintaining a balance between the interests of the enterprise itself and the requirements of environmental legislation.

**Connection with scientific programs, plans, topics.** The thesis was performed in accordance with the research topics of the Innovation Activity and Services Management Department of Ternopil Ivan Puluj National Technical University.

**The Aim of the Research.** The aim of the master's work is to develop and substantiate the environmental management system of the enterprise. To achieve this goal, the following main tasks were set and solved:

- to explore the concept and principles of ecological management and the system of standards and international recommendations in the field of environmental management;

- to justify the role of the environmental management system in the development of an enterprise;
- to give the general characteristics of LLC “SE Bordnetze – Ukraine”;
- to do the SWOT-analysis of the industrial and economic activity of the investigated enterprise;
- to research the factors influencing the ecological management introduction at an enterprise;
- to describe the conceptual bases of implementation process of environmental management system at an enterprise according to ISO14000;
- to substantiate the effectiveness of environmental management system introduction at the investigated enterprise.

**Object of study** is LLC “SE Bordnetze – Ukraine” whose main activity is the production of cable and wire products for the Volkswagen Golf A 7 and Audi A6 projects.

**Subject of research** is the process of implementing an environmental management system.

**Methodology.** The main research methods of this thesis are questionnaire based empirical research method. In this study, appropriate variables and measurable mode are selected for testing the theoretical hypotheses. Data needed for empirical research is collected through designing and releasing questionnaires to sample corporations.

The information base of the study is documents and materials of public authorities and administration, laws and regulations of Ukraine, materials and data of periodicals, monographs and other scientific literature on the topic of the master's thesis.

**The scientific novelty** of the obtained results lies in the development of theoretical provisions and the development of practical recommendations for the implementation of environmental management system in the enterprise. In particular, in the master's thesis:

- conceptual bases of process of introduction of system of ecological management are offered;
- the expediency of introducing an environmental management system for the researched enterprise is substantiated.

**The practical significance of the obtained results.** In the course of the research the procedure of introduction of the environmental management system for LLC “SE Bordnetze – Ukraine” was proposed in order to ensure its innovative development.

**Approbation of research results.** The main conclusions, provisions and results of the study were considered and approved at two scientific and practical conferences, as well as at the Innovation Activity and Services Management Department of Ternopil Ivan Puluj National Technical University.

**The volume and structure of the thesis.** The master's thesis is presented on the pages of a computer text, consists of an introduction, four chapters, conclusions, a list of used sources of 28 items. The work includes 4 tables, 7 figures.

# **CHAPTER 1. THEORETICAL AND METHODOLOGICAL THEORETICAL AND APPLIED FUNDAMENTALS OF THE ENVIRONMENTAL MANAGEMENT SYSTEM AT AN ENTERPRISE**

## **1.1. The concept and principles of enterprise management system**

The practice of ecological management revolves around the relationship between ecology, man and ethics. This practice can be profitable to the company and at the same time allow the customer to enjoy better products and service. A lot of companies struggle with the dynamic between environmental and social matters on one hand and making profit in the other.

Every enterprise must have the capacity to disturbance from both economic shocks and natural incidents. This is why every enterprise has to be resilient. The fundamentals of practices should be based on industrial ecology, performance economy and urban sustainability. In the last decade, scientific research and management models have been integrated into environmental preservation. In a proper industrial setting, the fundamentals of circular and bio based economy should be a guide in reducing both resource and input and waste and energy leakage in industrial activities. All this can be achieved through a specific waste management task, reducing harsh work conditions and minimization of input and waste recycling.

Ecological management strengthens general stability and local social stability. It also provides a working model for sustaining development which directs economic growth in profitable ecosystem functions. It also limits an industry's optimal scale relative to economic capacity of the socio- environmental setting. Human needs and activities put a strain on the ecosystem and drains natural resources.

In 1994, Edward Grumbine presented 10 dominant themes of ecosystem management:

- Interagency cooperation
- Integrity



- Organizational change
- Hierarchical context
- Ecological boundaries
- Monitoring
- Adaptive management
- Humans embedded in nature
- Values
- Ecological integrity

Collaboration between all who are involved in Ecological management is necessary. It should be developed between the government, regulatory agencies, scientists, engineers and landowners to work together to in order to define and establish proper boundaries and integrate legal mandates and management goals. The enterprise has to be sensitive to the activities, traditions and habits of the residents. When landowners witness questionable practices, they may take legal action against the enterprise. Ecological management follows legislation and imposes regulation by legislation to propose proper solutions with the aim of sustainability in mind. Proper scientific research about the region should be done to help in the planning, design and decision making process. A disciplinary group has to emphasize a research well conducted using experts, modern instruments, monitoring systems, accurate soft wares, measuring systems and accurate methods.

There are certain elements on which the principles work:

- Sustainability
- Sound ecological principles
- Complexity and connectedness – Biodiversity and structural complexity are important elements of the ecosystem.
- Goals: goals which properly specific the plan and all the processes needed to be done.

- Adaptability and accountability: Managers should be able to adapt to the needs of a particular region, adapt to new information and account for the activities of the company.
- Human beings as ecosystem components: human activities and conservation of nature should go hand in hand. Human activities are allowed but with certain restrictions and legislation.
- Context and scale: a constant challenge for ecological management is the dynamic between spatial and scales at which humans make resource management decisions.
- The dynamic character of ecosystems: attempts to keep ecosystems in a particular configuration can lead management projects to failure in the long run.

Starting in the 90's, Scholars in the field of management and economics demonstrated ecology as a metaphor for the business world's living organisms and introduced the term 'business ecosystem' (Moore, 1993). Even up to now, Business ecosystem is still a relatively new concept in the field of business research, addressed by a certain number of researches (Zhao & Wang, 2008; Gong & Jiang, 2016; Kapoor & Agarwal, 2017). Since the term 'business ecosystem' was concerned by academics in the field of economics and management in the 1990s, the business ecosystem studies have largely been focusing on conceptually defining business ecosystem or describing its framework (Moore, 1993; Moore, 1998; Iansiti & Levien, 2004; Peltoniem & Vuori, 2004; Zhao & Wang, 2008). Moore (1993) suggested "a company be viewed not as a member of a single industry but as part of a business ecosystem that crosses a variety of industries. In a business ecosystem, companies co-evolve capabilities around a new innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations".

Subsequently, Moore highlighted interaction within a business ecosystem and further defined business ecosystem as "an economic community supported by a foundation of interacting organizations and individuals, the organisms of the business world" (Moore, 1996). In other studies, Moore defined Business ecosystem

as an “extended system of mutually supportive organizations; communities of customers, suppliers, lead producers, and other stakeholders, financing, trade associations, standard bodies, labor unions, governmental and quasigovernmental institutions, and other interested parties. These communities come together in a partially intentional, highly self-organizing, and even somewhat accidental manner.” (Moore, 1998). Obviously, he emphasized more on self-organization and decentralized decision-making in this definition of the concept. In order to understand the business ecosystem, Iansiti and Levien (2004) used business networks to analogize the business ecosystem: “We found that perhaps more than any other type of network, a biological ecosystem provides a powerful analogy for understanding a business network.

Like business networks, biological ecosystems are characterized by a large number of loosely interconnected participants who depend on each other for their mutual effectiveness and survival. And like business network participants, biological species in ecosystems share their fate with each other. If the ecosystem is healthy, individual species thrive. If the ecosystem is unhealthy, individual species suffer deeply. And as with business ecosystems, reversals in overall ecosystem health can happen very quickly.” Iansiti and Levien (2004) argued that features of a business ecosystem include fragmentation, interconnectedness, cooperation and competition and the relationship between participants and ecosystem.

Besides, Peltoniem and Vuori (2004) also emphasized the structure and participants of business ecosystem. According Peltoniem and Vuori (2004), business ecosystem is composed of interconnected and dynamic business organizations, including suppliers, distributors, social public service institutions and related organizations, and consumers.

Ecological management methodology:

- Localization of issues: this is the first step and it involves investigating the issues to be studied in the region
- Participation of the population: the next step is to encourage the local population to participate in the program.

- Political, economic and legislative analysis: money wasting can be avoided if the company has the support of local authorities and politicians even though strategies have to be developed beyond limits.
- Definition of goals: this is the fourth step. This comes after the localization of issues, the support of the public and interest in participating.
- Definition of boundaries of the ecosystem: ecosystem boundaries are defined by scientists operationally. The constant changing character of the ecosystem does not allow rigid guidelines boundary delineation.
- Development of the plan: it is the result of various entities which cooperate and work together and provide the necessary information.
- Monitoring: monitoring programs determine whether the management actions are moving the ecosystem towards the desired conditions.
- Evaluation: this is the last step and all actions taken at every step of ecological management may be taken after evaluation or public awareness.

#### Individuals involved in ecological management

- The government
- Legislators, ministries
- The public
- Local authorities
- Agencies, Nongovernmental organizations
- Scientists, researchers, engineers and managers

There are certain parameters to follow for Ecological management to work:

1. The money spent on public relations to make the activities of environmental management known.
2. The amount spent on promoting the ecological consciousness of the staff.
3. The amount spent on environmental protection.

The finance of the company is another aspect to take into consideration. Profit and loss values are drawn and its components compiled in variable cost. There are different levels of profit, before taxes and after taxes. Balance sheet values, current

assets, fixed assets, debt and equity all have to be calculated. A number of indices are to be calculated which includes debt ratio, returns on sales, returns on capital and equity. Quality management tasks which influences output per employee, quality of products and cost of defects. Hourly salary for employees which impinges on the cost of labor per unit produced. The cost for research and development also triggers the intensity and level of process maturity.

LLC “SE Bordnetze – Ukraine” is a company that manufactures and sells wiring harnesses for cars. It’s mother company, Sumitomo wiring system was founded in 1917 as an electrical wiring manufacturer. The company has since grown into a leading global company in wiring harnesses for cars. The company has built a solid business foundation by adapting to changes over time and using technology prepared through its experience with electrical wires.

The auto industry is facing factors ranging from cars relationships with the environment and its role in people’s lives and expanding market in several countries. The company aims to push ahead with the expansion of new technologies and products with the customer in mind. The company aims to become a major supplier of wiring harnesses as its main product. SWS Group has three main targets and that is to strengthen their manufacturing abilities, enhance their strength in proposals and increasing commercialization of products and improving Human Resources and organizational abilities. SWS has the aim to achieve the “22VISION” – a management plan with a final target of fiscal 2022.

The company’s basic principle is to convey their commitment to the importance of all connections it is associated with and build trust in these connections and to establish very strong relationships. The company is also determined to carry out operations that connect to the future by connecting with customers, communities and people.

## **1.2. System of standards and international recommendations in the field of environmental management**

The phenomenon of environmental management starts with increase in human activities which puts pressure on the environment and affect the state of the environment and create environmental problems which in turn affects human activities. It is a cycle that has been going on for centuries.

The International Organization for Standardization (ISO, pronounced “eye-zoe”), is an international nonprofit federation of national standards organizations. It is based in Geneva but is not a member of the United Nations system. ISO was founded in 1946 when 26 delegates met to establish an organization to eliminate technical barriers to trade through “coordination and unification” of industrial standards. The first ISO standard was published in 1951--a reference temperature for industrial length measurement. (ISO n.a.; U.S. Environmental Protection Agency 1998) ISO has put forward more than 8,000 standards “for everything from paper sizes to film speed.” (EPA Standards Network 1995 p.1).

The purpose of the ISO is to develop standards, which are the “the specifications and criteria to be applied consistently in the choice and classification of materials, the manufacture of products, and the provision of services.” (ISO n.a.). These standards are intended to facilitate trade, exchange, and the development of technology, and to eliminate technical barriers to trade. The commitment of ISO members to engage in this system is part of a broader belief that economic and sustainable development depend upon the existence of an infrastructure for standardization (ISO n.a.). The ISO typically develops product standards, and historically has not developed standards for production processes. It does not have any environmental mandate, unlike some other international organizations.

