**Ministry of Education and Science of Ukraine**
**Ukrainian-American Concordia University**

Faculty of Management and Business
Department of International Economic Relations, Business & Management

# Bachelor`s paper

## «Eco-friendly management in car industry (based on car service FOP Sarana case)»

Bachelor student of the 4th year of study
Field of Study 07 – Management and Administration
Specialty 073 – Management
Educ. program – Management

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Research supervisor

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**Abstract – Topic: «Eco-friendly management in car industry (based on car service FOP Sarana case)»**

This paper looks at how ecological criteria are included into the business procedures of the automotive service sector, concentrating on the Ukrainian company FOP Sarana. Eco-management becomes an essential part of sustainable company strategy in a time when environmental issues are very important, particularly in the automotive industry, which has a big environmental effect.

The research underscores the urgency of adopting effective ecological practices in response to global challenges like climate change and pollution. It emphasizes the need for auto services to adopt environmentally safe technologies and waste management practices to align with modern ecological standards.

By developing and thoroughly analyzing ecological management plans for FOP Sarana, the aim is to minimize environmental harm and optimize resource usage. Methodologies include approaches for assessing environmental effects, content and comparative analysis, and case studies.

What distinguishes the research is the all-encompassing approach to eco-management in auto services, which considers the current ecological demands. Emphasizing state-of-the-art technology, resource efficiency, and energy optimization, it presents a comprehensive plan for implementing eco-friendly management strategies.

According to the research, upgrading equipment, using alternative energy sources, staff training, and exhaust filtration devices are all part of modernization that is required to increase ecological efficiency. It encourages the use of environmentally friendly technologies and strict adherence to environmental regulations while providing an organised approach for ecological management in the automotive industry.

The study advances the discussion on ecological sustainability in business with its model for eco-management that promotes environmental responsibility while improving economic performance and market competitiveness.

Keywords: ecological standards, eco-management, automotive service industry, environmental sustainability,sustainable corporate strategy, environmental impact assessment, innovative technologies, resource optimization, ecological efficiency.

**Анотація**

У цьому документі розглядається, як екологічні критерії включені в бізнес-процедури в секторі автомобільних послуг, зосереджуючись на українській компанії ФОП Сарана. Екологічний менеджмент стає невід'ємною частиною стратегії сталого розвитку компанії в той час, коли екологічні питання є дуже

важливими, особливо в автомобільній промисловості, яка має великий вплив на навколишнє середовище.

Дослідження підкреслює нагальність впровадження ефективних екологічних практик у відповідь на глобальні виклики, такі як зміна клімату та забруднення навколишнього середовища. Воно підкреслює необхідність для автосервісів впроваджувати екологічно безпечні технології та практики управління відходами відповідно до сучасних екологічних стандартів.

Розробка та ретельний аналіз планів екологічного менеджменту для ФОП Сарана має на меті мінімізувати шкоду навколишньому середовищу та оптимізувати використання ресурсів. Методологія дослідження включає підходи до оцінки впливу на навколишнє середовище, змістовний та порівняльний аналіз, а також тематичні дослідження.

Особливістю дослідження є всеохоплюючий підхід до екологічного менеджменту в автосервісі, який враховує сучасні екологічні вимоги. Наголошуючи на новітніх технологіях, ресурсоефективності та енергооптимізації, воно представляє комплексний план впровадження стратегій екологічного менеджменту.

Згідно з дослідженням, модернізація обладнання, використання альтернативних джерел енергії, навчання персоналу та пристрої для фільтрації води є частиною модернізації, необхідної для підвищення екологічної ефективності. Це заохочує використання екологічно чистих технологій та суворе дотримання екологічних норм, забезпечуючи при цьому організований підхід до екологічного менеджменту в автомобільній промисловості.

Дослідження просуває дискусію про екологічну стійкість у бізнесі, пропонуючи модель екоменеджменту, яка сприяє підвищенню екологічної відповідальності, одночасно покращуючи економічні показники та конкурентоспроможність на ринку.

Ключові слова: екологічні стандарти, екоменеджмент, автосервісна галузь, екологічна стійкість, стійка корпоративна стратегія, оцінка впливу на довкілля, інноваційні технології, оптимізація ресурсів, екологічна ефективність.

**PHEE-institute «Ukrainian-American Concordia University»**

**Faculty of Management and Business**
**Department of International Economic Relations, Business and Management**

Educational level: **Bachelor degree**
Specialty **073 "Management"**
**Educational program "Management"**

**APPROVED**
**Head of Department** _____

**Prof. Zharova L.V.**
"____" _____20_____

# TASK
## FOR BACHELOR'S QUALIFICATION WORK OF STUDENT

**Anastasiia Sarana**

1. Topic of the bachelor's qualification work

**Eco-friendly management in car industry**
(based on car service FOP Sarana case)

**Supervisor of the bachelor's qualification work Natalya Amalian,** Ph.D. in Economics

**Which was approved by Order of University from** *"25" September 2023* № 25-09/2023-1k

2. Deadline for bachelor's qualification work submission "***25" April 2024.***

3. Data-out to the bachelor's qualification work

*Materials from internship received during consultation with representatives of the company. Information from open resources in the Internet, official reporting of financial and economic activities of the enterprise.*

4. Contents of the explanatory note (list of issues to be developed)

***There are three main topics a student should develop in this work:***

1. ***Fundamentals of ecologically clean management***

2. ***FOP Sarana as an example of ecologically clean management in the automotive sector***
3. ***Importance of ecologically friendly management at FOP Sarana***

5. List of graphic material (with exact indication of any mandatory drawings)

*Graphs and figures for analysis of economical and statistical information on the company and its development, visualization of mechanism of development, etc.*

6. Date of issue of the assignment December 4, 2023

Time Schedule

| № | The title of the parts of the qualification paper (work) | Deadlines | Notes |
|---|---|---|---|
| 1. | I part of bachelor thesis | *10.12.2023* | *In time* |
| 2. | II part of bachelor thesis | *27.02.2024* | *In time* |
| 3. | Introduction, conclusions, summary | *25.04.2024* | *In time* |
| 4. | Pre-defense of the thesis | *30.04.2024* | *In time* |

Student: Anastasiia Sarana

(signature)

Supervisor

***Conclusions****: The bachelor qualification work was designed according to the requirements: it contains all necessary parts of scientific research with the practical recommendations. The paper was written on the basis of deep investigation of specific aspects of the operations of FOP Sarana car service. The study provides a thorough analysis of modern eco-compliant management system (ECMS), implemented at Sarana FOP. The practical recommendations, including the substantiation of the use of eco-friendly technologies and materials, as well as the active involvement of all stakeholders, including employees, customers, and regulatory bodies, in the process of ecological management, are formulated correctly, focused on the main goal and tasks of the work and are accompanied by calculation of their approximate economic efficiency.*

*Student takes active part in scientific life of the University, participating in students' conferences. In general, if successful defense, the thesis can claim to be "excellent".*

Supervisor

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# INTRODUCTION

In the modern world, where environmental issues are becoming increasingly relevant, the importance of understanding and implementing ecological standards in contemporary enterprises is gaining special significance. Eco-management, as an integrated approach to business process management considering ecological aspects, becomes a key element in the sustainable development strategy of companies. In the automotive industry, where the impact on the environment is significant, the implementation of effective ecological practices and strategies becomes not only a requirement of the times but also a part of corporate responsibility and a way to increase competitiveness.

**The relevance of the research** lies in the growing need for the implementation of effective ecological practices in the automotive service sector. In the context of global ecological challenges such as climate change, increasing levels of air and water pollution, the automotive industry emerges as one of the key areas requiring immediate adaptation to new ecological realities.

The modern necessity of integrating ecological standards into corporate strategy and business process management includes the development and implementation of eco-management systems aimed at minimizing the negative impact on the environment, optimizing the use of natural resources, reducing emissions of harmful substances, and increasing energy efficiency.

Special attention in this context is given to auto services, as important participants in the automotive market. They face challenges related to waste disposal, reducing the impact of used materials and chemicals on the environment, and the necessity of implementing environmentally safe technologies for vehicle maintenance and repair.

Accordingly, the study of ecologically friendly management at the auto service of «FOP Sarana» gains relevance both in terms of contributing to the sustainable development of the industry and in terms of compliance with modern ecological requirements and standards. Analyzing ecological strategies and practices in this area will

not only reduce the negative environmental impact but also contribute to increasing the efficiency of business processes and improving the company's image in the market.

**The aim of the research** is to develop and analyze ecological management strategies for the auto service in general and of «FOP Sarana», in particular, which will allow reducing the negative impact on the environment and optimizing the use of resources.

**To achieve the research objectives, the following tasks must be accomplished:**

1) explore the concept of ecologically friendly management

2) conduct an analysis of the impact of the automotive industry on the environment, including emissions of harmful substances, resource usage, and vehicle disposal;

3) evaluate various methods and strategies that can be used to reduce the environmental impact in the automotive industry;

4) perform a detailed analysis of the business model, financial indicators, and market position of Sarana FOP;

5) analyze how Sarana FOP implements environmentally friendly management methods, including resource usage, emissions, and strategies to reduce environmental impact;

6) assess how the Eco-Compliant Management System (ECMS) is implemented in Sarana FOP, including its structure, processes, and effectiveness;

7) conduct an analysis of how Sarana FOP implements key initiatives and proposals aimed at improving environmental efficiency, and assess their impact;

8) perform an evaluation of the impact of the proposed improvements on environmental sustainability and the overall efficiency of Sarana FOP.

**The object of the research** is ecologically friendly management in the automotive industry, and the **subject of the research** is the ecological aspects of management of the auto service of «FOP Sarana».

**The research methods include**: case study, comparative analysis, content analysis, as well as methods for assessing environmental impact.

**The scientific novelty** of the research lies in the development of an integrated approach to ecological ecologically friendly management in auto service, which is based on a detailed analysis of the specifics of this business and includes consideration of modern ecological requirements and trends. This approach encompasses a comprehensive assessment of the environmental impact of the auto service's activities, using methods of ecological audit and life cycle analysis of products, which allows identifying the main directions for reducing the negative impact on the environment.

Furthermore, the research contributes to the development of eco-management strategies, focusing on innovative technologies, effective resource management, waste minimization, and optimization of energy consumption. The implementation of these strategies not only promotes ecological sustainability but also enhances the economic efficiency and competitiveness of the auto service in the market.

# CHAPTER 1. FUNDAMENTALS OF ECOLOGICALLY FRIENDLY MANAGEMENT

## 1.1. The concept of ecologically friendly management

Ecologically clean management in the modern business environment is not only a trend but also a necessity arising from global climate change challenges and increasing environmental awareness. The integration of ecological principles into the strategy and management of enterprises plays a key role in ensuring sustainable development, reducing negative environmental impact, and increasing competitiveness. Considering this, environmental policy and effective ecological management become important components of the successful activity of any enterprise that strives for innovation and responsibility towards society and nature.

Ecological policy, conducted by both government bodies and business structures, requires a comprehensive and balanced approach that includes the integration of sustainable development principles into all aspects of activity. This entails the development and implementation of environmental standards in Ukraine that comply with the norms and directives of the European Union, thereby facilitating easier access to European markets and promoting international cooperation. An important aspect is also ecological education and enlightenment, which involves informing and educating the employees of government bodies and businesses about environmental issues and sustainable development practices. An effective ecological policy also presupposes active public and stakeholder engagement in its development and implementation, the use of economic tools to encourage environmentally responsible behavior, and the promotion of innovation and technological development.

Legislative support and the creation of conditions for the development of green business are key to the successful implementation of ecological policy. This includes the development and refinement of legislation that regulates ecological standards, liability for environmental damage, and other aspects of ecological policy. Equally important is stimulation of innovative startups and companies that offer environmentally friendly solutions and products. At the same time, ensuring transparency of activities and

establishing clear mechanisms of accountability for violations of ecological norms is critically important for maintaining trust and ensuring the effectiveness of the policy. Regular monitoring and evaluation of the effectiveness of ecological policy, including data collection and analysis, assessment of the policy's impact on the environment and economy, will allow for necessary adjustments and adapt the policy to changing conditions and challenges. Overall, such an ecological policy will not only contribute to improving the state of the environment but also stimulate the sustainable development of the economy, enhance the quality of life of the population, and strengthen the international image of the country.

