1. Introduction

Environmental protection (E) is the activity of the state authorities of the Russian Federation and its subjects, local governments, public and non-profit organizations, enterprises and citizens, aimed at preserving and restoring the natural environment, rational use and reproduction of natural resources, preventing the negative impact of any activity on environmental and elimination of the consequences of such activities [2]. Environmental protection is carried out through environmental protection measures (PM), which include all types of economic activities of enterprises, aimed at reducing and eliminating the negative impact on the environment, preserving, improving, and rational use of the natural resource potential of the country. And as any kind of enterprise activity entails a set of costs that affect the cost of products manufactured by an enterprise (services).

The implementation of the PM is a specific form of services, the demand for which will depend on their value and the ability of the enterprise to pay for these services. The market for environmental services can be classified as follows. [3]:

- The market for environmental services that are aimed at achieving environmental goals (the development of environmental protection equipment, the production of organic food, materials for the home, etc.);
− The market of environmental intelligent products (patents and documentation for closed and waste-free technologies, environmentally friendly raw materials and materials, equipment for monitoring of environmental, technologies for eliminating the consequences of accidents, restoration of natural resources, recycling, rehabilitation of territories, etc.);
− Intangible environmental services market (research and development, legal, auditing, educational, advertising, consulting services, as well as services in the areas of environmental certification, certification, metrological certification and standardization, monitoring, etc.);
− The market for “ecological capital” and financial and economic activities in the field of ecology (calculations and collection of environmental payments, environmental insurance, environmental funds, etc.);
− The labor market associated with the accounting and creation of new jobs in enterprises that provide environmental services, as well as with the training of environmental specialists.

When correlating an enterprise with a specific segment of the environmental services market, it is necessary to focus on the ability of the enterprise to pay for services and goods. Based on the cost of services and goods and the financial capabilities of an enterprise, the market for environmental services can be divided into environmental and economic groups (EEG).

The purpose of the article is to study the EEG of the enterprise and the rationale for how to optimize the work of specialists in the selection and provision of environmental services in modern market conditions to improve the efficiency of the environmental protection management system.

2. Materials and Methods
Works in the field of organization and efficiency of environmental activities have formed the theoretical and methodological basis of research [3-7]. In the course of the research, laws, instructions, and guidelines were analyzed on the economic efficiency of environmental protection activities [1, 2, 4, 8-10]. When conducting research, the methods of algebra and logic were used, and the cost indicators of environmental services serve as initial indicators for measuring the costs and environmental effect in determining economic efficiency.

3. Results and Discussion
The term “efficiency” refers to the degree of achievement of specific results. The concept of environmental performance is not equivalent to the general economic category of efficiency with the corresponding indicators in the sphere of material production. Environmental activities can give a “zero” and “negative” result, even with the use of the most qualified labor and the use of modern environmental protection equipment.

The effectiveness of environmental protection cannot be determined unambiguously. In relation to protection measures, three types of efficiency determine: environmental, economic, and social. There is a relationship and interdependence between environmental, social, and economic efficiency [4].

Knowledge of the economic efficiency of the protection measures allows one to get information about the funds spent, which, in turn, more accurately allows you to determine the standards for their financing.

The emergence of the EEG of an enterprise is a reaction of the environmental protection management system to socio-political changes in modern conditions. The EEG is a specific segment of the environmental protection market, which is characteristic of enterprises of any form of ownership and departmental affiliation.

Various types of enterprise expenses (intellectual, financial, labor, and others) are taken into account when forming the enterprise EEG. Depending on the selected protection measures, we determine the EEG, actual workload of the personnel, and the work quality of the work.

The following actions are performed during the formation of the EEG:
− Systematization of all the results of environmental monitoring and control of the state of the environment, which were carried out by the company and the facts of non-compliance with the requirements of regulatory documents (RD);
− Analysis of enterprise capabilities for the implementation of the protection measures;
− Analysis of the financial capabilities of the company to pay a range of services during the implementation of the protection measures;
− Choosing options for the protection measures.

Systematization of the results of environmental monitoring and control of the state of environmental protection produced by certain patterns (questionnaires, charts, etc.) is necessary. At the same time, the obtained data is recorded in a computer system and combined in the EEG. Systematization is based on the accumulated experience of the company, taking into account the composition, frequency of registration of non-compliance with the requirements of the regulatory documents (RD), the value of exceeding the maximum permissible levels, the size of fines imposed on the company. Those EEGs being formed on the basis of environmental factors contain sections generated by enterprise standards, consisting of schemes or lists, or personnel action algorithms in the implementation of protection measures, with an indication of the cost of labor, consumables, depending on the parameters of non-compliance with RD requirements.

The EEG consists of three sections: general, environmental, and economic. For each section they generate standards consisting of services in various combinations. One or several standards and / or separately simple and complex services can be included in the EEG.

The general section of the EEG is formed on the basis of regulatory documents (RD) containing general principles for organizing and conducting work to minimize environmental factors.

The environmental section of the EEG contains the results of environmental monitoring and monitoring of the state of the environment, the standards established for the enterprise by project documents (“Draft Standards for Waste Generation and Limits on Their Disposal” [8], “Draft Standards for Maximum Permissible Emissions to the Atmosphere for an Enterprise” [9], “Draft Standards for Permissible Discharges of Substances and Microorganisms into Water Bodies for Water Users” [10]).