4 ISO members are the national standards setting associations “most representative of standardization in its country,” with one member per country (ISO n.a.). These associations may be state agencies, public-private partnerships, private associations, or any mix of representation. ISO does not stipulate the structure or mandate for these bodies, but most member bodies have some type of government mandate (ICF 1997). The majority of national members are represented by

government or government-related agencies (Cascio, Woodside, and Mitchell 1996). The American National Standards Association (ANSI) is the US representative to the ISO. ANSI is financially supported by the private sector, with technical support from government. In 1995, the National Institute for Standards and Technology (NIST), an arm of the US government, signed a Memorandum of Understanding that recognizes ANSI's role as the US member body in the ISO (Subcommittee on Technology 1996 p.27). ANSI procedures allow for public interest participation in the standard setting process (Seifert 1998). The structure of ISO does not explicitly lay out formal roles for public, private, and nonprofit sector actors. Many national standards bodies do have rules about trying to balance different interests within the standards body, including government, industry, practitioners, users, and non-governmental organizations. All members are volunteers.

The ISO has three forms of membership—full voting members, plus corresponding and subscribing members that participate less directly or pay lower dues. The latter are generally held by countries that do not have a national standard setting system or are too poor to support full ISO membership. Not all countries have a national standards association, and therefore not every country is a voting member of the ISO. The ISO negotiating process is built on developing a consensus during negotiations, and it is open to participation by all interested parties. The rationale is that the final standard will not be useful in facilitating trade and production unless it is widely adopted. Market forces, in the shape of industries, must support the standard since it is entirely voluntary on the part of corporations. In addition, national regulatory systems also must support the standard. This requires full participation by national bodies, which represent a national consensus of industry and government on the content of a standard. One industry representative described the ISO process as “fantastically democratic”, although other observers would not agree. (Subcommittee on Technology 1996 p.91) The foundation of all ISO activity is the member associations. The ISO itself is simply an umbrella under which they negotiate. (Salter 1993-94) They are the bodies charged with communicating with interested parties in their home countries about standards issues and ISO activities.

They are expected to negotiate with domestic interests to develop a cohesive national position on proposed standards, and then represent that position at ISO negotiations. They are also expected to provide a secretariat to staff the committees and subcommittees that deal with the standards in which that association is most interested. The ISO Central Secretariat, which is relatively small, is financed by dues levied on member associations, in addition to the sale of standards and publications. Member associations are assessed varying amounts based on the country's GNP and trade figures. The Secretariat of each technical committee that develops a new standard is financed by whichever member body volunteers to staff and run it. Approximately 66% of the support for technical committees comes from the US, UK, Germany and France (Krut and Gleckman 1998 p.47). Any "experts" that participate in the standards development process typically pays their own way. In addition to facilitating the development of standards, the ISO also provides a number of related services. It established ISONET, a worldwide network of national standards information centers designed to provide information about standards, technical regulations, testing and certification activities. The ISONET generally also serves as the information center that each country must maintain under the terms of the Agreement on Technical Barriers to Trade of the GATT. ISO also provides training and consulting services, especially for developing country members, and usually works on these projects with the support of government aid agencies and industrialized country governments. ISO generates new standards through a long, complicated and highly decentralized process.

The detailed negotiations over the exact content of standards are carried out through technical committees, subcommittees and working groups. These are composed of representatives from industry, research centers, government, consumers, and international organizations. Industry is the agenda setter, source of all data, and driver of the process of standards setting. Each member body interested in a particular standard has a right to be represented on the relevant committee. International organizations typically take part in the work, and more than 500 international organizations are in liaison with ISO committees. Typically, a



particular industry sector identifies a need for new standards. A national association convinced of this need by its members will make a proposal to begin negotiations to the ISO Technical Management Board. If supported by two-thirds of the membership and at least five member associations are willing to participate directly, the ISO Board creates a new Technical Committee for the negotiations. The ISO defines the scope of the standard to be negotiated, usually through a working group of experts. The representatives of the national standards associations serving on relevant committees and subcommittees then negotiate detailed specifications and build a consensus on a draft standard. Committees meet regularly around the world when developing standards, and operate in accordance with specific rules of procedure for technical work. The Central Secretariat of the ISO facilitates communication and information flow among member associations, and coordinates technical committee and subcommittee meetings.

The committees aim to achieve a consensus on a draft standard. Since it is the members most interested in a standard who contribute to its development, a consensus on the final draft will be likely to be voted on positively by the full membership and later on widely adopted by industry and government. Their negotiations are supposed to be informed by discussions with manufacturers, vendors and users, consumer groups, testing labs, governments, engineering professions, and research organizations. However, standard setting is fundamentally intended to be industry driven. Non-industry interest groups and representatives from developing countries tend to have less of a presence than technical experts, industry representatives and members from industrialized countries. The committee presents its final draft standards to the ISO Central Secretariat, which submits it to the full membership for a vote. The standard is adopted if it is approved by 2/3 of the members that participated in its development and 3/4 of all voting members. All ISO standards are voluntary and their adoption and implementation are market driven. Typically, all standards are reviewed on a regular basis in order to see if further revisions are necessary.

The ISO 14001:2015 engulfs several topics with regard to environmental management systems which includes:

- Context of the company
- Leadership
- Planning
- Support
- Operation
- Performance evaluation
- Improve

There are 10 major areas of the ISO 14001:2015 revision which includes:

1. Expansion in EMS coverage and scope
2. Required interactions with external parties
3. New requirements for leadership engagement
4. Expanded legal compliance requirements
5. Need for risk – based planning and controls
6. New documentation requirements
7. Expanded operational control requirements
8. Changes in competence and awareness requirements
9. Impacts on the internal audit program
10. Increased certification costs

The documents required by ISO 14001:2015 (compulsory):

- Scope of the Environmental management system
- Environmental policy
- Risk and opportunities to be addressed and processes needed
- Criteria for evaluation of significant environmental aspects
- Environmental aspects with associated environmental impacts
- Significant environmental aspects
- Environmental objectives and plans for achieving them
- Operational control

- Emergency preparedness and response
- The records required by ISO 14001:2015
- Compliance obligations record
- Records of training, skills, experience and qualifications
- Evidence of communication
- Monitoring and measurement results
- Internal audit program
- Results of internal audits
- Results of the management review
- Results of corrective actions

The benefits of ISO 14001:2015 are many for companies with environmental management system. Some of the benefits companies enjoy are:

- Gain competitive advantage in supply chain design
- Increase new business opportunities
- Meet legal obligations
- Increase stakeholder and customer trust
- Improve overall environmental impact
- Manage environmental obligations with consistency
- Improve resource efficiency
- Reduce waste
- Drive down costs
- Provide assurance that environmental impact is being measured
- Gain competitive advantage in supply chain design

How to get ISO 14001 certificate?

Companies that adopt the ISO 14001 into their system are encouraged to transition to the 2015 version. Companies are given a three-year transition period to modernize their environmental management systems to the new standard.

Environmental policy

ISO 14001 environmental policy spells all intentions and direction of how the company will relate to its effect on the environment. It comes from top management, because it is a primary directive for how every person in the company will perform their job in relation to environmental impact. It is how both the employers and employees display their commitments to the company and how they can improve the impact made on the environment.

Environmental policy should have certain factors that are required to meet ISO 14001. Below is a list of ideas to address what needs to be included in environmental policy

Firstly, it has to be appropriate to the organization that wants to adopt the policy. The environmental policy needs to be appropriate to the environmental impacts of the company. The environmental policy should depend on the activities of the company.

Secondly, the policy should include preventing pollution. Another commitment that needs to be included as a basic part of the policy is the company to prevent pollution.

Another idea should be continually improving. One reason for implementing any management system is to identify the processes in order to improve them. Environmental policy expected to include a commitment to this concept of continual improvement in how the company's processes affect the environment.

Another idea is to comply with legal requirements. Every company has to comply with all legal requirements that is related to the company's environmental aspects.

There are three types of Environmental management system: a formal system which doesn't meet the ISO 1400 standards, an informal and formal system which meets the ISO 14001 standards. The effect environmental management system has on environmental performance and financial performance.

There are several opinions arguing that environmental management system inhibits the financial performance of a company. Other opinions suggest it harms both environmental performance and the financial performance. The effect on the

financial performance can be direct and indirect. The direct effects may be limit in resource usage and could lead to reduction in cost. The indirect effect may be advantaged marketing and a better image. Environmental management system can boost the reputation and attract customers. The introduction of a better option in bringing out products improves both the manufacturing and environmental performance. For the companies who are fully indulged in environmental management system practices, the financial gains are high with cost saving. Sometimes, the effect is not always good, financial performance may be improved but not so much for environmental performance. This is because the environment may be polluted to a certain degree because of the limitations put on the company but the damage is still there.

### **1.3. The role of the environmental management system in the development of an enterprise**

A lot of companies adopt environmental management system into its system because of the numerous benefits. Statistics was conducted to analysis the company that adhere to environmental management system and the companies that don't work with the system and it was realized that the companies that had adopted the system had competitive advantage and less legal problems that the other companies that did not.

Several laws have been put in place to limit the excessive damage done to the environment by industrial activities. A lot of customers have become environmentally aware and how patronizing companies that practice questionable methods makes them equally guilty.

For a company that wants increase profits, this can be a great tool. In 1992, Stead and Stead quoted "environmental management systems have emerged as a means to systematically apply business management to environmental issues to

enhance a firm's long- run financial performance by developing processes and products that simultaneously improve competitive and environmental performance”

Implementing environmental management system has become essential because it hinges the company's activities impact on the environment and making profits. Environmental management system makes companies responsible and helps them reduce waste. Companies can redesign products to reduce their impact. This can be achieved by a number of factors including reducing packaging and for SE Bordnetze – Ukraine, that includes replacing toxic materials with non- toxic ones. ISO 14001 is an effective tool to help companies to capitalize on reducing the cost of getting rid of waste.

The role of Environmental management system is to develop, manage and oversee a company's environmental activities to make sure the right procedures are followed.

According to Tibor and Feldman (1996), environmental management system has a lot of benefits to management including:

- Pointing out the legislative requirements and environmental aspects of the company's products and services to determine impact, objectives and the priorities of the company.
- It provides resources which includes personnel training to achieve targeted performance levels on an on – going basis.
- It helps to establish a management process to review and audit the environment management system and to point out the opportunities for improvement of the system.
- It helps to establish appropriate communications with important internal and external parties.
- It develops employee commitment to the environment with clear assignation of accountability and responsibility.
- It helps to establish policies and objectives with a disciplined process of achieving target performance levels while seeking improvement where necessary.

- It helps environmental planning throughout the full range of the organization's activities from acquiring raw materials to distributing the products.
- It facilitates planning, controlling and monitoring to make sure policy is complied with and remains appropriate for the organization.
- It helps to establish an environmental policy necessary for the company including a commitment to the preventing pollution.

The ISO 14001 defines five main stages of Environmental management system:

1. Commitment and Policy – it commits to environmental improvement and establishes the company's environmental policy because the foundation of environmental management system is policy.

2. Planning – a company first has to identify its environmental aspects of its activities. Environmental aspects include pollutants or hazardous waste which in this case will be the toxic materials used in producing the wiring harnesses.

3. Implementation – the company has to follow through with the action plan using its resources. Awareness among employees and their training is another important factor.

4. Evaluation – the operations are to be monitored to evaluate the outcomes. This is done to know whether targets are met or not.

5. Review – the results are reviewed to know if the environmental management system is working.

There are certain benefits that a company can enjoy when they adopt environmental management system. The benefits include:

1) a better strategy and documentation: the system spells out the details for the company to follow. The proper procedure to follow for the benefit of the company, the employees and the environment are all documented;

2) increase in regulatory compliance: it helps companies to become better rule followers. Following the ISO standards can help a company avoid all sorts of legal problems including fines, constant check-ups and in some cases, closing the

company down. Investors look out for companies without legal problems to invest their money and this can help the company;

3) a better environmental performance: the negative impact on the environment is little to non-existent when the operations carried out by companies are followed judiciously. The system helps companies be responsible. Exploiting the environment damages, it and even makes living difficult;

4) improvement of environmental awareness among the employees of the company: employees are usually the ones who are hands on in carrying out the company's activities. They are the ones who are directly affected when for example, hazardous and toxic materials are use and in another case, cause damage to the environment;

5) environmental management system gives the company a better image. Environmental activists have done a good job in educating the masses so now customers look for companies that practice good environmental management. A good name can bring more customers and therefore more financial profits;

6) there is competition for every business company no matter how good they are. They get an upper hand using certain tools and environmental management system is one of them. Using the system gives the company an advantage over other companies that being recognized by environmental protection agencies;

7) regulatory flexibility is another benefit. Regulatory agencies are less strict on companies that have adopted the system than the non- adopters.