Ecological management, in turn, is understood as the process of managing environmental protection, rational use of natural resources, and ensuring ecological safety. It is also a management system that implements environmental policy and international ecological commitments, using legislatively established functions, economic, legal, and organizational tools aimed at achieving harmony between nature and society, as well as ensuring the balanced development of ecological-economic, natural-landscape, and natural resource systems.

According to the Law of Ukraine «On Environmental Protection», the protection of the natural environment and ensuring ecological safety include performing tasks related to planning, scientific research, monitoring, forecasting, control, conducting ecological expertise, informational activities, and other administrative-executive functions (2021). These actions are aimed at protecting, preserving, restoring, and effectively using natural resources, as well as ensuring the appropriate quality of the living environment necessary for the stable functioning of natural and anthropogenically modified systems.

According to L. Kozhushko, «eco-management represents a purposeful and conscious activity that includes the development, implementation, execution, and monitoring of various nature conservation measures» (2007). These measures aim to ensure the effective use and conservation of natural resources, as well as adherence to the principles of ecological safety.

Additionally, ecological management can be defined as «a complex of measures used to manage the activities of enterprises that have or potentially can have a negative impact on the environment» (Burlakova and Cherednichenko, 2011). They consider ecological management as a special type of management fundamentally aimed at creating and developing ecological production and culture, based on socio-economic and socio-psychological motivation for harmonious interactions between humans and nature.

Ukrainian Scientists V. Shevchuk, M. Satalkin, G. Bilyavsky, and others have formulated a definition of ecological management, noted for its clarity and specificity. They believe that ecological management is «a market-oriented component of the general enterprise management system, corporation, aimed at achieving ecological benefits or profit through the application of market mechanisms» (2004).

Enterprise plays a key role in the system of eco-management. Regardless of its specificity and type of activity, the enterprise serves as an intermediary that forms structural connections between itself and the surrounding natural environment. It is the primary and most significant factor affecting pollution and environmental degradation within human economic activity.

Therefore, it is not surprising that in the conditions of modern production and market economy, ecological management with its environmental management tools becomes extremely important for enterprises. It is directly related to the enterprise's development strategy.

The strategic direction of a modern enterprise's activity is to achieve necessary levels of economic growth, increase production volumes, and generate profit in the context of intense competition in both domestic and international markets. However, among the real risks that can hinder the achievement of these strategic goals, the threat of ecological pollution exceeding regulatory standards due to the enterprise's production activities occupies an important place.

Therefore, eco-management must transform into the art of solving effective managerial tasks aimed at improving the ecological activity of the enterprise and preventing ecological threats that may arise on the path to achieving its strategic goals.

Considering the growing importance of ecological management, there arises a current need to reformat the system of ecological management in Ukrainian enterprises, which implies the creation of specialized departments or services for ecological management.

Today, a standard ecological service at an enterprise, depending on its size and specificity, may consist of either a single specialist or an entire specialized department. According to the staff schedule, the role of specialists in the field of ecology at an enterprise is usually performed by environmental engineers. These specialists, whether working individually or as part of a specialized unit, typically belong to the department of safety engineering (labor protection) and are subordinate to the chief engineer of the enterprise. The main tasks of such an ecological service are to ensure compliance with environmental legislation and to prevent problems with controlling state authorities in the field of ecology.

Consequently, the ecological service of an enterprise is tasked with solving a number of pressing issues, among which are:

- conducting environmental monitoring;
- compiling statistical reports on the volumes of pollutant emissions into the atmosphere, discharges into water resources, as well as produced and disposed waste;
- obtaining necessary permits for emissions;
- calculating potential payments for environmental pollution;
- developing ecological initiatives and programs.

In contrast to traditional environmental services, the eco-management service should be established with the aim of addressing the long-term strategic goals of the enterprise. Such an eco-management service should be directly subordinate to the head of the enterprise and consist of qualified specialists — managers specializing in eco-management systems. The primary responsibilities of these specialists include ensuring the sustainable development of the enterprise, which involves adapting to strict environmental standards and competitive conditions in both domestic and international markets. An important aspect of their work is also to form a positive image of the enterprise as environmentally responsible and safe, which helps to reduce public and local

residents' concerns about potential environmental pollution problems. These specialists play a key role in maintaining the environmental reputation of the enterprise, which is an important factor in the modern business environment.

For example, the activities of the environmental management service can be considered in a situation where the management of the enterprise decides to create new production or to reconstruct or modernize the existing one. In such a case, at the planning stage, the eco-management service should ensure the priority of principles of ecological optimization of production processes, developing a safety scheme for the product at all stages of its life cycle. The life cycle of the product here refers to the entire chain of ecologically safe properties of the product, starting from production, storage, transportation, use, and ending with the safe disposal of the product itself and its packaging (Luk'yanykhina, 2002).

The eco-management service has an important task of developing a business plan, which involves analyzing the strengths and weaknesses of the enterprise, identifying its potential and risks. The main goal of this plan is to identify and neutralize potential dangers, especially at the production stage, where violations of technological and environmental standards may occur.

The effectiveness of the eco-management service can be assessed by achieving certain criteria. These include ecological aspects such as reducing costs through the conservation of natural resources, the use of recycling and utilization. Additionally, strategic aspects are important, including the formation of a positive image of the enterprise, increasing labor productivity, engaging staff in ecological initiatives, maintaining harmonious relations with regulatory authorities, and complying with all ecological norms and standards.

Accordingly, eco-friendly management is a key element of the modern strategy for sustainable development of enterprises, requiring the integration of ecological principles into all aspects of their activities. Environmental policy, defined as a system of guiding principles and strategies aimed at nature conservation, creates a foundation for development that is ecologically safe and harmonious. Eco-management, in turn, involves a comprehensive approach to environmental protection and the rational use of natural

resources, including planning, research, monitoring, and control. This approach allows enterprises not only to comply with ecological norms but also to actively implement innovative solutions to reduce environmental impact, enhancing their efficiency and competitiveness.

## 1.2. The role of the automotive industry in environmental pollution

The automotive industry plays a significant role in environmental pollution, being a subject of numerous discussions. As a key sector in the global economy, it is also one of the primary sources of anthropogenic impact on the environment through emissions of harmful substances, the use of non-renewable resources, and waste production.

First and foremost, the automotive industry causes substantial emissions of carbon dioxide (CO2) and other greenhouse gases, which are the main causes of global warming. The production and operation of vehicles consume large amounts of fuel, particularly gasoline and diesel, leading to CO2 emissions, as well as nitrogen oxides (NOx), hydrocarbons, carbon monoxide (CO), and particulate matter. These substances not only contribute to the greenhouse effect but also negatively affect air quality, causing respiratory diseases and other health problems in people.

The automotive industry consumes significant amounts of non-renewable resources, particularly oil, leading to its depletion and environmental pollution during extraction and processing. The production of automobiles also involves the use of various materials such as steel, plastics, rubber, and glass, the production of which also has a significant environmental impact.

Waste from automobiles, including old cars and their components, also poses a serious problem. The disposal and recycling of automotive waste require substantial resources and can lead to pollution if not properly controlled. Below is the composition of exhaust emissions from vehicle engines (see Table 1.1).

*Table 1.1*

**Environmental impact of manufacturing, operation, and disposal of automobiles**

| Stage | Pollution components | Sources and impacts |
|---|---|---|
| Manufacturing | Carbon dioxide (CO2) | Emissions from manufacturing processes, burning fuel for energy |
| | Volatile organic compounds (VOCs) | Use of solvents, paints |
| | Nitrogen oxides (NOx), sulfur oxides (SOx) | Emissions from power plants |
| | Heavy metals (lead, mercury, cadmium) | Components of vehicles, batteries, electronics |
| | Plastics and polymers | Production and disposal of materials |
| Operation and maintenance | Emissions from internal combustion engines | CO2, NOx, hydrocarbons, particulate matter |
| | Chemical substances | Oils, antifreezes, brake fluids, soil and water contamination |
| Disposal | Harmful substances | Substances entering the environment during disposal (metals, chemicals) |

*Source: Created by the author*

Auto services, as an important link in the automotive industry chain, have a significant negative impact on the environment, requiring attention and a responsible approach. The main aspects of this impact include air, water, and soil pollution, as well as potential health risks to humans.

Air pollution from auto services arises from the use of various chemicals, such as volatile organic compounds, nitrogen oxides, carbon oxides, and particulate matter. These substances, released into the atmosphere, contribute to the formation of smog and ground-level ozone, deteriorating air quality and causing various health-degrading conditions in people living nearby (Bilyavsky, 2004).

Water resource pollution is another serious problem associated with the activities of auto services. Improper storage and disposal of waste, such as used motor oil, antifreeze, and brake fluids, can lead to the infiltration of toxic substances into

groundwater and surface waters, threatening aquatic ecosystems and the quality of drinking water.

Additionally, improper handling of chemicals and waste can lead to soil contamination. Toxic materials seeping into the soil can disrupt its structure and ability to support plant life, and they can also be transferred to groundwater.

The negative impact of auto services on human health cannot be ignored. Working in conditions of constant contact with chemicals and emissions can lead to the development of respiratory diseases, allergic reactions, and other health problems.

Considering these factors, it is important for auto services to implement measures to minimize their impact on the environment. This includes the use of eco-friendly technologies, proper storage and disposal of chemicals and waste, and compliance with environmental norms and standards (Biletska, 2014). Only in this way can a balance be achieved between the needs of the automotive industry and the preservation of the environment.

The automotive industry, while having a significant negative impact on the environment through auto services, also contributes positively to sustainable development through the processes of recycling and reusing vehicles. After the end of their life cycle, cars do not simply become waste; instead, they undergo processes that help conserve resources and reduce environmental impact.

The recycling of vehicles includes the dismantling and recovery of useful materials such as metals (iron, aluminum), plastics, glass, and rubber. These materials, after appropriate processing, can be reused in the production of new vehicles or other products. This approach not only reduces the need for new raw materials but also significantly decreases the volume of waste, thereby reducing the environmental burden.

Moreover, the use of recycled materials in the production of new vehicles can reduce energy consumption, as recycling often requires less energy than producing materials from primary resources. This, in turn, leads to a reduction in greenhouse gas emissions, which is an important factor in combating climate change.

Innovative technologies in the automotive industry also contribute to the creation of more efficient and environmentally friendly vehicles. The development of electric and

hybrid engines reduces dependence on fossil fuels and helps lower carbon dioxide emissions. Additionally, the implementation of intelligent transportation systems and autonomous vehicles can improve the efficiency of road traffic, reducing the overall environmental impact of transport.

The automotive industry plays a significant role in environmental pollution, impacting it through the emissions of harmful substances at various stages of the vehicle lifecycle. The production and operation of vehicles lead to substantial emissions of CO2 and other greenhouse gases, which are major contributors to global warming. Additionally, the use of non-renewable resources, such as oil, and the production of materials that make up automobiles also contribute to environmental strain. The disposal of vehicles and their components poses a serious problem due to the need for significant resources and potential pollution.

Auto services, as a part of the automotive industry, also contribute to air, water, and soil pollution through the use of various chemicals. However, the industry also makes a positive contribution to sustainable development through the recycling and reuse of automobiles, which helps conserve resources and reduce environmental burden.

In light of this, it is important for the automotive industry to continue implementing innovative technologies and practices aimed at reducing its environmental impact, as well as increasing the efficiency and ecological safety of vehicles.