The economic section of the EEG includes information on payments for environmental management, payments for the negative impact on the environmental, established in the region price lists for the provision of various environmental services, fines imposed on the company for violation of environmental requirements of the RD.

When registering new inconsistencies with the requirements of the RD, their characteristics are compared with the known inconsistency parameters that occurred earlier in the enterprise, which makes it possible to quickly detect the source of exposure to the environmental and begin eliminating the inconsistencies.

When forming the EEG, it is necessary to take into account the ratio of the required protection measures complex to eliminate the inconsistency (Lᵦ) to the capabilities of this enterprise (Lₑₑ). In this case, there are two options:

− The enterprise can implement the protection measures: Lₑₑ ∈ Lₑₑ;
− The enterprise cannot implement the protection measures: Lₑₑ ∉ Lₑₑ.

If an enterprise cannot perform the necessary protection measures for various reasons, then it is necessary to interact with other enterprises (financial institutions, design firms, etc.) in order to find such an opportunity.

For the study of the EEG of the enterprise, the authors in Figure 1 show the process of the formation of the EEG.
Figure 1. The process of formation of environmental and economic groups.

The point on the plane with the coordinates “Environmental Factor / Non-compliance” - “Financial Capacity of an Enterprise” is determined by the state of the enterprise (environmental and financial), and the point on the plane with the coordinates “Environmental Factor / Non-compliance” - “Environmental Action / Cost of the Environmental Protection Measure” determines the financial capacity enterprises.

For the formation of the EEG, it is necessary to take into account the financial capabilities of the enterprise \( C_p \) and the cost of the implementation of the protection measures \( C_{np} \), with three possible options:

- \( C_p > C_{np} \).
- \( C_p = C_{np} \).
- \( C_p < C_{np} \).

If \( C_p > C_{np} \) or \( C_p = C_{np} \), then the company is able to pay for the whole range of work on the PM; if \( C_p < C_{np} \), then financing is required for the difference between \( C_p \) and \( C_{np} \) using borrowed funds, state funds or attracted investors, otherwise the company would be forced abandon the implementation of the PM, or implement a less effective PM.

Analysis of the relationship of the financial capabilities of the enterprise and the possibilities of the implementation of the PM shows that four options are possible:

- The existing level of design work in the field of environmental protection and the financial capabilities of the enterprise do not allow it to carry out the PM. The company needs to look for other solutions to the problem.
The project company can perform the necessary range of services for the enterprise, but the financial capacity of the enterprise does not allow it to pay for the necessary work. The company must seek funding for the implementation of PM.

The capabilities of the project company do not allow to provide the necessary range of services, the financial capabilities of the enterprise allow it to pay for the necessary work. The company needs to look for another project enterprise.

The optimal case when the possibilities of the project enterprise and the financial capabilities of the enterprise allow it to carry out the PM.

The capabilities of the enterprise are taken into account when forming the EEG within the project enterprise. From the analysis of the conditions of EEG formation, it follows that the EEG is a logical operation of conjunction of environmental problems of the enterprise (environmental factors (EF)), the presence of non-compliance with the requirements of the regulatory documents (NR), the capabilities of the design enterprise (CDE) and the financial capabilities of the enterprise (FCE):

\[ EEG_i = EF \& NR \& CDE \& FCE, \]

where the symbol “&” means a logical conjunction.

The implementation of the protection measures requires large cash costs; therefore, the main ways to reduce the cost of the enterprise to protect the environment, according to the authors, are environmental monitoring and timely elimination of nonconformity.

In addition to improving the cost-effectiveness of protection measures (PM), the environmental monitoring procedure, according to the authors, contributes to reducing the burden on the enterprise’s financial system. Figure 2 shows the formation of EEG taking into account the capabilities of the enterprise, the environmental protection management system without monitoring (A) and with monitoring (B).

![Figure 2. Formation of environmental and economic groups in monitoring the status of the enterprise.](image)

In Figure 2, the letter A corresponds to significant levels of non-compliance with the requirements of the RD (EEG2); the letter B refers to the minor levels of non-compliance identified during the monitoring phase (EEG1). It is obvious that the cost of EEG2 is greater than the value of EEG1.

The EEG cost is the sum of the labor costs of personnel, the cost of expert and design work, consumables, tools, equipment wear and tear in accordance with the approved standards. The cost of
the protection measures is the most important component of the EEG cost, which directly depends on
the magnitude of the nonconformity and the monitoring procedures carried out. Smaller funds for the
implementation of protection measures are required at minor levels of non-compliance, despite the
additional costs of the need for expert and design work and environmental monitoring procedures
(purchase of equipment, use of specialized software, etc.).

4. Conclusions
Thus, the environmental monitoring of the state of the environmental protection and identification of
minor levels of inconsistency at the monitoring stage reduces the cost of EEG, reduces the financial
burden on the environmental protection management system, and improves the efficiency of the
protection measures. Formation of EEG allows one to select the appropriate protection measures for
enterprises of various forms of ownership and departmental affiliation, provides a transition to a
modern environmental protection management system, and contributes to its informatization.

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