8) environmental management system helps in reducing cost spent in manufacturing products. This can help save time and money.

There are certain blockades to implementing environmental management system

There are still people who doubt the effectiveness of environmental management system. According to such people, it does not improve financial performance. They therefore refuse to adopt the system. They also claim the cost of implementation is high.



The documentation and paperwork is also another issue people complain about. A research conducted revealed that it was hard to convince a company to add documentation to its system especially if it believes it's successful in maintaining compliance. The lack of resources for example, finances or capital can also be a barrier in implementing the system, that is, the time taken to understand the system. Apart from hiring consultants, there is also the issue of human resource allocation.

### **Conclusion to chapter 1**

This chapter describes the need for ecological management. It talks about why practicing ecological management is important. The methodology, elements, principles and all parameters needed for ecological management to work are described. It describes the corporate principles specifically to SEBN UA.

ISO 14001 is outlined, the documents, records and the benefits along with other systems of standard when it comes to environmental management are described in detail. The chapter talks about how to acquire the system of standard and environmental policy. The importance of implementing environmental management system and barriers inhibiting its implementation.

**CHAPTER 2. ANALYTICAL AND CALCULATION  
RESEARCH OF THE ECONOMIC ACTIVITY OF  
LLC “SE BORDNETZE – UKRAINE” FOR THE PURPOSE OF  
ECOLOGICAL MANAGEMENT**

**2.1. General characteristics of LLC “SE Bordnetze – Ukraine”**

SE Bordnetze belongs to the automotive industry. The main activity is the manufacture of cable and wire products for cars Volkswagen (VW Golf A7 (MQB)) and Audi (AUDI A4). The continuous cable network consists of structural modules and provides the car's electrical functionality, namely the electrical connection of components in the car, such as controls, headlights, turn signals, relays, etc.

SE Bordnetze-Ukraine does not sell its products in Ukraine, that means the company has no competitors in Ukraine. The company has only one customer, Volkswagen with headquarters in Germany. Raw materials are supplied here from abroad and products are made according to the quantity of the set plan.

Sumitomo Electric Bordnetze GmbH plants operate in 15 countries around the world: Germany (Wolfsburg (head office), Ingoldstadt Emden, Stuttgart), Spain (Arazuri), Poland (Gorzow), Czech Republic (Mladá Boleslav, Kvasiny), Slovakia (Nitra, Brati), Belgium (Brussels), Moldova, Ukraine (Ternopil, Chernivtsi, Chortkiv), Bulgaria (Karnobat, Mezdra), Romania (Caransebes), the Russian Federation (Nizhny Novgorod), Morroco (Tangier), Tunisia, Mexico, China.

The organizational management structure of SE Bordnetze-Ukraine is of the hierarchical type, the abstraction of which was formulated by the German sociologist Max Weber, who developed a normative model of rational bureaucracy based on the following principles: clear division of labor; hierarchy of management; the presence of formal rules and regulations; hiring is carried out in accordance with the qualification requirements for the position. Such principles are typical for SE Bordnetze–Ukraine.

The management of SE Bordnetze–Ukraine includes: technical director (subordinate departments of planning, production, logistics, quality) and chief financial officer (under his authority are the departments of personnel, information technology, finance).

For market relations that have come up not long ago, a totally new plan of action for production activities and long-term development of enterprises has become distinctive. SE Bordnetze-Ukraine is no exception in this process. In the center of this master plan is the principle of designing a plan of economic development that would allow for the rational production of products or services at the lowest cost.

The company imports and exports to many countries including China, France, Germany, Morocco and Switzerland to name a few. It includes approximately 331 subsidiaries and affiliates in more than 33 countries around the world. The total number of employees exceeds 180,000. The shareholders of the Sumitomo Electric Bordnetze are the Sumitomo Electric Industries with 60% and the Sumitomo Wiring Systems with 40%.

The company supports its employees with activities like internal training courses, health programs, trainee positions for university graduates and projects for employees studying to obtain a degree.

The company branch in Ternopil operates in Baykivtsi, where 3500 people are employed and also has another branch in Chortkiv which opened in 2016 and employs 1600 people. The Chernivtsi branch was opened in 2013 and has 1300 employees and in 2018, the Khmelnytsky branch was opened with 450 employees. The company is one of the first companies to introduce free health insurance to its employees. It is one of the largest employers in Ternopil due to its excellent personnel policy. Work at the company takes place in shifts. Because of the continuous production, a three shift work schedule has been established.

Vision 2022 - the company has pledged to form value that contributes to social well-being by influencing the diversity and strength of their products and technologies in the automotive, industrial materials and info communications. It

aims to create a better society by growing three core areas: mobility, energy and communications. The concept is to contribute to a better society by using their expertise in connectivity and transmission technologies through the efforts of the whole group.

Enhancement of the five business segments: The Group strives for segments centered on mobility, energy, communication fields along with materials, products and solutions.

Types of economic activities at LLC “SE Bordnetze – Ukraine”:

- Production of insulated wire and cable
- Manufacturing vehicles and equipment
- Production of electrical equipment
- Wholesale of car parts and accessories
- Retail trading in car parts and accessories
- Wholesale trading cycles

Below are some of the products produced by SE Bordnetze – Ukraine

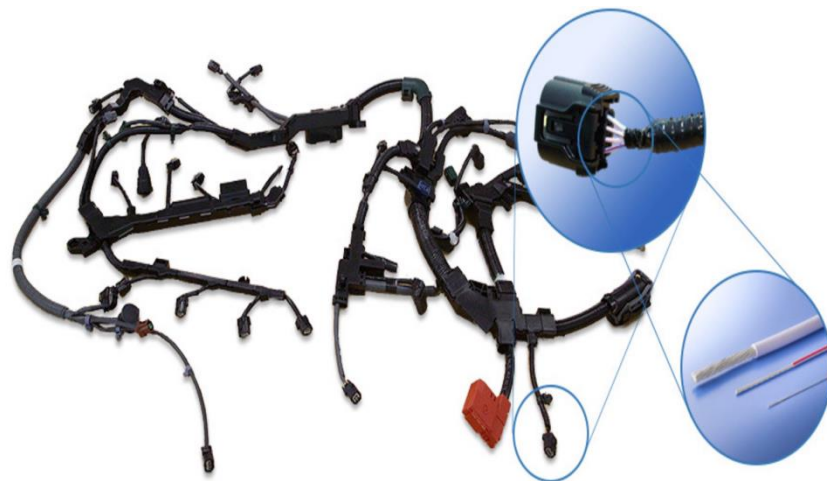


Fig. 2.1. Aluminum harness

Source: SWS.Co.jp

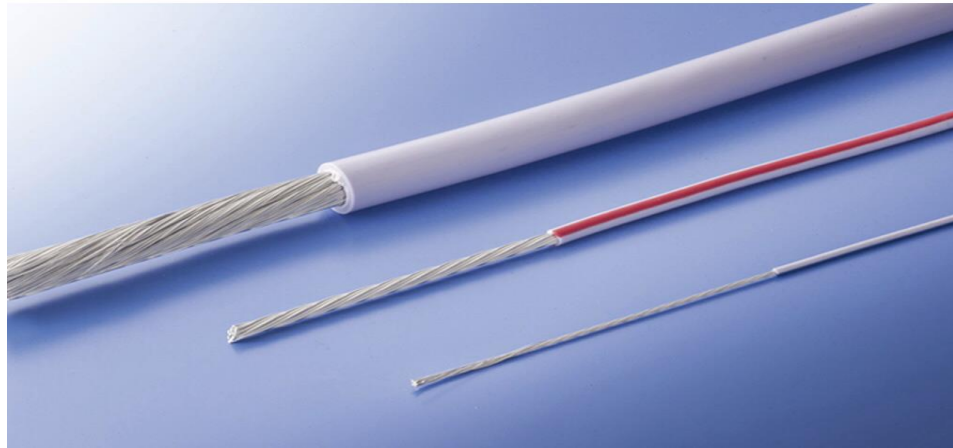


Fig. 2.2. Aluminum Electric wires

Source; SWS.Co.jp

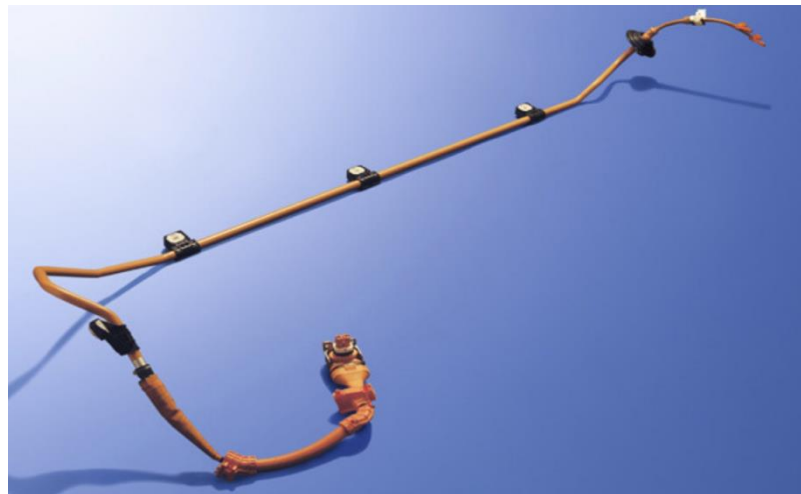


Fig. 2.3. Under floor pipe harness

Source; SWS.Co.jp

The company accepts the quality of products as a set of its properties that characterize the degree of ability of this product to meet the needs of consumers in accordance with its intended purpose.

## **2.2. SWOT-analysis of the industrial and economic activity of the investigated enterprise**

SWOT-analysis is a tool used by companies to plan strategically with the use of certain parameters. It consists of four variants, two favorable and two unfavorable internal and external issues in an analysis grid. It helps the company to use its strength to explore new opportunities and understand how weaknesses can cause the company to become stagnant or increase threats. SWOT analysis was first described in 1969 and has since become a major tool in improving decision making.

SWOT-analysis is used by a lot of marketing researchers, business marketers and students. It is one of the most significant and prevalent tools of strategic planning. In 1999, it was ranked as one of the highest ranked set of tools and analysis techniques in the United Kingdom. SWOT-analysis is used in almost every published business case.

SWOT stands for (fig. 2.3):

- ✓ S-strengthen
- ✓ W-weaknesses
- ✓ O-opportunities
- ✓ T-threats

<p><b>Strengths</b></p> <p>Characteristics of a business which give it advantages over its competitors</p>	<p><b>Weaknesses</b></p> <p>Characteristics of a business which make it disadvantageous relative to competitors</p>
<p><b>Opportunities</b></p> <p>Elements in a company's external environment that allow it to formulate and implement strategies to increase profitability</p>	<p><b>Threats</b></p> <p>Elements in the external environment that could endanger the integrity and profitability of the business</p>

Fig. 2.3. A SWOT Analysis Matrix

STRENGTHS OF SE BORDNETZE UKRAINE

SE Bordnetze has a global presence with branches operating in about 15 countries. This will help the country increase productivity and profits. The enterprise also pursues a policy of cost optimization and at the same time pay attention to the requirements of quality services and products. Another strength of the company is the development of partnership with other companies. Since Golf VW was introduced, SE Bordnetze has also taken steps to develop a partnership with VW and their partnership is built on trust and reliability. The company is reliable and professional in their dealings; their certified project managers relate with the customers professionally. The company is reliable because of their product quality and speed of delivery. In 2014, the company received the international industry of conformity ISO / TS 16949:2009.

SE Bordnetze-Ukraine is an organization with high standards and transparency of production. Because of this, they are constantly improving and adapting to any change that comes their way. The company has been operating for years because of their flexibility and adaptability. The quality of their products and services are good because of the advanced training of their suppliers, this promotes the development of the quality management system of the supplier. Active customer service is another strength of the company, they are in constant communication with their customers and respond quickly to the complaints of their customers to fix the problem.