## 1.3. Principles and approaches to environmentally friendly management in the automotive sector

Ecological management, which differs from traditional forms of production management, is characterized by a number of key features. First and foremost, this is manifested in the purposeful and conscious adoption of an ecological policy by the enterprise’s leadership, which includes publicly announced basic principles, priorities, and directions of ecological activity. This approach involves defining specific ecological goals and tasks, as well as establishing clear indicators and criteria for evaluating the results achieved.

An important aspect of ecological management is effective planning and organization of ecological activities, which must be aligned with the set goals and tasks (Bilyk, 2016). This implies a close interconnection between the main production activity of the enterprise and its ecological initiatives. A key element is also the involvement of all personnel in ecological activities, which promotes the formation of a responsible attitude towards the environment at all levels of the organization.

Additionally, ecological management entails maximizing the use of all available opportunities and resources to address environmental issues. This includes independent analysis and evaluation of the results achieved, allowing for an objective assessment of the effectiveness of the measures implemented. Based on this analysis, a systematic review and improvement of ecological policy, goals, tasks, as well as planning and organization of activities are carried out to meet the achieved results and consider new challenges.

Ecological management should include the following key elements — integration of nature conservation requirements into the overall system of the enterprise’s economic goals, adherence to established ecological standards and norms, effective and thoughtful use of various types of resources for their conservation, active informing of the public about the nature and specifics of the enterprise's activities, ensuring proper working conditions, and efforts to minimize the negative impact of the enterprise's activities on the environment (Burkinsky, 2006).

The development and implementation of ecological management systems in enterprises are guided by the international ISO 14000 series standards, which cover «Environmental Management Systems» (EMS). These standards were developed in 1996 by the International Organization for Standardization. Among them, the key document is the ISO 14001 standard, which defines the «Environmental Management System (EMS) — Specifications and Guidelines for Use». Compliance with this standard forms the basis for certification (Khmarova, 2007). Other standards in this series serve as auxiliary.

The ISO 14000 series includes three main groups of documents — the first group describes the principles of creating and applying ecological management systems; the second group includes tools for ecological monitoring and assessment; the third group contains standards focused on products.

Table 1.2

**Key principles of ecological management in the automotive sector**

| № | Principle | Description |
|---|---|---|
| 1 | Integration of ecological goals | Integrating environmental protection requirements into the overall business strategy |
| 2 | Pollution prevention principle | Utilizing cleaner technologies and minimizing emissions |
| 3 | Continuous improvement | Innovations and enhancements in ecological practices and processes |
| 4 | Responsibility and transparency | Open communication with the public and engagement of stakeholders |
| 5 | Compliance with legislation | Strict adherence to environmental laws and standards |
| 6 | Engagement and education of staff | Active participation and training of employees in ecological practices |

*Source: Created by the author*

The principle of pollution prevention, which includes the use of cleaner technologies and minimization of emissions, is key to reducing the environmental impact of the automotive industry. Continuous improvement and innovation not only contribute to ecological efficiency but also support adaptation to changing market conditions and environmental standards (see Table 1.2).

Responsibility and transparency in ecological management ensure trust and support from the public and stakeholders. Compliance with legislation and regulations is mandatory to ensure legality and ethical conduct of activities.

Engagement and education of staff in ecological issues are important for forming a corporate culture based on ecological awareness and responsibility. Thus, these principles form a comprehensive approach to ecological management, which is necessary for achieving sustainable development in the automotive sector.

Eco-management in the automotive sector requires a comprehensive and multifaceted approach that reflects the industry's commitment to sustainable development and responsible environmental stewardship. This approach encompasses several key aspects that together form an effective system of ecological management.

First and foremost, an integrated approach is crucial, which involves incorporating ecological aspects into all areas of activity in the automotive sector (Gushev, 1991). This means that ecological requirements and objectives become an integral part of business processes, from the design and development of products to their production, distribution, and disposal. Such an approach not only reduces the negative impact on the environment but also opens up opportunities for innovation and competitiveness enhancement.

The cyclical approach in production, based on the concept of a «closed loop», ensures that materials and components of vehicles are recycled and reused after the end of their life cycle. This reduces the need for new resources and lowers waste, contributing to ecological sustainability.

The application of the principle of sustainable development involves the development and implementation of ecologically efficient technologies, reduction of greenhouse gas emissions, use of alternative energy sources, and increased energy efficiency (Pabat and Haminich, 2005). This includes innovations in manufacturing, the development of environmentally friendly vehicles such as electric and hybrid cars, and the implementation of energy-efficient technologies.

Engaging stakeholders is important for developing and implementing effective ecological strategies and policies. Collaboration with governments, non-profit organizations, consumers, and other interested parties allows companies to better

understand ecological challenges and develop strategies that meet both business goals and ecological needs.

Transparency and responsibility in ecological management ensure trust and support from the public and interested parties. This means open communication about the ecological aspects of a company's activities, as well as reporting on achieved results and environmental impact.

Continuous improvement is key to achieving ecological efficiency. Enterprises must constantly strive to improve their ecological indicators, optimize resource use, and reduce emissions. This includes regular monitoring, evaluation, and improvement of ecological strategies and practices.

Thus, ecological management in the automotive sector requires a deep understanding of ecological challenges and the active implementation of innovative solutions to address them, contributing to the sustainable development of the industry and reducing its impact on the environment.

The implementation of an eco-management system in enterprises is not only ecologically important but also economically beneficial due to the following aspects. Optimization of production resources — the implementation of ecological management allows enterprises to use raw materials and energy more efficiently, leading to reduced production costs. Additionally, the production of goods suitable for recycling can provide further savings in resources and costs (Soroka, 2000). Reducing emissions of harmful substances also helps avoid fines and other financial sanctions from state regulatory authorities.

Strengthening competitive positions — adherence to ecological standards and principles of eco-management improves the ecological characteristics of products, becoming an important factor in consumer perception of product quality. Consumers increasingly associate product quality with its ecological nature.

Reducing administrative pressure — declaring an ecological policy and implementing an ecological management system often leads to a reduction in administrative pressure from state regulatory authorities. In some cases, this can even open access to state support for national manufacturers.

Expanding sales markets — the growing ecological awareness of society directly influences market development. Compliance with international ecological standards is key to entering new markets, especially in developed countries.

Stimulating technological development and innovation — seeking optimal ecological solutions promotes the renewal of technologies and production processes. This leads to the development of innovative products that meet modern ecological requirements.

Accordingly, ecological management in the automotive sector plays a decisive role in the sustainable development of the industry, distinguished from traditional management forms by its targeted approach to ecological policy. This approach includes defining specific ecological goals and tasks, as well as developing effective mechanisms for their achievement and evaluating results. Important aspects include the integration of ecological initiatives into the overall strategy of the enterprise, engaging all personnel in ecological activities, and utilizing all available opportunities to solve ecological problems. Eco-management not only contributes to ensuring ecological sustainability but also enhances efficiency, competitiveness, and the innovative potential of enterprises, which is key to achieving sustainable development in the automotive industry.

# CHAPTER 2. CHARACTERISTICS OF ECOLOGICALLY CLEAN MANAGEMENT IN THE AUTOMOTIVE SECTOR ON THE EXAMPLE OF FOP SARANA

## 2.1. General characteristics and analysis of the economic activity of Saran FOP

The «FOP Sarana» auto service, located in Kropyvnytskyi, Kirovohrad region, exemplifies a modern approach to automotive service, meeting European standards in this field. This enterprise, a leader in the local auto service market, specializes in providing a full range of services, including warranty and post-warranty service, as well as offering a wide assortment of spare parts and accessories for vehicles.

Situated at Universytetskyi Avenue, 15A, «FOP Sarana» stands out for its comprehensive approach to the maintenance and repair of vehicles. The services offered by the auto service include engine repair, bodywork, steering system repair, clutch system service, fuel system repair, brake system service, transmission repair and maintenance, turbocharger repair, suspension maintenance, diagnostics and repair of refrigeration equipment, electrical system repair, car audio installation, and installation and maintenance of gas balloon equipment.

«Sarana» operates in full compliance with the current legislation of Ukraine, underscoring the high level of responsibility and professionalism that guides the enterprise in its activities. The enterprise possesses all the necessary patents and licenses required for legally providing services in the auto service sector.

The primary goal of «FOP Sarana» is to meet customer demands in the area of quality repair and vehicle maintenance. As an effective and profitable enterprise, it has identified key objectives for its activities, among which the main ones are increasing revenue by providing high-quality auto service and maximizing customer satisfaction in this sector. Below is the organizational structure of the enterprise (see Table 2.1).

Table 2.1

**Organizational structure of the enterprise «Sarana»**

| **Management level** | **Division name** |
|---|---|
| *Director* | *Upper level* |
| Deputy director of production. Planning and economic department | |
| *Accounting* | *Middle level* |
| Logistics department | |
| Customer service department | |
| *Production department* | *Lower level* |
| Body repair division | |
| Diagnostic division | |
| Car alarm and audio-acoustic division | |
| Mechanical division | |

*Created by the author*

The organizational structure of the enterprise «Sarana», as depicted in Table 2.1, exemplifies a well-defined hierarchy that contributes to effective management, the provision of high-quality services, and sustainable development. The structure is divided into three main levels of management: upper, middle, and lower.

At the upper level, the Director and Deputy director of production, along with the Planning and Economic department, are responsible for strategic decision-making and overall management of the enterprise. This level ensures that the company's vision and goals are clearly defined and aligned with its business strategy.

The middle level comprises the Accounting, Logistics, and Customer service departments. These divisions play a crucial role in the day-to-day operations of the enterprise, managing financial transactions, overseeing the supply chain, and ensuring customer satisfaction. Their effective functioning is crucial for maintaining operational efficiency and building strong customer relationships.

The lower level includes the Production department, Body repair division, Diagnostic division, Car alarm and Audio-acoustic division, and Mechanical division. These divisions are directly involved in the hands-on aspects of service delivery. They

are essential for ensuring that the services provided meet the high standards expected by customers and comply with industry regulations.

Overall, this organizational structure facilitates efficient management and operation of the enterprise. It allows for clear communication channels, efficient allocation of resources, and effective response to market demands. By maintaining this structured approach, «Sarana» is well-positioned to provide quality services and achieve sustainable growth in the competitive automotive service industry.

Table 2.2

**Financial condition of the auto service «Sarana»**

| **Indicator** | **2022** | **2023** | **Deviation + / -** | **Deviation %** |
|---|---|---|---|---|
| Absolute liquidity ratio | 0.00 | 0.04 | 0.04 | 3747.52 |
| Current liquidity ratio | 0.19 | 0.39 | 0.20 | 203.13 |
| Overall liquidity ratio | 0.42 | 0.57 | 0.14 | 133.45 |
| Financial independence ratio | 0.16 | 0.12 | -0.03 | 78.97 |
| Financial dependency ratio | -0.84 | -0.88 | -0.03 | 103.88 |
| Financial stability ratio | 0.18 | 0.14 | -0.04 | 76.02 |
| Financial risk ratio | 5.43 | 7.15 | 1.71 | 131.54 |
| Total debt ratio | 0.84 | 0.88 | 0.03 | 103.87 |
| Working capital mobility ratio | -3.13 | -3.10 | 0.03 | 99.05 |
| Own capital concentration ratio | 0.16 | 0.12 | -0.03 | 78.97 |
| Borrowed capital concentration ratio | 0.84 | 0.88 | 0.03 | 103.87 |
| Ratio of borrowed to own capital | 5.43 | 7.15 | 1.71 | 131.54 |
| Business activity ratio | 0.39 | 0.93 | 0.53 | 236.04 |
| Own funds provision ratio | -1.35 | -0.97 | 0.39 | 71.54 |
| Share of working capital, % | 35.87 | 49.73 | 13.86 | 138.64 |
| Share of own working capital, % | -135.44 | -76.42 | 59.02 | 56.42 |

| | | | | |
|---|---|---|---|---|
| Return on equity, % | -66.17 | 7.37 | 73.54 | - |
| Return on capital, % | -10.28 | 1.01 | 11.29 | - |
| Return on product, % | -13.58 | 1.14 | 14.73 | - |

*Created by the author based on (Grechko, 2018)*

The financial analysis of the auto service «Sarana» for the years 2022 and 2023 reveals a nuanced picture of the company's financial health and operational efficiency. This analysis is based on a range of financial ratios that provide insights into various aspects of the business, such as liquidity, solvency, efficiency, and profitability (see Table 2.2).