#### WEAKNESSES OF SE BORDNETZE UKRAINE

SE Bordnetze-Ukraine operates with the hierarchical type of organizational management structure and although it has its advantages, it also has its disadvantages. The hierarchical structure can create problems as bureaucracy slows things down in the case of decision making and taking action. This is because communication must travel up and then back down the chain of command. The centralization of power is also another problem. For example, a local manager in SE Bordnetze branch in Ternopil may be caught up in the daily operations and make all the decisions even though the employees may be the best people to handle the case

since they are closer to the situation. The manager may take advantage of the situation and become territorial. Employer-employee relationship is another issue, this is due to certain factors like inability to take initiative and disconnect from top level management.

#### OPPORTUNITIES FOR BORDNETZE UKRAINE

In Ternopil, the company is one of the highest employers with over 4000 employees. This lays foundation for them to open more branches in Ukraine and expand the company. Electric cars are the future of motoring and the company has technologies building on this. The company is also working on self-driving cars which is gradually becoming the new phase of motoring. A recent report by ING claimed that in 2035, every car it produces will be electric. The company can advantage of the evolution of automobile technology to become more successful. Many people prefer products that are better for the environment. Electric cars are better than conventional cars because they generate lesser emissions.

#### THREATS TO BORDNETZE UKRAINE

The wiring harness world has serious competition. Because of this, company overview, company total revenue, market potential and the company's global presence is important. Sales and revenue generated, market share, product launch and price should also be taken into consideration. Yazaki Corporation and Furukawa Electric, two vehicle wiring harness companies have given serious competition to SE Bordnetze over the past few years.

*Table 2.1*

**The SWOT-analysis of SE Bordnetze – Ukraine**



<b>Strengths</b>	<b>Weaknesses</b>
<ol style="list-style-type: none"> <li>1. Global presence with branches in about 15 countries.</li> <li>2. Partnership with other companies (VW).</li> <li>3. One of the largest employers in Ternopil with over 4000 employees.</li> <li>4. One of the top automotive wiring harnesses manufactures in the world</li> <li>5. ISO/TS 16949 certificate holder</li> <li>6. Major supplier to Volkswagen and Audi.</li> </ol>	<ol style="list-style-type: none"> <li>1. Hierarchical type of organizational management structure (bureaucratic)</li> <li>2. Strained employer- employee relationship.</li> <li>3. Employees cannot take initiative since everything has to go through the chain of command.</li> </ol>
<b>Opportunities</b>	<b>Threats</b>
<ol style="list-style-type: none"> <li>1. Increasing interest in technology based on electric cars for eg. Self-driving cars.</li> <li>2. Competitive advantage over other automobile companies because electric cars are safer than conventional ones.</li> <li>3. The company can take advantage of the partnerships and connections to further expand the company to open more branches.</li> </ol>	<ol style="list-style-type: none"> <li>1. Taxes on raw materials the wiring harnesses which are supplied from abroad.</li> <li>2. Serious competition from companies like Yazaki corporation and Furukawa Electric.</li> <li>3. Raw materials are not readily available.</li> <li>4. The company has monopoly in supplying wiring harnesses to Volkswagen and Audi but if other companies begin to supply them also, the company may face difficulties.</li> </ol>

### **2.3. Research of the factors influencing the ecological management introduction at an enterprise**

There are several factors that will make a company adopt an environmental management system. Implementing an environmental management system goes hand in hand with the accomplishment of the goals according to the order of priority including preserving the company's current and long-term competitiveness. The system heightens the responsibility of the company with the production of safe and toxic free products and the wise use of natural resources with technologies that are environmentally safe.

There are direct impact factors that influence the introduction of ecological management including: the customers, the company's competition with other companies, labor resources and the law and state regulatory services.

The indirect factors are usually external and it includes: the economy, the political- legal factor, the environmental situation, the response and relationship of the company with the inhabitants of that settlement, international factors, the education and cultural factors of the people and social factors to name a few.

Organizational factors that influence ecological management in SE Bordnetze-Ukraine are the organizational structure of the company – SE Bordnetze-Ukraine is hierarchical, the size of the company, the quality management of the company and the result of the ecological audit.

The educational and cultural factors are the qualification and expertise of the employees, the information system and the ethics of entrepreneurs in cultural and professional field. The ecological factors that influence the introduction of ecological management are acquiring the ecological certificate, the condition of the company's premises and workplace, the ecological norms and ecological advantage. The political- legal factors are the funds of the company, the changes in legislation and organizational processes.

There are risk factors that influence a company's decision to introduce ecological management, factors like financial loss through fines, legal problems and closure of the company, market risk, production of services, the legislation involving the environment, the dynamics of the environment and technological factors.

Mixed factors like external assessments, interactions among people, the interest of people in preserving the environment and scientific progress. For most companies, the pressure from the government, their customers and various stakeholder groups trigger them to effectively incorporate sustainability into its activities.

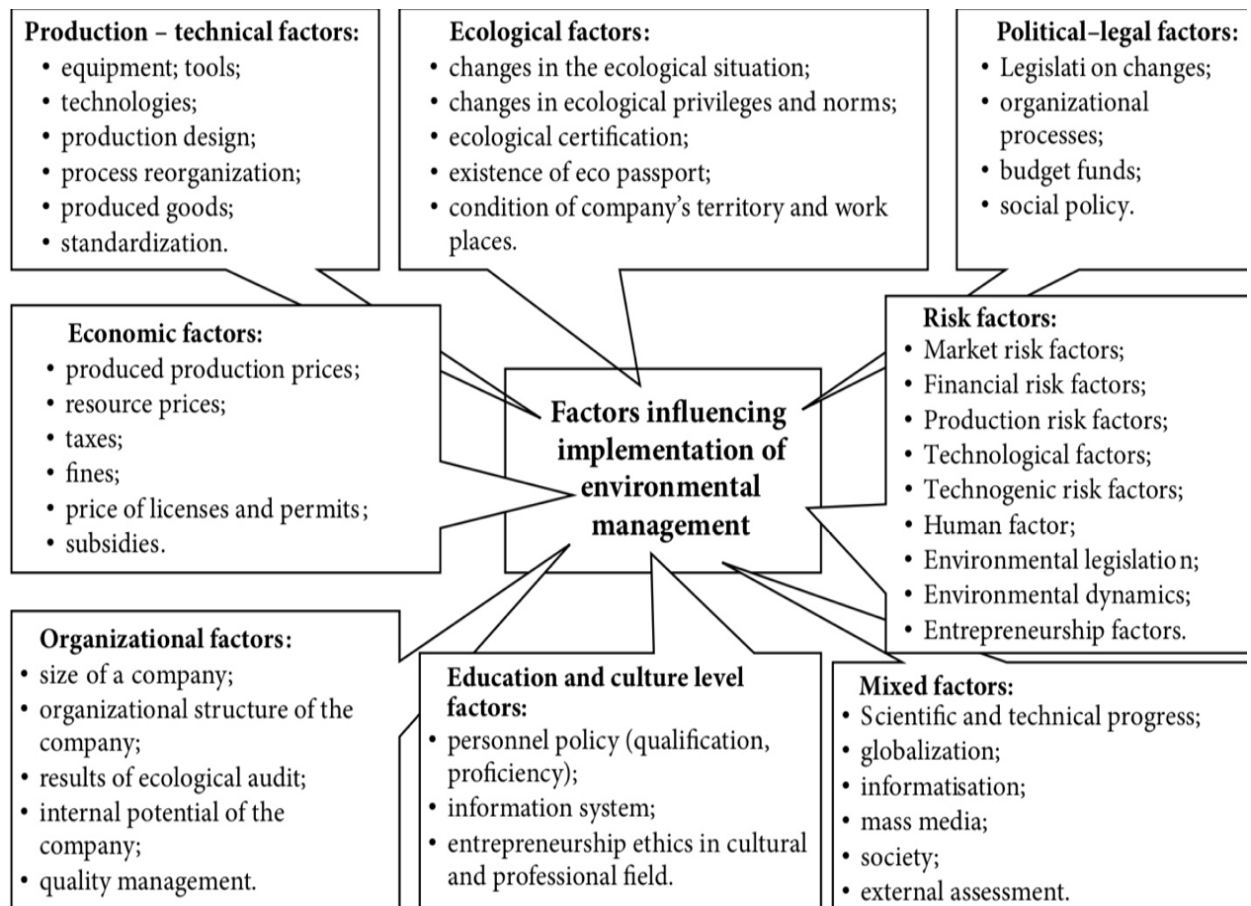


Fig. 2.4. Figure showing the factors that influence a company to adopt the environmental management system

Source: Article text (2)pd

The laws that govern health and safety, employment, discrimination and permission to certain processes and procedures have an effect on how much a company spends and its need for products. Influence from the media and the desire to preserve the company's image can be a factor that can influence the company to adopt ecological management.

At SEBN, the introduction of ecological management has reduced bureaucracy by putting an end to the duplication of policies and procedures.

Another factor can be the desire for the company to appear “perfect” so that stakeholders will be attracted to the company. Stakeholders like investors, Non-governmental organizations, suppliers, the media, shareholders and trade associations all have an influence on a company’s performance. Standardization plays a role too; every company is encouraged to adopt ecological environmental.

It has become a requirement and companies that have the old versions of the environmental management system are encouraged to transition to the new version.

## **Conclusion to the chapter 2**

Chapter 2 describes the peculiarities of SEBN and its activities. The type of organizational management structure and management are briefly discussed. The economy activities and products made by the company are discussed. The strengths, weaknesses, opportunities and threats(SWOT) were analyzed. The factors influencing the implementation of environmental management was also discussed.

**CHAPTER 3. PROJECT AND CALCULATION  
DEVELOPMENT AND IMPLEMENTATION OF THE  
ENVIRONMENTAL MANAGEMENT SYSTEM  
AT THE LLC “SE BORDNETZE – UKRAINE”**

**3.1. Conceptual bases of process of implementation of environmental management system at an enterprise according to ISO14000**

The basic international standard in the field of environmental management is the standard ISO 14001: 2004 «Environmental management system. Specification with guidance for use ». In Ukraine this standard is known as DSTU ISO 14001: 2006 “Environmental Management Systems. Requirements and guidelines for application”. It is the only official international instrument that contains requirements that can be verified by an external audit organization for certification. Compliance with the standards of ISO 14001: 2004 and DSTU ISO 14001: 2006 allows the establishment of an environmental management system suitable for independent assessment of compliance with certain criteria, certified by a certificate that certifies the existence of an appropriate environmental management system at the enterprise.

At the heart of EMS functioning is a cycle (Deming's circle) of repetitive cycles, aimed at the consistent improvement of the system as a whole (Fig. 3.1). The model symbolizes the requirements for the improvement of the environment and the constant rise to a higher degree.

From the figure it is clear that the creation and improvement of EMS consistently covers several important stages, every of which solves certain tasks, requires various resources (material, financial, information, time, staff, documents, etc.), and is characterized by efficiency.



Fig. 3.1. Deming Cycle

It is clear that the core of the process is implementation. However, the previous stages are of no less significance. The *planning* is focused on the identification of the main environmental aspects of the company's activities and presents a detailed program of EMS. Doing or performing checks and corrective actions is a stage that allows timely detection and correction of errors. The evaluation of the effectiveness of the EMS is the final stage of the cycle and is all about the analysis by the management, the findings of which are used to improve the system and its individual elements.

The EMS implementation at the enterprise is a 5-step process:

The stage name	Description of actions
<b>I. Preparation</b>	1. Senior management’s decision about the introduction of the EMS, determining the scope of coverage of the planned EMS, and the feasibility of engaging a consultant. 2. Training of specialists for the introduction of EMS, especially if the assessment of the initial situation is carried out by the enterprise itself.

<b>The stage name</b>	<b>Description of actions</b>
	<p>3. Assessment of the initial situation: the establishment of compliance of the current environmental management system with the requirements of DSTU ISO 14001: 2006 (ISO 14001: 2004), as well as an assessment of the environmental impact and compliance with environmental legislation, the identification of priority environmental aspects.</p> <p>4. Creation of a working group on environmental management.</p> <p>5. Development of the program (plan) for the introduction of the EMS.</p> <p>6. Development of a system of standards regulating the use of procedures related to EMS</p>
<b>II. Planning</b>	<p>7. Development of ecological policy, bringing it to the personnel of the enterprise and interested parties.</p> <p>8. Identification of environmental aspects of activity that are of prior importance.</p> <p>9. Formation and maintenance of a register of legislative acts and other requirements for environmental protection activities.</p> <p>10. Development of target and planned environmental indicators, as well as internal performance criteria.</p> <p>11. Development of environmental protection programs</p>
<b>III. Implementation and functioning</b>	<p>12. Formation of the organizational structure of the EMS.</p> <p>13. Organization of the education system.</p> <p>14. Studying documents related to the implementation of the EMS.</p> <p>15. Organization of the system of information exchange.</p> <p>16. Preparation for emergencies.</p>
<b>IV. Control and corrective actions</b>	<p>17. Monitoring and measurement.</p>

The stage name	Description of actions
	18. Carrying out inspections and developing corrective actions. 19. Management of registered data. 20. Organization and conduct of internal audit of EMS
<b>V. Analysis of the system by the management</b>	21. Analysis of the system by the management

### **I. Preparation Stage:**

*Decision made by the senior management.* Taking a decision in favor of the development and implementation of an environmental management system, managers come from both its financial advantages (saving resources and means, improving production efficiency, developing potential market opportunities) and in terms of reducing the risks associated with inadequate attitude to the environmental aspects of the company's work. The system will radically allow to make the situations better. This includes coverage of accidents, sanctions of regulators, difficulties in attracting new, primarily foreign, investors and clients i.e, in obtaining a bank loan, loss of markets, etc.).

Thus, the main condition for making a decision about the introduction of EMSs by senior management is to understand that in order to maintain its position in business, the enterprise should take into account environmental requirements in shaping the strategy and long-term planning.

The decision of the senior management can concern both the whole enterprise and its separate units. At the same time, the introduction of EMS at separate units is carried out either to receive a certificate for the production of a particular type of product, or to implement a pilot project.

After the management of the company decided to create an EMS in accordance with the requirements of international standards, it is necessary to understand whether the company can implement this system independently or it is necessary to involve the consultants.



*Training specialists for the EMS introduction.* The need of the organization for trained personnel on environmental management and organizational structure is determined first by the fact that the system of environmental management needs to be maintained in a working condition, continuously improved, periodically presented to different controlling bodies. Second is that the urgency of environmental issues is constantly increasing – in the work of each person – from a senior manager to an ordinary employee. Thus, the awareness and competence of all staff is one of the key requirements of ISO 14001.

Educational programs in the field of environmental protection and resource conservation should be targeted at workers of all levels including senior management, specialists of the middle level and workers of all specialties. This need is due to the fact that, at the stage of development and implementation of the EMS, all staff should realize their responsibility for the impact of their activities on the environment.

The basic stages of personnel training and their competence cover the definition of the need for education, the development of programs, the direct learning (internal and external) and the assessment of training effectiveness. The training program is determined by the level of the staff. All personnel are divided into groups, each of which has a specific training plan depending on the nature of the activity and the level of responsibility.

Typical training programs should include the following questions:

- general information about EMS, general idea about requirements of DSTU ISO 14001: 2006;
- the existing state of the environment at the enterprise;
- environmental aspects of activity and environmental impact;
- anticipated benefits from the introduction of EMS;
- characteristic of the main elements of the EMS;
- existing structures and management approaches;
- EMS implementation plans;

- resources required from the enterprise to implement the EMS;
- ways to continuously improve effectiveness of EMS.

Such an approach to training and qualifying the personnel will increase the general culture of production, understand and feel the responsibility of all employees of the company for the success of the functioning of the environmental management system.

*Evaluation of the initial situation.* In the process of evaluation, the following tasks are put forward:

- estimation of the initial state of environmental activity of the enterprise;
- identification of priority of ecological aspects and development of preliminary recommendations for prevention of negative environmental impacts;
- analysis of the resources necessary for the implementation of the EMS and the indicative cost-effectiveness of the EMS activities.

In general, the main areas of study of the initial situation are as follows:

- requirements of legislative and normative acts;
- ecological aspects of activity of the enterprise, its products, services;
- compliance with requirements of standards, regulations, rules and norms;
- existing practices and procedures for environmental management;
- existing policies and business procedures for the execution of contracts, supplies;
- realization of feedback on the results of audit;
- possibilities of providing advantages in competitiveness;
- stakeholder evaluation;
- functions and activities of other organizational and technical systems that may contribute to or impede the improvement of the environmental characteristics.

*Creating a working group.* Practice shows that for a medium or large enterprise it is necessary to equip the working group with 3-5 specialists for a full term of up to one year. At small enterprises, one or two persons can engage in this

work (at 50% of the time during the working day). It is believed that on average, one person per 200 employees is required to carry out work on the introduction of EMS.

At the initial stage, a group of environmental management is usually part of the relevant environmental unit of the enterprise. Gradually, with the implementation of the provisions of the EMS group of environmental management transformed into EM service.

*Development of the EMS implementation plan.* The group of environmental management (in cooperation with the consultant) is developing a plan for the implementation of the EMS, which should be approved by senior management, determines the sequence of actions, presupposes the involvement of specialists, managers of the middle and lower levels of units, takes into account existing development programs of the enterprise.

*Development of the internal standards system.* A special role in the positive decision of the problem of the introduction of EMS at the enterprise belongs to the internal standards, which are developed and approved by enterprises themselves. The number of standards should not be too large to allow for the adoption of independent environmental decisions. On the other hand, they should not be too small, so as not to diminish significance and control. The most expedient number of documents and standards is 20-25.

Following is the list of recommended environmental management standards at the enterprise:

- “Guide to EMS”;
- “Identification of environmental aspects”;
- “Identification of legislative and other environmental requirements”;
- “Target and planned indicators. Environmental Management Program”;
- “Responsibility and authority. Organizational structures, regulations on structural subdivisions, job descriptions. Order of development and design”;
- “Human resources. Training and qualification improvement of personnel”;

- “Internal and external communications”;
- “Document Management. Substantive provisions”;
- “Document Management. Procedure for consideration of draft standards, specifications and other normative documents on standardization”;
- “Operations Management”;
- “Organization of Production Environmental Control”;
- “Infrastructure. Maintenance and repair of equipment”;
- “Procurement”;
- “Preparedness and response to emergencies”;
- “Organization of ecological monitoring”;
- “Management of monitoring and measurement tools. Means of measurement. Inspection, calibration, repair, operation, accounting and storage”;
- “Management of Means of Monitoring and Measurement”;
- “Inconsistencies. Corrective and preventive actions”;
- “Management of environmental records”;
- “Internal audit”;
- “Analysis of the functioning of the CEM from the leadership”.

At the same time the initial development is subject to half of the required standards, the rest assume correction of existing.

Mandatory generalization document governing the introduction of EMS, is “Guidance for EMS”, the size of which should not go beyond the 35-40 pages, otherwise the document becomes unreadable.

Typically, the Guide to EMS includes a description of the distribution area of the environmental management system, provides a brief ecological characteristics of the objects that are part of the certification, describes the responsibility and authority of the management of the company within the EMS, and gives a brief description of all elements of the system and their interactions. As an appendix to the Guide, there may be given: the administrative structure of management in the

enterprise, the matrix of responsibility distribution in the EMS, environmental policy, a list of basic EMS documents, indicating their place of storage.

## **II. Planning Stage**

In the overall cycle of the creation of EMS the first step, preceding the work of planning, is the formulation of the environmental policy of the enterprise.

According to ISO 14001, environmental policy is an organization statement about its intentions and principles related to its overall environmental performance.

Environmental policy is a document (no more than a page) having read which, one can understand which production is aimed at, the main activities of the enterprise, which ecological are to be conducted by the team of the enterprise and which principles are there for achieving them.

The development of environmental policy is carried out by the working group of the EMS, however the document can be corrected and improved by all the enterprise personnel.

The text of the formulated and approved ecological policy should be placed at the prominent place of each unit of the enterprise.

*Environmental aspects of the enterprise.* Identifying environmental aspects is one of the most difficult stages. The environmental aspect is an element of the enterprise, its products and services, which can interact with the environment, that is, to change the parameters of its quality.

Identification of environmental aspects and assessment of associated impacts is carried out in several stages. At the first stage, a selection of activities, products or services that have an impact on the environment is carried out. Then, for the chosen type of activity, environmental aspects associated with it are being determined as much as possible, for example: atmospheric air pollution, emissions of electricity; sequestration of water resources and sewage; waste generation; possible emergencies. After that, the definition of the maximum number of impacts (negative and positive) on the environment, which are associated with every identified environmental aspect, is carried out.

The identified environmental aspects need to be formulated in a common list – a register of environmental aspects, on the basis of which the specialists of the EMS group should form questionnaires for the work of the commission on the allocation of priority environmental aspects. It is recommended that a priority assessment should be performed using the expert judgment method. Selected most important environmental aspects should be listed on a separate list. It is on their basis that the environmental goals and objectives of the enterprise will be determined.

*Register of Legislative Acts.* The operation of the EMS at the enterprise prescribes compliance with all legislative and regulatory requirements in the field of environmental protection. In this connection it is obligatory to compile a register of legislative requirements and environmental aspects of the enterprise, its products and services, as well as a register of normative documents.

Legislative acts include: international legal acts, laws of Ukraine, decrees and orders of the President, resolutions of the Cabinet of Ministers, legal acts of branch, departmental and corporate nature, legal acts of local authorities.

The normative documents include: interstate and state standards, hygiene standards, sanitary rules and norms, building codes and rules.

*Table 3.1*

**An example of registering the legislative requirements and regulatory documents**

Type of a document	Title of a document	Number, the document date of approval, the date of the last document edition
<i>1</i>	<i>2</i>	<i>3</i>
...	...	...
...	...	...

*Development of target and planned environmental indicators.* Targets are a quantitative characteristic of EMS goals for a certain period of time. All targets should be based on environmental policy. Scheduled indicators are a quantitative description of tasks.

The document with the finally developed target and planned indicators is called “the note of target and target indicators” and is approved by the head of the enterprise.

Established target and target indicators, documented, serve as the basis for drawing up environmental protection programs.

*Development of environmental protection programs.* The program of environmental measures is a complex of technical and technological measures aimed directly at reducing the harmful impact of environmental aspects of the enterprise activities on the quality of the environment, as well as organizational measures to improve the environmental monitoring system, organization of the environmental education system, development of the required environmental documentation.

The Environmental Action Program is a guideline for action, which specifies people, time frame, expense resources and plan of action.

The development of programs must involve all structural divisions of the company, the plans of the activities of these units are the basis for the development of the program for the enterprise as a whole.

*Table 3.2*

**Form of the action plan of the structural unit**

The Name of the environmental activity	Planned expenses for the current year	The source of funding	Terms of activity		Person in charge	Expected outcomes
			start	finish		
...	...	...	...	...	...	...
...	...	...	...	...	...	...

The program, performed in accordance with current requirements, is approved by the management of the enterprise.

**III. The stage implementation and functioning of the ecological management system:**

*Formation of organizational structure.* The best structure is a specialized management service whose leader is at the same rank as the deputy director or deputy chief engineer. The responsibilities of the group (bureau) of the EMS include solving the following issues:

- training, staff awareness (personnel training with specially developed programs);
- internal and external connections (creation of internal connections between structural units, as well as coordination of external relations with stakeholders on environmental issues of the enterprise);
- development and management of documentation in the EMS (including the development of enterprise standards under the system of environmental management);
- audit of the EMS (the procedure for conducting internal audits is established in order to confirm the effectiveness of the operation of the EMS).

An important element of this stage is the formation of a liability distribution matrix in the EMS.

*The organization of the education system* should be aimed at changing the attitude of workers to environmental problems, the education of their ecological consciousness, as well as information possible ways and methods of reducing environmental impacts.

All technical staff of the enterprise, involved consultants, specialists of related organizations, and superior enterprises participate in the training process. Learning programs differ in this way. It is expedient to organize the training of the average managerial staff and specialists in an active form (seminars and practical classes are more appropriate than lectures). The most appropriate way to train employees is to train them in the workplace.