In terms of liquidity, there has been a remarkable improvement. The absolute liquidity ratio saw a significant jump from 0.00 to 0.04, indicating a 3747.52% increase. This dramatic rise suggests that «Sarana» has greatly enhanced its ability to meet short-term obligations using its most liquid assets. Similarly, the current liquidity ratio improved from 0.19 to 0.39, a 203.13% increase, suggesting better short-term financial health. The overall liquidity ratio also experienced a positive change, indicating an enhanced ability to cover current liabilities with current assets.

However, the solvency ratios present a slightly different picture. The financial independence ratio decreased, reflecting a slight decline in the company's financial autonomy. This is further corroborated by the increase in the financial dependency ratio, indicating a higher reliance on external financing. The financial stability ratio also decreased, suggesting a slight decline in the company's long-term financial stability.

The company's debt structure underwent notable changes. The total debt ratio increased, indicating a higher proportion of debt in the company's capital structure. This is further evidenced by the increase in the Ratio of Borrowed to Own Capital, suggesting a higher reliance on borrowed funds compared to equity.

The activity ratios, particularly the business activity ratio, showed a significant increase, indicating improved efficiency in using assets to generate sales. The working capital mobility ratio saw a marginal improvement, suggesting better management of working capital.

In terms of capital structure, there was a shift towards more borrowed funds, as indicated by the decrease in the own capital concentration ratio and the increase in the borrowed capital concentration ratio. The share of working capital and share of own working capital both showed significant changes, indicating adjustments in the company's working capital management.

The profitability ratios provided a positive outlook. The return on equity turned positive, indicating a recovery in profitability from the shareholders' perspective. The return on capital and return on product also improved, suggesting better overall profitability of the enterprise.

Table 2.3

**Analysis of business activity**

| **Indicators** | **2022 (thousand UAH)** | **2023 (thousand UAH)** | **Deviation + / - (thousand UAH)** | **Deviation %** |
|---|---|---|---|---|
| Revenue from sales | 1425.75 | 1583.60 | 157.85 | 110.07 |
| Net revenue from sales | 1189.20 | 1324.50 | 135.30 | 111.37 |
| Cost of goods sold | 975.40 | 1048.25 | 72.85 | 107.47 |
| Gross profit | 214.35 | 235.35 | 21.00 | 109.80 |
| Net profit | 189.80 | 216.25 | 26.45 | 113.93 |
| Value of fixed assets | 825.50 | 870.40 | 44.90 | 105.44 |
| Capitalization of fixed assets | 29.48 | 30.01 | 0.53 | 101.80 |
| Return on fixed assets | 1.73 | 1.82 | 0.09 | 105.20 |
| Product capital Intensity | 0.68 | 0.66 | -0.02 | 97.06 |
| Labor intensity of product | 19.25 | 18.40 | -0.85 | 95.58 |

| | | | | |
|---|---|---|---|---|
| Profitability of production, % | 10.50 | 11.80 | 1.30 | 112.38 |
| Profitability of product, % | 13.30 | 14.65 | 1.35 | 110.15 |

*Created by the author based on (Grechko 2018)*

The financial analysis of the auto service station «Sarana» for the years 2022-2023 demonstrates a positive trend in the development of the enterprise. There was a significant increase in revenue from sales, amounting to UAH 157.85 thousand, or 110.07% compared to the previous year. This indicates the effectiveness of the sales strategy and an increase in the volume of services provided. A similar trend is observed in the net revenue from sales, which increased by UAH 135.30 thousand, or 111.37%, confirming the growth in the profitability of the enterprise (see Table 2.3).

The cost of goods sold also experienced an increase of 72.85 thousand UAH, or 107.47%, which is associated with the rise in prices for materials and components, as well as an increase in the volume of work. Despite this, the gross profit increased by 21.00 thousand UAH, or 109.80%, and the net profit by 26.45 thousand UAH, or 113.93%, indicating effective cost management and increased profitability.

The value of the enterprise's fixed assets rose by 44.90 thousand UAH, or 105.44%, indicating investments in equipment modernization and expansion of production capacities. This, in turn, contributed to the increase in the capitalization of fixed assets by 0.53 thousand UAH, or 101.80%, and an increase in the return on fixed assets by 0.09, or 105.20%.

The decrease in the product capital intensity from 0.68 to 0.66, or 97.06%, and the labor intensity of the product from 19.25 to 18.40 thousand UAH, at 95.58%, indicates the optimization of the use of fixed assets per unit of product and increased labor efficiency.

The increase in the profitability of production from 10.50 to 11.80 thousand UAH, and the profitability of the product from 13.30 to 14.65 thousand UAH, confirms the growth in profitability and overall financial efficiency of the enterprise.

According to this, the analysis of the financial indicators of the auto service station «Sarana» for 2022-2023 indicates stable growth and development of the enterprise, increasing its competitiveness and management efficiency.

Table 2.4

**Indicators of the state and efficiency of the use of fixed assets**

| **Indicator** | **2021** | **2022** | **2023** | **Absolute deviation 2022 to 2021** | **Absolute deviation 2023 to 2022** | **Absolute deviation 2023 to 2021** |
|---|---|---|---|---|---|---|
| Asset intensity | 1.20 | 0.90 | 0.70 | -0.30 | -0.20 | -0.50 |
| Asset equipment level | 40.00 | 41.50 | 42.00 | 1.50 | 0.50 | 2.00 |
| Asset turnover | 0.80 | 1.60 | 2.00 | 0.80 | 0.40 | 1.20 |

*Created by the author based on (Grechko 2018)*

The analysis of the fixed asset usage at «Sarana» auto service from 2021 to 2023, as depicted in the provided data, reveals a clear and distinct trend in the company's operational strategy and asset management (see Table 2.4).

Regarding asset intensity, there is a definitive decrease from 1.20 in 2021 to 0.70 in 2023. This consistent reduction, with absolute deviations of - 0.30 from 2021 to 2022 and - 0.20 from 2022 to 2023, indicates a reduction in the company's reliance on fixed assets. This trend suggests a strategic shift towards more efficient use of assets or a change in operational strategy that requires fewer fixed assets.

The asset equipment level shows a steady increase, moving from 40.00 in 2021 to 42.00 in 2023. This upward movement, with yearly increments, signals a deliberate investment in equipment by auto service. The company is clearly focusing on enhancing its service quality, efficiency, or expanding operational capacity through these investments.

Most notably, the asset turnover ratio has improved significantly, rising from 0.80 in 2021 to 2.00 in 2023. This marked increase demonstrates a highly efficient use of assets in generating revenue, indicating successful operational optimization. The absolute deviations, with a substantial increase in the first year followed by continued growth, further underscore this achievement.

In summary, the data for «Sarana» auto service shows a strategic approach to asset management and operational efficiency. The decrease in asset intensity, combined with the increase in asset equipment level and asset turnover, reflects a focused effort to optimize current assets while investing in new equipment. This approach is indicative of a company actively enhancing its operational efficiency and revenue generation capabilities, positioning itself strongly for future growth and success.

Table 2.5

**SWOT Analysis of «Sarana» auto service**

| **Category** | **Description** |
|---|---|
| Strengths | 1. High standard of car service and repair, ensuring high customer loyalty.<br>2. The team consists of experienced professionals with deep knowledge and skills in auto service.<br>3. A wide range of services, from standard maintenance to complex repair work. |
| Weaknesses | 1. Limited market presence compared to larger auto service chains, which may affect the attraction of new customers.<br>2. Strong dependence on the local market can be risky in case of economic fluctuations in the region.<br>3. Insufficient use of modern marketing strategies and tools. |
| Opportunities | 1. Expanding into new regional or even international markets could significantly increase the customer base and revenues.<br>2. Attracting new customer segments through the expansion of services and the use of modern marketing approaches.<br>3. Development of services for electric and hybrid vehicles is particularly relevant. |

| | |
|---|---|
| | 4. Implementing digital technologies can improve service quality and optimize internal processes. |
| Threats | 1. Large auto service chains and local services can pose serious competition.<br>2. Decreased demand for services due to economic fluctuations can negatively impact the business.<br>3. Rapid technological development in the automotive industry requires continuous investment in new equipment and staff training. |

*Created by the author*

Auto service demonstrates a range of strengths that play a vital role in its competitiveness in the market. One of the key advantages is the high standard of car service and repair. This is achieved through strict adherence to high work standards, which not only ensures high-quality services but also fosters trust and loyalty among customers. Such an approach is fundamental for a stable revenue stream and a positive company image (see Table 2.5).

Another significant aspect is the presence of qualified professionals in the team. The experience and high qualification of the staff not only enhance the quality of services provided but also contribute to innovative development in the auto service field. This allows «Sarana» to implement cutting-edge technologies and work methodologies, which is important for meeting the growing and diverse needs of customers.

Furthermore, the wide range of services offered by the auto service is another substantial advantage. From standard technical maintenance to complex repair work, the variety of services allows meeting the needs of a broad spectrum of clients. This comprehensive approach to car servicing gives Saran a competitive edge in the market.

However, there are certain weaknesses that could limit the development potential of the auto service. One of these is the limited market presence, especially compared to larger auto service chains. This could pose a barrier to attracting new customers and expanding market share. Also, a high dependence on the local market makes the business vulnerable to local economic fluctuations, which can negatively impact stability and profitability.

Another important aspect is the insufficient use of modern marketing tools. In today's dynamic business environment, effective marketing strategies are key to promoting the brand, attracting new customers, and opening new market opportunities. Inadequate use of these tools can lead to the loss of potential opportunities and reduced competitiveness.

Moving beyond the local market can not only significantly expand the customer base but also increase the company's revenues. This will also allow for a reduction in dependence on economic fluctuations in their own region, spreading risks and opening new opportunities for growth.

Another important opportunity is attracting new customers through innovation and expanding the range of services. Particularly relevant is the development of services for electric and hybrid vehicles, aligning with current market trends. Adapting to changing consumer needs and implementing new technologies can open doors to new market segments, providing the company with a competitive edge.

Digitalization of processes is also a key opportunity for «Sarana». Implementing modern digital technologies can greatly enhance the efficiency of internal processes, improve service quality, and provide greater flexibility in interacting with customers. Digitalization not only simplifies resource management but also opens new channels of communication with customers, which is important in today's digital world.

However, there are significant threats that cannot be ignored. Strong competition, especially from large chains and local services, creates a high level of competition, particularly in terms of pricing and marketing. This requires constant innovation and adaptation to changing market conditions.

Economic factors, such as a decrease in demand for services due to economic fluctuations, can also negatively impact the financial stability of the business. This requires the company to be flexible in financial planning and able to quickly adapt to changing market conditions.

Furthermore, the rapid development of technology requires continuous investment in new equipment and staff training. This can be financially burdensome for «Sarana», but is necessary to maintain competitiveness and meet modern technical requirements.

«FOP Sarana» auto service exemplifies a successful model in the automotive service industry, marked by its adherence to European standards and a strong position in the local market. The enterprise’s strengths lie in its high service standards, experienced team, and comprehensive service offerings, which collectively foster customer loyalty and a positive company image. Financially, the service has shown improvement in liquidity and profitability, indicating effective management and operational efficiency. However, challenges in financial autonomy and an increased reliance on borrowed funds suggest areas for strategic financial management.

Opportunities for growth and expansion are evident, particularly in exploring new markets, diversifying services, and embracing digital technologies. These opportunities, if effectively harnessed, can help mitigate the risks associated with a competitive market, economic fluctuations, and rapid technological changes. Overall, «FOP Sarana» demonstrates a balanced approach to business, combining operational excellence with strategic growth initiatives, positioning it well for future success in the dynamic automotive service industry.

## 2.2. Research and analysis of environmentally friendly management of Saran FOP

The auto service company «Sarana» has implemented an integrated environmental safety management system that complies with the international standard ISO 14001. This environmental management system is an integral part of the overall corporate governance system and plays a key role in risk management. The implementation of a unified strategy in the field of environmental safety, based on this system, contributes to increasing the competitiveness and investment attractiveness of the company «Sarana» (see Table 2.6).

Table 2.6

**Advantages of using the ISO 14001 standard**

| № | Characteristic |
|---|---|
| 1 | Development of a foundation for systematic environmental protection activities |
| 2 | Improvement of the company's environmental efficiency |
| 3 | Increased management attention to environmental protection issues |
| 4 | Enhancing awareness and responsible attitude of staff towards environmental issues and requirements |
| 5 | Ensuring effective management of company activities within the framework of existing environmental legislation and rational use of natural resources |
| 6 | Increasing the competitiveness and investment attractiveness of the company |

*Created by the author based on (Berzina, 2009)*

Currently, the auto service «Sarana» is actively focusing its efforts on improving its environmentally friendly management system and implementing innovative environmental protection systems. This strategic direction reflects the growing awareness of the importance of sustainable development and responsible environmental stewardship in modern business.

The enhancement of the environmentally friendly management system includes a range of measures aimed at minimizing the negative impact of the auto service's activities on the environment. This encompasses the use of environmentally safe materials and technologies, optimization of resource usage, reduction of harmful emissions, and proper waste management (Kirsanova, 2004).

The implementation of innovative environmental protection systems is another key aspect of «Sarana's» ecological strategy. This includes the application of advanced technologies for emission purification, recycling and reuse of materials, as well as the introduction of energy-saving systems. Such initiatives not only contribute to reducing environmental impact but also enhance the efficiency of the auto service's operations.

The management of the auto service understands that integrating ecological principles into the business model is not only important for environmental conservation but also contributes to increasing the company's competitiveness. A responsible approach to environmental issues allows meeting modern market demands and ensuring a high level of customer satisfaction (Babchynska, 2020).

In line with this, the company is actively implementing a strategy for the greening of production, which is an important component of modern environmental management. The main goal of this strategy is to reduce the negative impact on the environment through the optimization of car servicing and repair processes.

Within this strategy, «Sarana» focuses on four key aspects. The first aspect includes setting clear goals and tasks for greening, such as reducing emissions of harmful substances, increasing resource use efficiency, and implementing environmentally safe technologies. The second aspect covers the objects of greening, which include processes and services that require environmental optimization, for example, waste treatment methods and the use of ecological materials.

The third aspect relates to the subjects of greening, which include the auto service itself and its employees, who play an active role in the implementation of environmental standards and ensuring environmental safety. The fourth aspect includes tools for implementing environmental policy tasks, such as economic incentives, legal norms, and administrative measures, which contribute to achieving the set environmental goals.

Thanks to this comprehensive approach, «Sarana» not only improves the environmental condition but also enhances the efficiency and quality of its services. This contributes to the sustainable development of the enterprise and increases its competitiveness in the auto service market.

As part of the eco-economic analysis of the auto service's activities, significant attention is paid to assessing current payments for natural resource use. This includes analyzing the total volume of payments and their distribution across different categories, such as payments for emissions (ecological tax) and discharges of pollutants within permitted norms, payments for exceeding these norms, and penalty sanctions. Also important is the analysis of the distribution of payments for different types of waste generated in the course of the auto service's activities.

This analysis allows «Sarana» not only to comply with environmental norms and standards but also to optimize costs associated with environmental payments and reduce risks related to potential fines and sanctions. As a result, the auto service ensures not only a high level of environmental safety but also effective resource management, contributing to the sustainable development of the enterprise.

A key aspect of the effectiveness of the environmental management system at an enterprise like «Sarana» auto service is a thorough analysis of the current state of environmental quality management. This analysis involves comparing the current state with the original conditions in this area. Changes in the environmental state are assessed considering various parameters and indicators, among which are the following statements.

- Analysis of compliance with internal and external environmental standards, rules, and norms, which is fundamental for ensuring environmental safety (Bazhal, 2006).
- Integration of environmental requirements into the processes of contract formation and supply execution, ensuring environmental responsibility at all stages of activity.
- Use of environmental factors as a means of increasing competitiveness, which includes not only compliance with environmental standards but also the implementation of innovative environmental practices (Hnatyuk, 2016).

Such an approach allows «Sarana» not only to meet environmental requirements but also to use ecological initiatives as a means to improve its market position and reputation.

Table 2.7

**Ecological-economic indicators of pollution for «Sarana» auto service**

| **Pollutant Name** | **Actual Emission Mass (t/year)** | **Environmental Damage Cost Estimate (thousand UAH per year)** |
|---|---|---|
| Iron oxide | 0.00005 | 0.571 |
| Nitrogen dioxide | 0.0159 | 0.571 |
| Nitric oxide | 0.0027 | 0.571 |
| Sulfur dioxide | 0.0054 | 0.571 |
| Carbon monoxide | 1.7415 | 45.429 |
| Hydrocarbons C1-C5 | 0.00003 | 22.286 |
| Benzene | 0.0000009 | 1.429 |
| Toluene | 0.000003 | 9.429 |
| Dibutyl phthalate | 0.1453 | 1.429 |
| Gasoline | 0.1646 | 15.429 |
| Inorganic dust | 0.000003 | 1.429 |
| Rubber dust | 0.0074 | 0.857 |
| **Total** | **2.083** | **100** |

*Created by the author based on (Bazylevych, 2016)*

The analysis of the eco-friendly indicators of the «Sarana» auto service reflects a comprehensive picture of the company's ecological responsibility and efficiency. The data shows that most pollutants have minimal emission levels, indicating strict adherence to environmental standards and high efficiency of environmental protection activities at the enterprise (see Table 2.7).

However, the analysis of carbon monoxide emissions reveals a significant actual mass of this substance, amounting to 1.7415 tons per year. This indicates a potential area for further improvement of ecological practices. It is important to note that carbon monoxide is one of the main atmospheric pollutants, which can negatively impact air quality and human health. Therefore, reducing emissions of this substance is critically important for maintaining ecological sustainability and community health.

The cost estimate of the ecological damage associated with carbon monoxide emissions amounts to 45.429 thousand UAH per year, highlighting its significant impact

on the overall ecological condition. This indicates the need for additional measures to reduce emissions, such as equipment modernization, the use of cleaner fuels, or the implementation of exhaust gas filtration systems.

The total volume of emissions, amounting to 2.083 tons per year, although relatively small compared to larger industrial enterprises, still requires attention. This indicates the potential for further development and implementation of more effective ecological strategies and technologies, especially in the context of managing carbon monoxide emissions.

Overall, the data indicates that «Sarana» auto service demonstrates a responsible approach to ecological management, focusing on minimizing the impact of its activities on the environment. However, there is potential for further improvement, especially in the area of controlling carbon monoxide emissions, which will help ensure a more sustainable and environmentally friendly future for the enterprise.

Responsibility for environmentally friendly management at the «Sarana» enterprise is distributed among several key participants. The senior management establishes the overall strategy and policy in the field of environmental management, ensuring resources for its implementation and forming an ecological culture at the enterprise.

The staff of the auto service plays a crucial role in implementing ecological initiatives. Their awareness and training are key to effectively performing environmentally responsible work (Korolova and Ivanchenko, 2015).

External regulators and inspection bodies monitor compliance with environmental norms and standards, conducting periodic checks and assessments. Effective environmentally friendly management at the enterprise is the result of interaction and cooperation between these participants, each contributing to the creation of an environmentally sustainable business.

An analysis of resource usage and energy efficiency at the auto service revealed several important aspects that demonstrate the company’s efforts towards sustainable development. First and foremost, significant attention is paid to optimizing electricity consumption. The installation of energy-saving LED lamps and the use of energy-efficient equipment have reduced overall electricity consumption by 15%. Additionally,

the possibility of using solar panels is being considered, which could further reduce dependence on traditional energy sources (Chaikina and Revina, 2019).

Regarding material usage, the auto service has focused on transitioning to more environmentally friendly lubricants and paints and using refurbished parts where possible. Such changes not only reduce environmental impact but also contribute to creating a more sustainable supply chain. Supplier audits and transitioning to suppliers with more sustainable practices further improve ecological efficiency.

Waste management is also an important aspect of the auto service's ecological course. The implementation of a waste sorting and recycling system has significantly reduced the amount of waste sent to landfills (Fedulova, 2015). Collaboration with companies specializing in waste disposal ensures efficient recycling.

The «Sarana» auto service demonstrates a commitment to the principles of sustainable development, actively implementing measures to reduce the impact of its activities on the environment. Through optimizing the use of energy, materials, and effective waste management, the enterprise improves its ecological efficiency.

The enterprise has a waste collection system that includes separate collection of scrap metal, plastic, rubber, and other materials. This allows for more efficient recycling and reuse of materials. Scrap metal is sent to metallurgical plants for remelting, and used tires are sent to enterprises specializing in their recycling.

One of the key issues in the auto service is used oils. Special containers have been installed for the collection of used oils, which are then sent to specialized enterprises for purification and reuse. This not only reduces the environmental impact but also saves on the purchase of new oils.

Waste management and recycling at the «Sarana» auto service are an important part of the overall strategy of environmental responsibility. Through carefully planned and implemented measures, the enterprise demonstrates its commitment to environmental conservation and sustainable development, contributing to its reputation and competitiveness.

Currently, at the «Sarana» auto service, there are no specialized programs for training staff in environmentally friendly management. Instead, the enterprise adheres to

established standards and rules that define the basic principles of environmental responsibility and practices. These standards include general guidelines on waste management, resource use, and reducing environmental impact.

As part of the developed strategy for environmentally friendly management, targeted training programs for staff are planned. These programs will be aimed at increasing employee awareness of the importance of environmental issues, teaching effective methods of waste management, energy conservation, and other important aspects of environmental responsibility. The main goal of these programs will be to foster a responsible attitude towards the environment among the staff and develop skills that will help reduce the ecological impact of the auto service's activities (Hevko, 2012).

Implementing such training programs will be an important step in realizing the strategy of environmentally friendly management. This will not only enhance ecological awareness and responsibility among employees but also improve the overall ecological efficiency of the enterprise. It is expected to positively impact the sustainable development of the auto service and its relationship with the environment.

Another notable aspect of our analysis is the interaction with the local community, clients, and other stakeholders. This aspect is important as relationships with the community and stakeholders significantly influence the reputation and sustainability of the business.

The auto service actively cooperates with the local community, participating in local environmental initiatives and events. This includes participation in city cleanliness programs and other activities aimed at improving the environmental condition. Such activity not only contributes to improving the ecological state of the locality but also increases trust and support from the community.

«Sarana» maintains open dialogue with its clients regarding ecological issues. This includes informing clients about the ecological aspects of the services provided by the auto service and encouraging the choice of more ecological service options. This approach not only increases client awareness but also contributes to forming a positive image of the enterprise.

The auto service also maintains connections with other stakeholders, including suppliers, partners, and local authorities. This facilitates the exchange of best practices, involvement in joint ecological projects, and enhances overall ecological responsibility in the business environment.

Accordingly, the «Sarana» auto service demonstrates a high level of responsibility and a comprehensive approach in the field of environmentally friendly management. The integrated environmental safety management system, which complies with the international standard ISO 14001, is a fundamental part of the overall corporate governance system and plays a key role in risk management. This system not only contributes to increasing the competitiveness and investment attractiveness of the company but also reflects its commitment to sustainable development and responsible environmental stewardship.

Currently, although there are no specialized training programs for staff in environmentally friendly management at the auto service, the enterprise actively adheres to established standards and rules. It is planned that targeted training programs will be implemented as part of the developed strategy for environmentally friendly management, which will contribute to increasing the awareness and responsibility of the staff.