*Table 3.3*

### **Types of training in the implementation of EMS**



People involved in training	Type of training	Purpose
Enterprise superiors	Review course on the strategic importance of environmental management	Obtaining knowledge and skills in forming an environmental policy of an enterprise, information about new laws and regulations
All staff members	Basic course on environmental protection, foundations of ecological management	Obtaining knowledge about the policy, goals and objectives of the environmental protection, raising a sense of responsibility
Personnel responsible for environmental protection activities	Improvement of qualifications, participation in workshops on exchange of experience	Increasing the level of knowledge of specific issues, obtaining updated information about changes in standards
Personnel whose functions are related to environmental problems	Short supplementary training programs, current information on the introduction of EMS	Introduction to normative acts and internal requirements

*The process of documentation.* The EMS documentation must be informative, easy to review and contain a description of all procedures relating to its development, approval, use, viewing and storage.

The developed documents go in accordance with the relevant officials of the environmental management service. The directors, chief engineer, head of the EMS, director of activities within the limits of the designated authority have rights to approve EMS documents.

<b>I level</b>
Ecological policy, director's orders
<b>II level</b>
Guidance on EMS, orders of Chief Engineer, head of EMS, regulations
<b>III level</b>

Enterprise standards, job descriptions, technological instructions. Decisions of the heads of structural divisions
<b>IV level</b>
Environmental records: records of meetings, assemblies, analysis, acts of inspections, passports, magazines, information, registers, reports, certificates, questionnaires, state standards, etc.

Fig. 3.2. The structure and level of the EMS documentation

*Organization of the system of external and internal communications.*

Communication processes in the field of environmental management are divided into internal (between employees of the enterprise) and external (between the enterprise and the external environment). Under communications, in this case, we understand the relationships that arise between people in the process of information exchange related to the activities of the enterprise in the field of environmental management.

One of the forms of external communications is the dissemination of environmental reporting which reflects the planning, organization and evaluation of the actual effectiveness of the EMS, including negative results. The methods of submitting an initiative environmental report may be different: the publication of newsletters, materials in the media, running a webpage on the Internet, etc. The most common form of environmental reporting is the annual initiative report, the form, content, methods and areas of distribution of which are determined by the enterprise.

The management of internal operations and processes that have the greatest impact on the environment goes through the following documents: enterprise standards; technological instructions; provisions on the environmental safety of the enterprise; job descriptions, etc. The plant must also establish rules for the environmentally safe storage, transfer, transportation and use of chemicals, raw materials, materials and waste containing harmful substances.

*Preparation for emergencies.* The enterprise is expected to develop a special procedure for the prevention of emergencies that may occur in the implementation of production processes, which may have a significant effect on the environment. This procedure should be documented and approved by the management of the enterprise in the Regulations on the system of environmental safety management, in the standards of the enterprise “Preparation and Response to Emergencies”, and it should be listed in typical accidents that have a negative impact on the environment and their environmental aspects.

The enterprise should keep records of all accidents and disasters that arose to analyze the causes and consequences of these situations and elaborate a plan of action for their elimination and preventive measures. *Disaster Elimination Plans* should be constantly reviewed, corrected and updated.

It should be especially noted that the elimination of the consequences of emergencies or the reduction of their scale, as well as the reimbursement of losses caused by these consequences, are associated with significant financial costs for the implementation of compensatory measures, which requires the establishment of a mechanism in search of sources of free financial funds.

One such mechanism in a market economy is the insurance system (including environmental), which performs a number of important functions: protection of entrepreneurs from economic losses, protection of economic interests of citizens, as well as social protection (state-initiated programs of social rehabilitation, the elimination of the consequences of environmental disasters, etc.). Extremely widespread are claims for compensation for damage to the environment, imposed by public authorities.

#### **IV. The stage of control and corrective actions**

*Monitoring.* Environmental monitoring is carried out to assess the quality and identify changes in the environment that are a consequence of the negative impact of the enterprise, as well as taking measures to eliminate deviations from the existing regulatory and methodological and other legislative ecological requirements.

The tasks of environmental monitoring are:

- real assessment of the current environmental situation;
- analysis of changes in the quality of the environment;
- observation of parameters of the main sources of environmental pollution;
- assessment of the effectiveness of environmental measures on the criteria of the quality of the environment;
- registering information in order to track compliance with target and target indicators;
- prediction of possible changes in the future.

The main objects of environmental monitoring in the enterprise are raw materials, reagents used in production, sources of waste generation, sources of pollutant emissions into the air, sources of discharges of pollutants in surface water, waste gas treatment systems, areas of temporary storage of waste. In addition, the objects of environmental monitoring production include finished products, as well as components of the natural environment in the zone of influence of the enterprise.

The system of environmental monitoring covers all structural subdivisions, carried out by the personnel of the enterprise and ecological service.

A group of environmental monitoring should address the following tasks:

- controlling compliance with the requirements of normative and technological documentation (technological instructions, production and technical instructions) in the production processes of the divisions of the enterprise, associated with significant environmental impacts;
- taking into account the nomenclature and the amount of pollutants entering the environment from the divisions of the enterprise;
- controlling the stability and efficiency of environmental equipment;
- controlling the ecological safety of products;

- carrying out the control of emissions to the atmosphere, wastewater discharges, water consumption and drainage directly at the boundaries of the technological process to assess compliance with the standards;
- monitoring the compliance of the company's units with the established environmental impact standards and waste placement limits.

Responsibility for organizing and conducting environmental monitoring at the enterprise is put on the Chief Engineer and the heads of the structural subdivisions.

*Carrying out inspections and corrective actions.* According to ISO 14001: 2004, the organization must verify the activity of the personnel in each specific unit (included in the scope of the EMS), assessment of staff awareness, its discipline (in terms of technological and executive discipline) and meaningful readiness to promote (within its competence) the implementation joint objectives of the company, as well as to carry out a permanent review of the compliance of the environmental management system with the planned activities, including the requirements of the standard ISO 14001: 2004.

In general, corrective and preventive actions in the field of environmental protection serve as a response, which reveals the inconsistencies of the organization's legislative and other normative requirements of environmental, sanitary and other nature, as well as the requirements of the environmental management system itself at the enterprise, and provide for the adoption of responsible decisions (including the senior management of the enterprise) regarding the timely development and implementation of necessary and sufficient measures to eliminate the problem of identified inconsistencies.

Procedures for implementing corrective actions in case of environmental incidents and emergencies are of particular importance. Therefore, the system element "Corrective and Preventive Action" is closely linked to the "Emergency Preparation and Response" element, which is only in ISO 14000 standards and is not in the ISO 9000 series of quality systems.

Depending on the significance and causes of situations, corrective actions may include:

- the production process is put to an end;
- technical actions for the elimination of non-conformity (repair, adjustment, etc.);
- obtaining special permissions (for example, for use of reserve capacities, stocks, etc.);
- notification of local authorities (in case of emergency);
- putting into action an emergency plan.

Corrective and preventive actions are aimed at implementing the main principle of the functioning of the EMS, i.e. a continuous improvement.

*Managing the registered data.* Documented data (protocols of measurements of the main characteristics of the enterprise's impact on the environment, schedules of implementation of measurements and inspections, forms of state statistical reporting of environmental activity of the enterprise, acts of inspections of structural units, copies of ecological registers, registers of legislative and other environmental requirements) should be kept in the Department of Environmental Protection; Logs of the primary reporting documentation in the structural subdivisions of the enterprise responsible for environmental activities.

*Organization and conducting of internal audits.* Unlike the “Monitoring and Measures”, which are conducted mainly for the purpose of providing instrumental control of the quality of the environment and the impact of the enterprise on the components of the environment and “Assessments of compliance with the requirements of environmental legislation and other regulatory documents”, which are provided for verification of external requirements for the enterprise as a whole, the internal audit is aimed at verifying the activities of employees in each specific subdivision (including the EMS), the assessment of personnel's awareness, discipline (in terms of technological and executive discipline) and understanding processes necessary for the implementation of the common objectives of environmental activities of the enterprise.

Internal audit is, in its essence, a production self-control (at all levels) that is provided by the personnel of the enterprise and it can be deeper and more concrete than the external one because the situation and problems of the enterprise are better seen from within.

The reason for conducting internal audits is the annual schedule and decisions of the management of the environmental management service.

The environmental audit is beneficial to the company's management, as the audit results inform whether the implemented environmental management system works as it should operate in accordance with the declared environmental policy.

The audit report should be submitted to the head of the structural unit where the audit was conducted and to the chief engineer of the enterprise for making appropriate decisions.

#### **V. The stage of analysis of the system by the management**

The availability of a regular reporting procedure to guide the results and opportunities for further development of environmental management activities, as well as a documented management conclusion from this report is one of the key requirements of the EMS ISO 14001 standard.

The analysis by the management allows, on the one hand, to implement the principles of consistent improvement, developing the EMS, on the other hand, it enables maintenance of the effectiveness and adequacy of EMS.

### **3.2. The expenditure calculation of environmental management system introduction at the investigated enterprise**

There is no new activity, no change that would not require any cost. This, of course, applies to the introduction of EMS as well. It is also evident that the costs for different types and sizes of organizations will vary. But there is no one answer to the question how much what kind of costs be it will imply and in practice it turns out that the costs of organizations rarely meet the planned.

The main stages and elements of the EMS implementation process are:

***I. Preparatory stage:***

Possible phase duration: from 1 month.

1.1. Obtaining general information, acquisition of normative and methodological literature.

Costs may vary significantly depending on whether or not non-profit information seminars or sufficiently accessible methodological literature are available. In any case, this stage does not require a lot of money.

1.2. Training of specialists – future managers of EMS.

Usually, specialists are sent to study the introduction of EMS and / or the preparation of internal auditors EMSs lasting from three days to two weeks. Large organizations teach a few people, one or two usually. Thus, the labor costs of specialists are from 5 to 30.

Alternative options include the use of training opportunities in the process of non-profit projects, etc. (only the time costs of specialists are needed); the recruitment of a specialist who already has experience in implementing EMS. In large companies, which include several companies, trained experts of one of them can transfer experience to other units.

1.3. Estimation of the initial situation for the implementation of EMS.

Estimation of the initial situation is one of the most important stages of the implementation of the EMS. Typically, its implementation is entrusted to consultants, and included as one of the stages in the comprehensive contract for the introduction of EMS.

Alternatively, one can consider the assessment of the initial situation by the company or with the invitation of specialists (including specialists of other enterprises) on an individual basis. In this case, it will take more time and will be greater than the contribution of the company's specialists, but the total costs will be less. Labor costs are from 3 to 20.

1.4. Decision on the introduction of EMS, planning and allocation of resources.



This stage is rarely considered costly, and there is no methodological approach to it. The decision on the introduction of EMS is usually taken by the supreme leader in the somewhat pushing order.

## ***II. EMS development (planning stage):***

Possible phase duration: from 3 to 6 months.

### **2.1. Training managers.**

Teaching managers with a consultant is usually held in the form of a meeting, taking up about half the work day of senior managers of the main areas (quality, production, finance, marketing, supply, information). An alternative option is to train managers by the people that have already been trained. In any case, the cost of time is approximately the same.

### **2.2. Training of specialists of the enterprise.**

For a small business, it is often enough to train one or more specialists (see step 1.2), which then conduct a training course for specialists and middle managers who, in turn, teach subordinates. For middle and, especially, large enterprises it may be expedient to train the main group of specialists at a specially organized seminar with the help of consultants or invited teachers. In this case, the labor costs of teachers will be 8-12 (including the preparation of adapted materials for training), involved in training specialists will be busy within 2-3 days each. For large enterprises, due to the number of specialists, it may be necessary to work in several stages.

At this stage, expenses for educational and informational materials, possibly rental of presentation equipment or premises, travel and accommodation of consultants or specialists of the enterprise will also be required.

### **2.3. Creation of a working group on the development of EMS.**

It might look simple and easy to create a working group, but it takes a lot of time. It is necessary to select a group of specialists who have received appropriate training and are able to work on new tasks, to provide the opportunity for the group to work. If for a small organization there can be enough 2-3 specialists, employed at 50% of the time; the development of an EMS for a medium or large enterprise

requires the involvement of specialists equivalent to full-time employment of 3-5 people for a period up to one year. The group needs to provide jobs, free selected specialists from other activities and, accordingly, ensure their replacement at the time of the introduction of the EMS. Often at the beginning to start working in the group it takes several weeks, although 1-2 days is enough to transfer the information.

#### 2.4. Development of EMS elements.

2.4.1. Development of system elements of the EMS (description of the general structure of the EMS, description of the processes of organization, policies, general procedures, goals, registers, etc.)

There are two main options for this step: all major documents are developed by a consultant based on available templates or documents are developed by the EMS Working Group with the support of the consultant and the wide involvement of the company's specialists.

In the case when the work is carried out by specialists of the enterprise, the labor costs of consultants are relatively small, usually 5-15. The involvement of senior executives is required mainly in developing the structure of the EMS, environmental policy, the setting of environmental objectives, and the development of management review and evaluation procedures. Significant involvement of specialists from different departments and middle managers will be required in developing the structure of the EMS, describing the processes of the organization, environmental goals. The largest labor costs of the EMSs working group will be needed to identify priority environmental issues, as well as develop appropriate procedures.

2.4.1. Development of “practical” elements of EMS (tasks and programs, responsibility, work procedures, monitoring system, etc.).

In the case when the work is carried out by specialists of the company, the contribution of consultants is usually small, but depends on the size of the organization. At the same time, the implementation of the phase requires significant labor costs of the company's specialists, and especially linear managers.

Participation of senior executives is usually only required for approval of EMS related responsibilities.

### ***III. Implementation and operation of the EMS:***

Possible phase duration: from 3 to 6 months.

#### **3.1. Motivational activity.**

Depending on the traditions, structures and principles of enterprise management, motivation can take different forms; the cost of it can be fundamentally different. In any case, certain costs of motivating specialists and staff will be needed.

#### **3.2. Training employees and implementation of procedures.**

To implement the practice of modified procedures, it is necessary to have a certain time during which the managers of the middle and lower level will have a noticeable load. Typically, the full implementation of procedures takes from one to two weeks.

Naturally, the introduction of modified procedures is accompanied by training: first, the managers of the lower level, and then, the staff. Labor costs at the stage are 5-15 of the specialists of the group on the introduction of EMS, 1-2 days for shift workers and unit leaders, from half to one day per state employee, whose activities include changed procedures. It is worth noting that in most cases even well-designed procedures will require adjustments based on the results of the pilot application.

In addition to labor costs, training and information materials are also needed. A minimum need is for replication of modified custom instructions and procedures for staff.

### ***IV. Functioning of the EMS (stage of control and corrective actions):***

Possible phase duration: 3 months.

#### **4.1. Control over the implementation of procedures and adjustments.**

The monitoring of the procedures should be performed by the managers of the lower link for a sufficiently long time to ensure that the procedures are clearly and regularly performed by the personnel and identify at least the major issues of

non-compliance. Typically, the introduction of EMS at this stage requires 2-3 months.

#### 4.2. Monitoring.

The main focus of the EMS is on monitoring processes and performance. Although monitoring development may require certain capital costs (for example, the installation of flow meters, etc.), such costs are necessarily determined by expediency and available funds. Normally there is no noticeable increase in the cost of instrumental monitoring.

#### 4.3. Internal audits.

The conduct of internal audits of EMS requires the participation of several specialists; most often the internal audit of different units is carried out according to a pre-designed program covering a significant period of time. The usual labor costs of auditors are 5-25.

### ***V. Analysis by management:***

#### 5.1. System analysis, management evaluation and system review.

Materials for analysis and recommendations are prepared by the manager of the EMS or the head of the group of internal auditors, decisions on recommendations should be taken by senior management. The labor costs of specialists at this stage essentially depend on the success of the introduction / operation of the EMS. Usually 5-10 days are enough to analyze the results and develop recommendations. The minimum labor costs of top management (if there is no need for significant changes) will be about half a day for each senior executive involved in the implementation of the EMS, an additional 1-2 days for a EMS representative.

### ***VI. EMS certification:***

The phase duration: from 2 to 3 months.

(before receiving a certificate)

#### 6.1. Certification and inspections.

The system for conducting environmental certification involves the following algorithm: the involvement of a third party, i.e. the environmental certification body (All-Ukrainian NGO "Living Planet"), the environmental audit

procedure, and the use of a list of conformity assessment works that are specified in the contract (scheme of environmental certification).

The cost of environmental certification of products depends on the number of claimed categories (types) of products, names, and completeness of data. For example, when it comes to products produced by one TU (DSTU, GOST), then it is considered as a product of one category. Documentary audit of one category of products costs 8000 UAH. For each name, which has differences in formulation / composition, it is added from 150 to 1500 UAH. (depending on the degree of discrepancy between the names of the number of ingredients, etc.). That is, if the company «X» claims to certify 10 product names in the category, for example, “cosmetic products” (soaps, shampoos, shower gels), the estimated cost of a documentary audit can be calculated as follows:

Maximum:  $8000 + 10 \times 1500 = 23,000$  USD.

Minimum:  $8000 + 10 \times 150 = 9500$  UAH.

Average:  $8000 + 10 \times 650 = 14500$  UAH.

The actual price is calculated on the basis of the initial analysis of the application for certification to which protocols of product tests are added, as well as the provision of comprehensive answers to all questions regarding the environmental aspects of production.

The above estimates are made for the “normal” situation when the implementation of the EMS is carried out in accordance with the plan. However, unforeseen circumstances that influence the introduction of EMS are often encountered. This is due to the following important factors:

- lack of experience both in enterprises and in the part of consultants which complicates the reliable planning of allocation of resources;
- sufficiently long period of time necessary for the implementation of EMS;
- rapid changes in the economy, market situations, etc.

Similar difficulties can increase the cost of implementation by 50-150% or more. At the same time, unpredictable costs of 10-15% are normal for such a complex process.

### **3.3. The economic effect of EMS implementation**

Like any other investment in the development of management systems, investments in the development of EMA pay off due to their results, including indirect ones which manifest themselves in changing the efficiency and effectiveness of the organization. As well as for any other such investments, their efficiency and timing of returning is difficult to characterize with a high degree of accuracy not only in advance, but often also on the basis of successful completion of the process of modernizing the management system.

Nevertheless, we can offer several approaches to assessing the economic results of the implementation of the EMS.

- One possible approach is to take into account only direct costs and directly related results. To the expenses category, it is necessary to take into account the direct costs of consultants and staff time, the costs of introducing pollution prevention methods and traditional methods of reducing exposure. The direct benefits can be seen in reducing payments and fines for environmental pollution, as well as the economic effects of implementing prevention approaches: reducing the use of resources and materials, reducing the cost of handling raw materials and other materials, as well as waste. It should take into account the savings in the entire system of logistics of the enterprise (taking into account the costs of transportation, storage, waste management, transportation of surplus mass of products, etc.).

Practice shows that for enterprises only the systematic use of low-cost pollution prevention methods is able to redeem investments for the development of EMS in a very short time. If we take into account that with the growth of enterprises, the costs of implementation increase more slowly, and the scale of processing of raw materials and resources is significantly increased, the introduction of EMS only through the application of pollution prevention approaches can give very good economic results.

- The economic effects of the introduction of EMS are determined not only by the results of the application of pollution prevention approaches. The feasibility of applying these methods is significantly restricted for organizations that are not engaged in manufacturing or do not provide services. In this case, you can apply an integrated approach to assessing the economic effects of the introduction of EMS. To do this, you can analyze the stock indexes of joint stock companies incorporated in the stock portfolio in order to exclude individual characteristics.

To analyze the effectiveness of investments in EMS, consider some approaches to creating such portfolios. The first is based on the use of the EcoVALUE'21 rating and index developed by Innovest Strategic Value Advisers for the US market. The rating is based on a number of “environmental” characteristics of the enterprise (more than 60 parameters) in five main categories:

- management systems;
- eco-efficiency;
- operational risks;
- the possibility of using the benefits of environmentally-oriented markets;
- historical information about accidents and violations of legislation.

The rating by criteria determines the rating of the company, e.g. from AAA (better) to CCC (worse). Therefore, all rating criteria are directly or indirectly related to the implementation and effectiveness of the EMS.

- The overall assessment of the contribution of environmental and other elements of sustainable development to the efficiency and capitalization of the company allows the indices provided by the Dow Jones Indexes and the FTSE Group. Both indices – *the Dow Jones Sustainability Index (DJSI)* and *FTSE4Good* – are independent and distinguish companies according to a comprehensive system of criteria that includes the economic, environmental and social aspects of sustainable development.

Thus, serious attention and a proactive approach to environmental activities, the development of environmental management systems bring significant economic

benefits to organizations which reflect not only the reduction of the cost of production and services and the reduction of many risks, but also the growth of market capitalization.

### **Conclusion to the chapter 3**

Chapter 3 is about the processes to be followed in implementing EMS. Every step is explained with the course of action to take. The time taken from the preparatory, planning, the control and corrective actions, implementation stage and the final stage which is EMS certification. The time taken and labor cost are all discussed. The foundation for an effective introduction of environmental management system at SEBN are addressed in this chapter. Suggestions about how to make the system effective are also made.



## **CHAPTER 4.**

### **LABOR PROTECTION AND SAFETY IN EMERGENCIES**

#### **4.1. Analysis and assessment of the features of labor protection system on LLC “SE Bordnetze – Ukraine”**

SE Bordnetze -Ukraine LLC is one of the largest enterprises operating in the Ternopil region. The plant, which is one of the components of the large German concern Sumitomo Electric Bordnetze (SEBN) in Ukraine was opened on July 1, 2006 at the legal address: Ternopil region, Ternopil district, p. Baykivtsi, street. Chernivtsi production unit was established in Chernivtsi in May 2015, which became an integral part of the large concern and the SEBN-UA family. The company has another branch in Chortkiv.

SE Bordnetze-Ukraine is a company that produces wiring harnesses for automobiles.

The main activity is the manufacture of cable and wire products for cars Volkswagen (VW Golf A7 (MQB)) and Audi (AUDI A4). The continuous cable network consists of structural modules and provides the car's electrical functionality, namely the electrical connection of components in the car, such as controls, headlights, turn signals, relays, etc.

The task performed by the employees are: pushing out contacts; cable tie testing; cutting and manual stuffing of contacts; welding; dynamic welding; paying; KSM; PUR process; maintenance and repair of equipment; control and measuring equipment; bench design; design production.

Due to the nature of the work, employees have the risk of being expose all sorts of factors that can harm them.

Getting electric shock and burns.

They could injure themselves from exposure to arcing.

There can also be fire from faulty electrical equipment or installations.

Explosions caused by unsuitable electrical apparatus or static electricity igniting flammable vapor.

Harmful substances from the wiring harness they may be exposed to include:

- Antimony and antimony compounds
- Barium and barium compounds
- Chromium and chromium compounds
- DEHP
- Lead and lead compounds
- Zinc and zinc compounds

Injuries can occur due to handling machinery:

Parts of the machine, materials and emissions can be hot or enough to cause burns or scalds and electricity can cause electrical shock and burns.

Injuries can also occur due to machinery becoming unreliable and developing faults or when machines are used improperly through inexperience or lack of training.

Another issue is working in confined space with machinery. Loud noise from machinery and noise are also factors.

Electrical safety can be provided by:

- protective grounding or grounding must provide protection of people from electric shock when touching metal non-conductive parts that may be energized as a result of insulation damage;
- protective grounding should be carried out by deliberate electrical connection of metal parts of electrical installations with "earth" or its equivalent;
- zeroing should be performed by electrically connecting the metal parts of electrical installations to the grounded point of the power supply using a neutral protective conductor.

Metal parts of electrical installations that are accessible to human touch and do not have other types of protection that ensure electrical safety are subject to protective grounding or grounding.

Natural grounding conductors should be used first of all as grounding devices for electrical installations.

Provision of personal protective equipment. This includes gloves, special work clothes and industrial ear muffs.