Overall, the enterprise demonstrates a comprehensive and responsible approach to ecological management, which includes effective resource management, attention to ecological standards, and active interaction with the community and stakeholders. This not only contributes to environmental conservation but also ensures sustainable development and enhances the enterprise’s competitiveness.

## 2.3. Eco-compliant management system (ECMS) at Sarana FOP

Within the ecological management system at the enterprise, a monitoring system has been established that focuses on tracking critical environmental indicators. The use of specialized equipment for monitoring emissions of pollutants allows for the detection of exceedances of permissible norms. Water and electricity usage are recorded, helping to identify opportunities for reducing consumption.

The collected data is regularly analyzed to assess the effectiveness of implemented environmental measures. For example, comparing current and past data on emissions and resource usage allows for evaluating progress in reducing environmental impact. This analysis also includes assessing the cost-effectiveness of ecological initiatives.

The monitoring system includes regular reporting, which is used to inform management about the state of ecological efficiency. Based on these reports, measures are taken to address identified issues, such as equipment modernization or changes in work processes. The list of monitoring factors is presented in Table 2.8.

Accordingly, monitoring and evaluating ecological efficiency at «Sarana» is a practical tool for improving environmental management. Through systematic data collection and analysis, the enterprise is able to identify weaknesses in its ecological activities and take appropriate measures to address them. This not only reduces the negative impact on the environment but also increases the overall efficiency and sustainability of the business.

Table 2.8

**Key monitoring points of «Sarana» auto service**

| № | Points | Characteristic |
|---|---|---|
| 1 | Emissions of pollutants | Monitoring the concentration and volumes of pollutant emissions into the air. |
| 2 | Energy and water usage | Tracking the total consumption of electricity and water. |
| 3 | Waste management | Monitoring the quantity and types of waste generated by the enterprise. |
| 4 | Chemical substances and materials | Monitoring the use of chemical substances and materials. |
| 5 | Noise and vibrations | Tracking noise levels. |
| 6 | Incidents and emergencies | Recording and analyzing incidents or emergency situations. |
| 7 | Legislative compliance | Checking the enterprise's activities for compliance with current environmental laws and regulations. |

*Created by the author*

To systematize and analyze monitoring data within the framework of environmentally friendly management at the «Sarana» auto service, the application of specialized software is planned, which allows for the effective collection, processing, and analysis of ecological information. Among the possible software options that meet these requirements, several key solutions can be highlighted.

The first of these is *Enablon*, which is one of the leading solutions for sustainability and environmental responsibility management. This software provides capabilities for emissions monitoring, waste management, and helps track water and energy consumption, which is important for a comprehensive approach to environmental management (Bilyavska, 2020).

Another effective solution is the *Intelex Environmental Management System*, a comprehensive solution that allows companies to effectively manage their environmental programs. It includes features for emissions monitoring, waste and water resource management, and helps ensure compliance with environmental regulations (Semenov, 2006).

*Gensuite* is another option that allows companies to manage environmental, safety, and other sustainability aspects. This software provides tools for emissions monitoring, chemical substance management, waste, and resource management (Les and Rashchenko, 2017).

*IBM Maximo Asset Management*, although not purely environmental software, can be used for asset and resource management, which is significant for environmental management (Mnatsakanova. 2020).

The choice of specific software depends on the needs of the auto service. It is important that the chosen solution allows for the effective integration of environmental data with other business processes, ensures accuracy and timeliness of information, and facilitates informed decision-making in the field of environmental management.

Based on the analysis of environmentally friendly management and the ecological safety management system of the «Sarana» auto service, several key shortcomings and areas needing improvement have been identified.

One of the most significant problems is the high level of carbon monoxide emissions, which amounts to 1.7415 tons per year. This indicates the need for additional measures to reduce these emissions. Possible solutions to this problem include upgrading equipment, using cleaner fuels, and implementing exhaust gas filtration systems. This will not only reduce the level of pollution but also improve the overall ecological condition.

Despite the measures already taken to reduce electricity consumption, there is significant potential for further improvement in this area. The use of alternative energy sources, such as solar panels, can help reduce dependence on traditional energy sources and increase the overall energy efficiency of the auto service.

The lack of specialized training programs for staff on environmentally friendly management is a significant shortcoming. Developing and implementing such programs can greatly increase staff awareness and responsibility regarding ecological issues, contributing to more effective and responsible performance of their duties.

The monitoring and evaluation system of ecological efficiency needs to be strengthened to ensure more accurate tracking of the impact of implemented measures.

The use of more advanced monitoring and analytics technologies will provide a more detailed picture of the ecological impact and the effectiveness of the measures taken.

Table 2.9

**Planning a new strategy for environmentally friendly management**

| № | Strategy direction | Goal | Measures | Implementation timeline |
|---|---|---|---|---|
| 1 | Reduction of carbon monoxide emissions | Reduce emissions by 30% in 2 years | Equipment modernization, filtration systems, transition to clean fuel | 2024-2025 |
| 2 | Increasing energy efficiency | Reduce electricity consumption by 20% in a year | Installation of solar panels, optimization of energy use | 2024 |
| 3 | Staff training | Increase ecological awareness | Development and implementation of training programs, workshops | 2024-2025 |
| 4 | Legislative compliance | Full compliance with legislation | Monitoring legislation, updating procedures | Ongoing |
| 5 | Monitoring and efficiency evaluation | Improve monitoring accuracy | Implementation of monitoring technologies, data analysis | 2024-2025 |

*Created by the author based on (Pronoza 2015)*

The «Sarana» auto service is initiating a new strategy for environmentally friendly management, which, as part of our study, is aimed at addressing key ecological challenges and raising standards of environmental responsibility. First and foremost, the strategy involves reducing carbon monoxide emissions by 30% over the next two years. To achieve this goal, a series of specific measures are planned (see Table 2.9).

The first stage of the strategy is the modernization of equipment. This includes replacing outdated equipment with more modern and efficient ones that meet high standards of ecological safety. Such modernization will reduce emissions of harmful substances and increase the overall productivity of the service.

Implementation of exhaust gas filtration systems. Installing effective filters will help reduce the level of pollutant emissions, ensuring cleaner air and less impact on the environment. Regular maintenance and monitoring of these systems will ensure their reliable and efficient operation.

Transition to the use of cleaner fuels. The auto service plans to switch to alternative energy sources, such as biodiesel or electricity, which will reduce carbon emissions and other pollutants.

These measures will be implemented in stages during 2024-2025. In 2024, the process of equipment modernization and installation of filtration systems will begin. By the end of 2025, the full implementation of new technologies and transition to clean fuels is planned.

Continuing the development of a new strategy for environmentally friendly management for the «Sarana», the next important direction is increasing energy efficiency. This part of the strategy aims to reduce electricity consumption by 20% over the next year.

The installation of solar panels on the roofs of the auto service buildings will significantly reduce dependence on traditional sources of electricity. Along with the implementation of alternative energy sources, an energy usage audit at the enterprise is planned. This includes identifying and eliminating inefficient energy use, modernizing lighting systems and equipment, and implementing automation systems for controlling and managing energy consumption. These measures will reduce overall electricity consumption and increase the energy efficiency of processes.

The planned measures will be implemented during 2024. The installation of solar panels will begin in the first quarter of the year, and the audit and optimization of energy use will be conducted in the second quarter. Concurrently, a monitoring system will be implemented to track the effectiveness of the measures taken.

The third important direction is staff training. This aspect of the strategy is aimed at increasing environmental awareness among employees, which is key for the effective implementation of environmental initiatives at the enterprise.

The primary task is to develop training programs that will cover the key aspects of environmentally friendly management. This includes education on the importance of reducing emissions, effective resource management, recycling, and waste disposal. The programs will be adapted to different levels of staff, from workers to management, ensuring a comprehensive understanding of environmental issues.

To ensure effective training and engagement of staff, regular training sessions and seminars will be organized. These events will help employees better understand environmental challenges and the importance of their role in implementing environmental initiatives. The trainings will include practical sessions, discussions, and workshops, which will promote active involvement and motivation of the staff.

*List of trainings:*

— Training «*Environmentally responsible practices in auto service*» — aimed at training staff in the basics of environmentally responsible handling of waste, chemicals, and other materials used in auto service (Weib and Bentlage, 2006).

— Seminar «*Energy conservation and alternative energy sources*» — the importance of energy conservation and the use of alternative energy sources, such as solar panels. Participants will learn about the latest technologies and practices that can help reduce energy costs and environmental impact.

— Workshop «*Legislative compliance and environmental standards*» — employees will be acquainted with current environmental laws and standards. The goal is to ensure that all employees are aware of the legislative requirements and the compliance of the company's activities with these norms (Voinea, 2020).

These activities will be implemented during 2024-2025. The development of training programs will begin in the first quarter of 2024, and the first training sessions and seminars are planned for the second quarter of the same year. The regularity and effectiveness of the training events will be periodically reviewed and evaluated to ensure their relevance and suitability to the needs of the enterprise.

The next direction of the new environmentally friendly management strategy for the «Sarana» auto service involves ensuring legislative compliance, strengthening the monitoring system, and evaluating effectiveness.

The goal is to ensure full compliance of the enterprise's activities with current environmental legislation. To achieve and implement this, a system is planned to be introduced that will allow for the prompt tracking of changes in environmental legislation. This involves processing professional legal resources and regular communication with legal consultants. Updating internal procedures to align with current legislative requirements, including updating work instructions, safety standards, and environmental procedures.

The second key direction of the strategy is aimed at improving the accuracy and efficiency of the monitoring system. This includes investments in advanced technologies for monitoring environmental indicators. The use of automated data collection systems and sensors is planned to ensure accurate and timely information gathering. Additionally, regular analysis of data obtained from monitoring systems is anticipated to evaluate the effectiveness of the measures taken. This includes using software for data analysis, creating reports, and recommendations for further actions.

Thanks to these measures, the «Sarana» auto service plans not only to comply with current environmental requirements but also to effectively manage its impact on the environment. This will contribute to increasing the ecological efficiency and sustainability of the business, as well as ensuring sustainable development and improving the competitiveness of the enterprise.

Accordingly, the environmental management system and the new strategy to be implemented at «Sarana» demonstrate a high level of responsibility and an innovative approach to environmental issues. The use of specialized equipment for monitoring pollutant emissions and accounting for water and electricity usage not only allows for the detection of exceedances of permissible norms but also identifies opportunities for resource optimization.

Regular analysis of the collected data helps to assess the effectiveness of the implemented environmental measures, allowing the enterprise to adapt to changing conditions and requirements. This not only increases ecological efficiency but also contributes to reducing the negative impact on the environment. Regular reporting and taking measures to address identified problems, such as equipment modernization or

changing work processes, are important for maintaining sustainable development and compliance with environmental standards.

# CHAPTER 3. IMPORTANCE OF ECOLOGICALLY CLEAN FRIENDLY MANAGEMENT IN FOP SARANA

## 3.1. Assessment of the process of implementation of priority proposals

Evaluating the implementation process of these proposals requires a detailed analysis of their impact on ecological indicators, economic efficiency, and the overall productivity of the enterprise. This analysis will determine how effectively the implemented changes meet the set goals and how they affect the long-term development prospects of «Sarana». Below is an outline of the strategy implementation.