Personnel training to avoid occupational hazards. Employees have to undergo training in occupational health and fire safety. Employees whose work is not associated with the risk of injury shall undergo trainings every six months. The employees whose work is associated with the risk of injury – every three months. Fire safety trainings shall be held once a year. If the company performs fire-hazardous works or provides fire-hazardous services – every six months.

Employees at SE Bordnetze – Ukraine usually work while standing so and this can take a toll on the body like varicose veins, stiffness in neck and shoulders, sore feet and whole body discomfort. Because of this:

- the design, the mutual arrangement of the elements of the workplace (controls, means of displaying information, etc.) must comply with anthropometric, physiological and psychological requirements, as well as the nature of the work;
- the workplace must be organized in accordance with the requirements of standards, technical conditions and/ or guidelines for labor safety;
- the organization of SE Bordnetze – Ukraine and the design of the equipment must ensure the straight and free position of the body of the worker or its inclination forward by no more than 15 °.

Working at SEBN during the COVID 19 - when the pandemic was initially declared, work was suspended for a while. Due to the economic crisis, the company had to reduce the number of staff and work schedule. The company also reduced staff losses by 5% of the total number of employees who reported back to work. When the employees were asked to return back to work, all the preventive measures were put in place. Temperature was checked before entering the workplace, mask had to be always worn and the employees were encouraged to wash their hands. Close contact was not allowed to reduce the risk of being exposed to a potentially sick person.

Assessing level of injury	$P_{tt} = D/A$
$P_{Thu} = 1000 \cdot A / T.$	$= 5/17$
$= 1000 * 17/2871.$	$= 0.29$
$= 5.92 \sim 6$	

This means the frequency of injuries is 6 during a reporting period and the severity of injuries is 0.29 among 2871 basic workers.

The disability rate is the number of man-days of disability per 1,000 employees:

- $P_{np} = 1000 \cdot D / T.$
- $= 1000 * 5 / 2871$
- $= 1.7 \sim 2$

The disability rate among 2871 basic workers is 2.

This means the company has put measures in place to limit the occurrences of occupational accidents. Although there are a lot of employees, the frequency of injuries, severity of injuries and disability rate is low. All the appropriate measures have been put in place to keep these indicators low.

SE Bordnetze Ukraine protects its personnel and provides them with equipment and tools to avoid any unforeseen incidents. Every aspect of their lives from mental health to physical health and safety are all taken seriously.

#### **4.2. Ensuring the implementation of measures to prevent emergencies at the enterprise**

Article 43 of the Constitution of Ukraine states that “Everyone shall have the right to work, including a possibility to earn a living by labor that he freely chooses

or to which he freely agrees. Article 4 of the Law of Ukraine talks about the creation of proper, safe and healthy working conditions, accident prevention and occupational diseases.

At the Ternopil branch of SE Bordnetze Ukraine, workers and auxiliary workers work in shifts. Due to the need for continuous production, a three-shift work schedule is in place. The employees are 3853 in total with 216 administrative workers, 766 auxiliary workers and 2871 basic workers.

The transition from one shift to another occurs every working week, i.e. each employee works a week in the morning shift, a week - in the afternoon and a week - at night.

The equipment the employees work with are: 42 Komax cutting machines; 536 crimping machines; 42 machines for ultrasonic welding; 28 electric test tables; 350 molding boards; 4 lines KSK VW370 INRA; 4 lines KSK VW370 MORA; 1 line KSK AU491 INRA; 1 line KSK AU491 Cockpit.

*Fire safety.* The material used in producing the harnesses and machinery can catch fire if they are faulty.

There are principles put in place in case of emergency:

1. Prevention of fire is put first. Because of this, sources of fire are checked frequently.
2. The ignition speed of the machinery is regulated appropriately.

All employees have a copy of evacuation in case of emergency. The means of escape should be made clear.



Fig 4.1. Fire Safety

*The wiring harness fireproof design.* High-temperature heat sources more than 150mm should be avoided and at the same time, high-temperature heat sources need to increase insulation aluminum tiles. The wiring harness should also be arranged to avoid sharp edges and moving parts to stop the wiring harness from being worn and short-circuited. The wiring harness should be designed to avoid passing under oil pipes, to prevent dripping on the wiring harness after oil leakage as this can also cause fire. Safety-related escape devices can be opened normally at any time, such as panic exit devices, sunroofs, to avoid the situations where workers cannot escape after a fire.

The company makes sure production is absolutely safe for both the health of workers and the environment. The company provides medical service to the employees like first aid in case of illness and it also keeps medical records of employees so they can know how best they can help them in case of emergency. There is a medical center on the territory of the company. The company has a psychologist who counsels the employees on stress management and conflict resolution. High social protection of employees is another indisputable rule of SE Bordnetze-Ukraine.

SE Bordnetze- Ukraine is one of the first plants to introduce voluntary and free health insurance for its employees. Every employee of the company who has worked there for 4 months has the opportunity to be voluntarily insured. All costs associated with health insurance are reimbursed by the company.

The company provides its employees with free transportation to and from work, according to approved routes. For employees from Ternopil, transportation takes place in the morning and in the afternoon shift. Night shift workers are transported in both directions. Transportation of regional directions is carried out in all three shifts also in both parties (delivery to work and transportation after work).

## CONCLUSIONS

*Chapter 1* describes the importance of ecological management. It talks about the principles, elements and all the parameters needed for ecological management to work. ISO 14001 is outlined along with other systems of standards (the documents, records and benefits) when it comes to environmental management. The versions of ISO 14001 are identified and the major areas of EMS are listed with the records required by EMS also listed. The ISO 14000 family with their specific areas drawn out. The role of EMS in a company with the benefits that come with it also explained.

*Chapter 2* describes the peculiarities of SEBN and its activities. The type of organizational management structure and management are briefly discussed. The economy activities and products made by the company are discussed. The strengths, weaknesses, opportunities and threats (SWOT) were analyzed. The factors influencing the implementation of environmental management was also discussed.

*Chapter 3* is about the processes to be followed in implementing EMS. Every step is explained with the course of action to take. The time taken from the preparatory, planning, the control and corrective actions, implementation stage and the final stage which is EMS certification. The time taken and labor cost are all discussed. The foundation for an effective introduction of environmental management system at SEBN are addressed in this chapter. Suggestions about how to make the system effective are also made.

The labour protection is discussed with the risks employees face drawn out with the appropriate preventive measures.



## REFERENCES

1. Aguilera, R.V., Williams, C.A., Conley, J.M., Rupp, D. (2007) Corporate governance and social responsibility: A comparative analysis of the UK and the US, *Corporate Governance: An International Review* 14. 3. 147 p.
2. An introduction to ISO 14000. Retrieved from: [http://www.intracen.org/uploadedFiles/intracenorg/Content/Exporters/Exporting\\_Better/Quality\\_Management/Redesign/EQB78%20En%2015.09.2010.pdf](http://www.intracen.org/uploadedFiles/intracenorg/Content/Exporters/Exporting_Better/Quality_Management/Redesign/EQB78%20En%2015.09.2010.pdf)
3. Bartlett, Albert (2006). Reflections on Sustainability, Population Growth, and the Environment, published in *The Future of Sustainability*, Springer, Dordrecht.
4. Briggs S.L.K., ISO 14001 Hits 10-Year Mark, *Quality Progress*, Milwaukee: Aug 40 (8), 67.
5. Daily G. *Nature's Services: Social Dependence on Natural Ecosystems*. Washington: Island Press, 1997. 392 p.
6. Ebner, D. and Baumgartner, J.R. (2006). The Relationship between Sustainable Development and Corporate Social Responsibility, *Corporate Responsibility Research Conference 2006*, 4th-5th September, Dublin.
7. *Eco-management for sustainable regional development* (2011), Torun, Poland, pp. 504.
8. *Enterprise-Level Indicators for Resource Productivity and Pollution Intensity: A Primer for Small and Medium-Sized Enterprises*. United Nations Industrial Development Organization, Vienna, 2010.
9. *Environment Action Programme to 2020* [Electronic resource]. Mode of access: World Wide Web: <http://ec.europa.eu/environment/action-programme/>
10. *Environmental management: The ISO 14000 family of International Standards*. Retrieved from: [https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/theiso14000family\\_2009.pdf](https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/theiso14000family_2009.pdf).

11. Fien John, Macclean Rupert, Park Man-Gon (Editors). Work, learning and sustainable development. Opportunities and challenges // UNESCO-UNEVOC Book series. Technical and vocational education and training: Issues, concerns and prospects / Volume 8. Springer Science + Business Media B.V., 2009. 516 p.

12. Grabara J., Bajdor P., Mihaescu L. (June 2015). Steps of sustainable development implementation into enterprise activities. Management of Sustainable Development Sibiu, Romania, Volume 7, No.1.

13. Henderson H. Growing the Green Economy – Globally // International Journal of Green Economics. 2007. №3/4. P. 276-298.

14. Hertin, J.; Berkhout, F.; Wagner, M.; Tyteca, D. Are EMS environmentally effective? The link between environmental management systems and environmental performance in European companies. J. Environ. Plan. Manag. 2008, 51, 259–283.

15. ISO, 1999. The ISO Survey of ISO 9000 and ISO 14000 certificate. The Eighth cycle: up to and Including 1998, ISOCentral Secretariat: <http://www.iso.ch/>

16. Jaffee, A.B., Peterson, S.R., Portney, P.R., Stavins, R.N., 1993. Environmental Regulations and the Competitiveness of US Industry. Economics Resource Group, Cambridge, MA. Kennedy, P., 1998. A Guide to Econometrics, 4th ed. MIT Press, Cambridge, MA

17. Jiang R.J., Bansal P., Seeing the need for ISO 14001, Journal of Management Studies, 40, 1047, 2003. EDWARDS A.J., ISO 14001 Environmental Certification Step by Step, ELSEVIER pp. 1-2, 2004.

18. Morris, A. S. (2004) ISO 14000 environmental management standards: engineering and financial aspects // John Wiley & Sons Ltd. 283 p.

19. National Round Table on the Environment and the Economy (2001) Calculating Eco-Efficiency Indicators: A Workbook for Industry, Canada. [<http://www.nrtee-trnee.com/eng/publications/ecefficiency-workbook/NRTEE-Ecefficiency-Workbook.php>].

20. Nlandu Mamingi (2011). Enterprise and Sustainable Development: Role, Challenges and Opportunities. *Journal of Economics and Sustainable Development*, Vol.2, No.11&12, pp. 16-26.

21. Olsthoorn et al (2001). Environmental indicators for business: a review of the literature and standardisation methods. *Journal of Cleaner Production* 9, 453-463.

22. Philipp, W., Bentlage, J. (2006) *Environmental Management Systems and Certification* // The Baltic University Press. p. 261.

23. Salim, H.K; Padfield, R.; Hansen, S.B.; Mohamad, S.E.; Yuzir, A.; Syayuti, K.; Tham, M.H.; Papargyropoulou, E. Global trends in environmental management system and ISO14001 research. *J. Clean. Prod.* 2018, 170, 645–653.

24. The Ever-changing Environmental Issues That Europe is Facing. Retrieved from: <https://helpsavenature.com/environmental-issues-in-europe>.

25. Wackernagel M., Monfreda C., and Deumling D. “Tracking the Ecological Overshoot of the Human Economy,” *Proceedings of the National Academy Science* 99, no. 14 (2002): 9266–71; and M. Wackernagel, *Ecological Footprint of Nations: November 2002 Update* (Oakland, CA: Redefining Progress, 2002).

26. World Economic Forum, 2002 Environmental Sustainability Index (Davos, Switzerland: World Economic Forum, 2002), <http://www.ciesin.org/indicators/ESI/downloads.html>; and D. C. Esty and P. K. Cornelius, *Environmental Performance Measurement: The Global Report 2001–2002* (Oxford, UK: Oxford University Press, 2002).

27. Zhang J. *Delivering Environmentally Sustainable Economic Growth: The Case of China*. SD: Asia Society, 2012. 25 p.

28. Internet Recourses:

14000store.com

Blogberg.com

[www.sws.co.jp](http://www.sws.co.jp)

isoconsultantpune.com

[www.sebn.com](http://www.sebn.com)

[www.terminal-crimping.com](http://www.terminal-crimping.com)

[falconerelectronics.com](http://falconerelectronics.com)