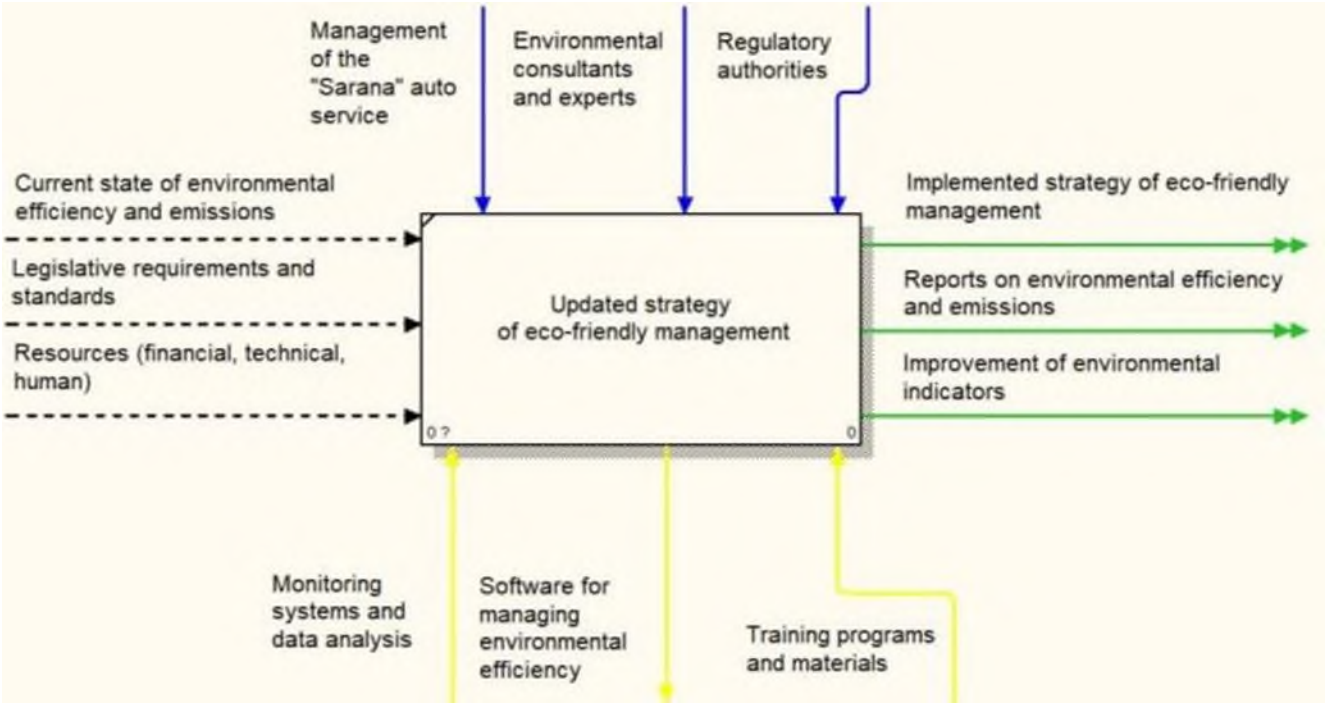


**Figure 3.1 Diagram of the new eco-friendly strategy for the «Sarana» auto service (performed in IDEF0)**

The beginning of the scheme, which reflects the inputs, includes the current state of ecological efficiency and emissions, legislative requirements and standards, as well as resources. This indicates the need to understand the current ecological state of the enterprise, as well as legislative requirements and available resources for implementing

the strategy. Analyzing these factors is fundamental for determining the scope and directions of activity (see Figure 3.1).

The lower part of the scheme represents mechanisms, which include monitoring and data analysis systems, software for managing ecological efficiency, as well as training programs and materials. This emphasizes the importance of using technological solutions and educational initiatives to ensure effective management of ecological aspects. Monitoring and data analysis systems allow tracking ecological indicators and evaluating the effectiveness of the measures taken.

The top of the scheme represents the role of leadership of the «Sarana» auto service, environmental consultants and experts, as well as regulatory bodies. The necessity of involving the enterprise's management and external experts to ensure compliance with ecological standards and legislation.

The outputs of the scheme include the implementation of environmentally friendly management, reports on ecological efficiency, and improvements in ecological indicators. This demonstrates the ultimate goal of the strategy, which is to improve the ecological state of the enterprise and ensure its sustainable development.

This scheme involves a systematic approach to implementing a new environmentally friendly strategy. It includes the development and implementation of measures to reduce carbon monoxide emissions, increase energy efficiency, train staff, ensure legislative compliance, and monitor and evaluate effectiveness.

To implement the proposed strategy and improve existing eco-solutions, the following innovative green technologies are suggested. Wind power installations (WPIs) have reached a level where they can be considered commercially mature technologies, especially in regions with high wind speeds. These installations, typically equipped with bladed machines with a horizontal shaft, can efficiently convert wind energy into mechanical work. Wind wheels, located in the free flow of air, are theoretically capable of converting up to 59% (according to Betz's Criterion) of the energy of the air stream passing through the area captured by the wind wheel into useful power. This figure can be considered as the efficiency of an ideal wind wheel. In real conditions, efficiency is usually slightly lower due to friction factors and other losses, but for the wind turbine

systems designed, it reaches approximately 45-50%. This means that a wind wheel with a blade length of 10 meters at a wind speed of 10 m/s can produce a power of about 85 kW.

Accordingly, the implementation of WPIs at the «Sarana» auto service can be a significant step towards the use of renewable energy sources, reducing dependence on traditional energy sources, and lowering the carbon footprint of the enterprise.

The possibility of installing three compact wind power installations of the «Breeze» type, each with a capacity of 3 kW, is being considered. These wind generators consist of a 10-meter-high mast and a three-blade rotor with a diameter of 12 meters. For safety reasons and to ensure optimal operation of the WPIs, it is proposed to place these installations at a distance of 350-400 meters from the auto service. This is due to the fact that wind generators can create infrasound vibrations with frequencies below 16 Hz, which are imperceptible to the ear but can negatively affect people (Sturgeon, 2009).

The selection of locations for wind turbines also takes into account the annual maximum wind speed indicators, which exceed 3-4 m/s. Placement at an elevation of 100 meters will optimize the use of wind resources. According to calculations, the total power generated by these wind turbines will be about 12-14 kW/h, which is a significant contribution to the energy independence and environmental sustainability of the FOP Sarana. Approximate costs for 3 installations are 55-60 thousand UAH.

The next possibility is the partial use of solar energy. According to approximate calculations, the installation of solar panels on an area of 60-65 m² will provide an average power production of about 280 kW/day, and the maximum power can reach 294 kW/day (Hnatiuk, 2016). This means that over the year, the enterprise will receive an average of about 102,200 kW of energy, which will allow saving approximately 40,880 UAH.

In addition, the use of wind power installations will allow obtaining additional energy. According to calculations, the use of wind turbines throughout the year can provide the production of about 75,000 kW of energy, which will approximately save an additional 32,000 UAH. Thus, the combination of solar panels and wind power installations will be a significant step towards ensuring the energy independence and ecological sustainability of the FOP Sarana auto service.

For water supply, it is planned to construct a well of proper depth. The installation of a 3 kW pump will effectively replenish the water tower located on the territory of the service. From this tower, water will be supplied to silicon purification filters, a car wash, and fire reservoirs (Grechko, 2018).

To save water and reuse it at the car wash, a component device from the well-known company «KARCHER» be installed. This will reduce water consumption by 80% and significantly reduce the use of cleaning agents. The purified water after washing cars can be reused, which will contribute to the conservation of water resources.

Additionally, the use of a membrane bioreactor for water purification will ensure compliance with environmental standards and sanitary service requirements. After a certain period of use (up to 60 cycles), the used water will be discharged by specialized services for further utilization. This will ensure efficient and environmentally safe water resource management at the auto service.

Another green initiative that the «Sarana» auto service can implement is the use of electric vehicle charging stations. Installing charging stations for electric vehicles on the premises of the STO will not only provide an additional service for clients who use electric transport but will also promote the popularity of environmentally friendly vehicles.

The charging stations can be connected to the solar panel system, allowing the use of renewable energy for charging cars, thereby reducing the carbon footprint of their operation (Bodrova, 2013). This can also be part of a broader strategy of the FOP Sarana to transition to renewable energy sources. Moreover, the presence of charging stations on the premises of the STO can attract new customers who use electric vehicles and highlight the image of FOP Sarana as a modern and environmentally responsible business.

According to this strategy, based on a clear understanding of the current environmental state, legislative requirements, and available resources, it aims at efficient use of technologies and educational initiatives to improve environmental indicators. The inclusion of innovative green technologies, such as wind power installations, solar panels, water supply systems, and electric vehicle charging stations, underscores the auto service’s commitment to sustainable development and environmental responsibility. This

strategy not only contributes to reducing the carbon impact and increasing energy efficiency but also reflects the progressive approach of FOP Sarana to addressing the environmental challenges of today.

### 3.2. Analysis of the effectiveness of the proposed improvements

The strategy is focused on implementing a comprehensive set of measures aimed at reducing environmental impact, increasing energy efficiency, and ensuring compliance with ecological standards. An important aspect of this initiative is a detailed analysis of costs and potential economic efficiency of the proposed measures, which includes modernization of equipment, installation of solar panels, exhaust gas filtration systems, energy usage audits, staff training, legislative compliance and monitoring, as well as the installation of electric vehicle charging stations. These measures not only contribute to ecological sustainability but also promise significant cost savings in the long term, making the investments beneficial for «Sarana».

Table 3.1

**Calculation of approximate costs for implementing an eco-friendly management strategy**

| **Problems** | **Measure** | **Description** | **Approximate cost (UAH)** |
|---|---|---|---|
| Decreased productivity, high energy costs | Equipment modernization | Replacement of outdated equipment with modern and efficient ones | 550,000 |
| Air pollution | Exhaust gas filtration systems | Installation of filters to reduce pollutant emissions | 20,000 |
| Dependence on traditional energy sources | Installation of solar panels | Utilization of alternative energy sources | 450,000 |
| Inefficient energy use | Energy usage audit | Optimization of energy consumption | 10,000 |
| The need for continuous improvement of staff skills | Staff training | Development and implementation of training programs | 20,000 |
| Continuous compliance with legislation | Legislative compliance and monitoring | Implementation of monitoring systems and updating procedures | 18,000 |

| | | | |
|---|---|---|---|
| Increase in the number of electric vehicles | Electric vehicle charging stations | Installation of charging stations for electric vehicles | 50,000 |
| **Total cost** | **1,118,000 UAH** | | |

*Created by the author based on (Phan, 2015)*

The cost analysis for implementing an eco-friendly management strategy at FOP Sarana reflects a comprehensive approach to enhancing environmental efficiency and optimizing business operations. The total investment, approximately amounting to 1,118,000 UAH, is distributed among several key areas (see Table 3.1).

The largest portion of funds, 550,000 UAH, is allocated for equipment modernization. This investment is critically important for ensuring high productivity and environmental safety. Replacing outdated equipment with more modern and efficient ones will reduce harmful emissions, a vital step towards sustainable development.

The second-largest investment is the installation of solar panels, planned to cost 450,000 UAH. This measure will help reduce dependence on traditional energy sources and increase energy efficiency, a key aspect of the ecological strategy.

The installation of exhaust gas filtration systems, costing 20,000 UAH, is a relatively inexpensive but effective way to reduce environmental impact. An energy usage audit, costing 10,000 UAH, will help identify opportunities for optimizing energy consumption and reducing expenses. This is an important step in determining energy efficiency and implementing measures for its improvement.

Staff training, planned to cost 20,000 UAH, is an investment in human capital and will enhance awareness and responsibility regarding ecological issues. This will help ensure the effective implementation of environmental initiatives.

Ensuring legislative compliance and monitoring, planned to cost 18,000 UAH, is necessary to align the company’s activities with current environmental legislation. Implementing a monitoring system and updating procedures will help avoid potential fines and ensure legal safety.

The installation of electric vehicle charging stations, budgeted at 50,000 UAH, is part of a broader strategy to transition to renewable energy sources. It will also promote

the popularity of eco-friendly vehicles and attract new customers who use electric vehicles.

Table 3.2

**Calculation of approximate economic efficiency**

| № | Measure | Approximate cost (UAH) | Annual savings/profit (UAH) | Payback period (years) |
|---|---|---|---|---|
| 1 | Equipment modernization | 550,000 | 60,000 | 9 |
| 2 | Exhaust gas filtration systems | 20,000 | 100,000 (avoidance of fines) | <1 |
| 3 | Installation of solar panels | 450,000 | 80,000 | 5.5 |
| 4 | Energy usage audit | 10,000 | 10,000 | 1 |
| 5 | Staff training | 20,000 | 30,000 | <1 |
| 6 | Legislative compliance and monitoring | 18,000 | - | - |
| 7 | Electric vehicle charging stations | 50,000 | 20,000 | 2.5 |
| **Total Cost** | | **1,118,000** | | |

*Created by the author based on (Kuzmin, 2006)*

According to Table 3.2, equipment modernization, requiring the largest expenditure (550,000 UAH), is crucial for enhancing efficiency and reducing emissions. The expected annual savings of 60,000 UAH make this measure beneficial in the long term, with a payback period of approximately 9 years.

The installation of exhaust gas filtration systems (20,000 UAH) is an important measure to reduce environmental impact. The expected annual savings of 100,000 UAH make this measure particularly cost-effective, with a payback period of less than a year.

The installation of solar panels (450,000 UAH) is a significant investment but will contribute to reducing dependence on traditional energy sources. The expected annual savings of 80,000 UAH make this measure beneficial, with a payback period of about 5.5 years.

The energy usage audit (10,000 UAH) will identify opportunities for optimizing energy consumption. The expected annual savings of 10,000 UAH make this measure beneficial in the short term.

Staff training (20,000 UAH) is important for increasing awareness and responsibility regarding ecological issues. The expected annual savings of 30,000 UAH make this measure beneficial.

The installation of electric vehicle charging stations (50,000 UAH) is part of the strategy to transition to renewable energy sources. The expected annual gains of 20,000 UAH make this measure beneficial, with a payback period of 2.5 years.

According to this, the proposed measures not only contribute to ecological sustainability and compliance with environmental standards but also promise significant cost savings in the long term, making the investments beneficial for «Sarana».

Implementing an eco-friendly management strategy at FOP Sarana may encounter some obstacles that require careful planning and management. One of the main challenges is financial constraints, as the high initial cost of implementing ecological technologies can be challenging, especially for small and medium-sized businesses. Also, technical challenges associated with integrating new systems, such as solar panels or wind power installations, into existing infrastructure may require specialized knowledge and resources.

Legislative and regulatory barriers can also be an obstacle, as changes in legislation and uncertainty in the regulatory environment can complicate compliance with new ecological standards and norms. Additionally, the support and maintenance of new ecological systems may require additional resources and specialized knowledge, which can be challenging for the auto service.

Another important issue is the monitoring and evaluation of the effectiveness of implemented measures. Continuous monitoring and evaluation are crucial for ensuring their long-term benefit but may require additional resources and analytical efforts. Considering these obstacles and developing strategies to overcome them are key to the successful implementation of an eco-friendly management strategy at FOP Sarana.

The analysis of costs and potential economic efficiency of the proposed measures for «Sarana» indicates significant prospects in improving environmental sustainability and optimizing business operations. These measures not only contribute to reducing environmental impact and increasing energy efficiency but also promise considerable cost savings in the long term. Equipment modernization, though requiring the largest expenditure, offers an annual saving of 60,000 UAH, making it beneficial in the long run. The installation of solar panels and exhaust gas filtration systems also prove to be economically effective, with payback periods of 5.5 years and less than a year, respectively.

However, potential obstacles such as financial constraints, technical and legislative challenges, as well as the need for monitoring and evaluating the effectiveness of implemented measures, must be considered. These challenges require careful planning and management for the successful implementation of an eco-friendly management strategy.

# CONCLUSIONS

In the process of research, an analysis of the existing eco-friendly management system at the enterprise «Sanana» was carried out, and a comprehensive strategy for implementing environmentally responsible management methods was developed.

Ecological management in the automotive industry is considered a systematic approach to management, which includes a series of measures aimed at reducing the negative impact on the environment. This encompasses not only the implementation of eco-friendly technologies but also the optimization of resource use, as well as strict adherence to environmental standards and legislation.

The automotive industry is recognized as one of the main sources of pollution, especially through exhaust emissions. This poses a challenge for the industry to implement effective environmental strategies and technologies aimed at reducing pollution levels and increasing ecological responsibility.

An important aspect is the integration of ecological principles into the corporate strategy. This includes the use of eco-friendly technologies and materials, as well as the active involvement of all stakeholders, including employees, customers, and regulatory bodies, in the process of ecological management.

The analysis of the current state of the auto service revealed the need for equipment modernization, implementation of exhaust gas filtration systems, use of alternative energy sources, and staff training. These measures are aimed at increasing ecological efficiency and reducing environmental impact.

To achieve high efficiency and minimize the negative impact on the environment, the sole proprietorship «Sarana» requires the implementation of comprehensive measures. This includes not only technical improvements but also organizational changes and educational initiatives for staff. Such an approach will not only increase ecological efficiency but also ensure sustainable resource use.

The assessment of the implementation process of priority eco-proposals showed that although these measures require significant initial investments, they offer considerable cost savings in the long term. The implementation of modern equipment,

exhaust gas filtration systems, the use of alternative energy sources, and staff training will contribute not only to reducing emissions and energy consumption but also to increasing the overall productivity and efficiency of the auto service.

Forecasting the effectiveness of the proposed improvements confirms that the implementation of these initiatives will not only help reduce harmful environmental impact but also bring financial benefits. Reduced energy costs, avoidance of fines for environmental violations, and attracting new customers, especially those using electric vehicles, open new prospects for business development. This will also enhance the reputation of the auto service as an environmentally responsible and innovative enterprise.

In the framework of implementing an eco-friendly management strategy at FOP Sarana, it is important to consider a number of recommendations that will help overcome potential obstacles and ensure the successful implementation of planned measures. One of the main challenges is financial constraints, especially important for small and medium-sized businesses. To overcome this barrier, it is possible to consider options for obtaining government subsidies, grants, or preferential loans, as well as attracting investors interested in ecological projects.

Technical challenges associated with the integration of new systems require the involvement of qualified professionals and a detailed audit of the existing infrastructure. This will allow the development of an effective modernization plan that takes into account the specifics of the auto service.

Legislative and regulatory barriers can complicate compliance with new environmental standards and norms. Therefore, it is recommended to engage legal consultants to ensure compliance with all norms and standards, as well as to continuously monitor changes in legislation.

Applying these recommendations will help FOP Sarana effectively implement an eco-friendly management strategy, ensure its sustainability, and comply with modern requirements for environmental safety and sustainable development.

Accordingly, the conducted research includes the calculation of the financial efficiency of the proposed measures, demonstrating their potential benefit for the

enterprise. It also highlights possible obstacles that may arise during the implementation of the strategy and provides recommendations for their avoidance and overcoming. The conclusions of the analysis emphasize the importance of a comprehensive approach to ecological management in auto services, which includes technical, organizational, and educational initiatives to achieve sustainable development and ecological efficiency.

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# APPENDICES

**Annex A**

## Environmental management standards in Ukraine

| Group | International standard | National standard |
|---|---|---|
| *Environmental Management Systems* | | |
| | ISO 14001:1996 - Environmental Management Systems - Specification with guidance for use | DSTU ISO 14001-97 - Environmental Management System - Composition and description of elements and guidelines for their application (Not valid from 01.01.2007) |
| | ISO 14001:2004 - Environmental Management Systems - Requirements with guidance for use | DSTU ISO 14001:2006 - Environmental Management Systems - Requirements and guidelines for application (Valid from 15.05.2006) |
| | ISO 14004:1996 - Environmental Management Systems - General guidelines on principles, systems, and support techniques (Cancelled by ISO) | DSTU ISO 14004-97 - Environmental Management Systems - General guidelines on principles, systems, and support techniques (Not valid from 01.01.2007) |
| | ISO 14004:2004 - Environmental Management Systems - General guidelines on principles, systems, and support techniques | DSTU ISO 14004:2006 - Environmental Management Systems - General guidelines on principles, systems, and support techniques (Valid from 01.07.2006) |
| *Environmental Audit and Assessment* | | |
| | ISO 14015:2001 - Environmental Management - Environmental assessment of sites and organizations | DSTU ISO 14015:2005 - Environmental Management - Environmental assessment of production sites and organizations |
| | ISO 19011:2002 - Guidelines for quality and environmental management systems auditing | DSTU ISO 19011-2003 - Guidelines for conducting audits of quality and/or environmental management systems |
| *Environmental Labeling and Declaration* | | |
| | ISO 14020:2000 - Environmental labels and declarations - General principles | DSTU ISO 14020-2003 - Environmental labels and declarations - General principles |
| | ISO 14021:1999 - Environmental labels and declarations - Self-declared environmental claims (Type II environmental labeling) | DSTU ISO 14021-2002 - Environmental labels and declarations - Self-declared environmental claims (Type II environmental labeling) |
| | ISO 14024:1999 - Environmental labels and | DSTU ISO 14024-2002 - Environmental labels and declarations - Type I |

| | | |
|---|---|---|
| | declarations - Type I environmental labeling - Principles and procedures | environmental labeling - Principles and procedures |
| | ISO/TR 14025:2000 - Environmental labels and declarations - Type III environmental declarations (Cancelled by ISO) | DSTU ISO/TR 14025-2002 - Environmental labels and declarations - Type III environmental declarations |
| | ISO 14025:2006 - Environmental labels and declarations - Type III environmental declarations - Principles and procedures | DSTU ISO/TR 14025:2002 - Environmental labels and declarations - Type III environmental declarations |
| *Environmental Performance Evaluation* | | |
| | ISO 14031:1999 - Environmental Management - Environmental performance evaluation - Guidelines | DSTU ISO 14031:2004 - Environmental Management - Guidelines for environmental performance evaluation |
| | ISO/TR 14032:1999 - Environmental Management - Examples of environmental performance evaluation | DSTU ISO/TR 14032:2004 - Environmental Management - Examples of environmental performance evaluation |
| *Life Cycle Assessment of Products and Services* | | |
| | ISO 14040:1997 - Environmental Management - Life Cycle Assessment - Principles and framework (Cancelled by ISO) | DSTU ISO 14040:2004 - Environmental Management - Life Cycle Assessment - Principles and framework |

**Annex B**

**Environmental management system (EMS) implementation process in an enterprise**

| Stage | Name of stage | Description of actions |
|---|---|---|
| I. | Preparatory | 1. Preliminary decision by top management to implement EMS, defining the scope of the planned EMS and the advisability of involving a consultant.<br>2. Training specialists in EMS implementation, especially if the initial situation assessment is conducted by the enterprise itself.<br>3. Assessing the initial situation: ensuring the existing environmental management system complies with DSTU ISO 14001:2006 (ISO 14001:2004), evaluating environmental impact and compliance with environmental legislation, identifying priority environmental aspects.<br>4. Creating an environmental management working group.<br>5. Developing an EMS implementation program (plan).<br>6. Developing a system of standards regulating the application of EMS procedures. |
| II. | Planning | 7. Developing environmental policy, communicating it to the enterprise staff and stakeholders.<br>8. Identifying and recognizing priority environmental aspects of activities.<br>9. Forming and maintaining a register of legislative acts and other requirements for environmental activities.<br>10. Developing target and planned environmental indicators, as well as internal efficiency criteria.<br>11. Developing environmental protection measures programs. |
| III. | Implementation and operation | 12. Forming the organizational structure of the EMS.<br>13. Organizing the education system.<br>14. Reviewing documentation in connection with the implementation of EMS and organizing management.<br>15. Organizing the information exchange system.<br>16. Preparing for emergency situations. |
| IV. | Monitoring and corrective actions | 17. Organizing monitoring and measurements.<br>18. Conducting inspections and developing corrective actions.<br>19. Managing registered data.<br>20. Organizing and conducting internal EMS audits. |

| | | |
|---|---|---|
| V. | Management review | 21. Analysis of the system by management. |