Information support of nature management and environmental protection in Ukraine

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Abstract. This research develops the problem of effectiveness of the management system and protection of the natural environment. In this research, the various factors of management activity are proposed. To achieve this goal we conducted research on information and analytical systems, which are implemented in the management of nature and environmental protection of Ukraine at three levels: regional (oblast), district and urban. The article presents the results of the analysis of classifiers for systematization of circulating documents, functions of computer document management systems, including those implemented in the management of nature and environmental protection, as well as the level of satisfaction with the quality of software products used to management. It is established that for information support of management activities the most necessary are databases on financial and economic activities, regulatory, personnel, resource, logistics and environmental statistics. The importance of information flow system analysis and information technologies are constantly developing and adapting to user awareness. In the investigation underlined the practical use of different methods to solve similar problems taking into account the peculiarities of the organization.

1. Introduction

The problem of environmental protection is closely related to the effectiveness of the management system and the protection of the natural environment. Among the various factors influencing the effectiveness of management activity, the level of information technology is important. Studies of the dependence of labor productivity on the organization of collection, processing and transmission of information indicate the complexity of the studied problems. Thus, it is proved that organized knowledge contributes to the emergence of new products or results [1]. However, information systems must comply with the strategic development plans of the organization [2]. Nowadays, the possibilities of information technology are constantly growing and adapting to modern challenges of management [3]. But there are new challenges and challenges related to user awareness, overcoming behavioral factors [4], which is in the process of recognition by authorities.

Information management is rightly considered as knowledge possession [2]. The mediator of their transfer plays an important role [5]. Awareness of information and document flow is fundamental to their effective management and allows the use of appropriate standards [6].

In the sphere of nature information management has both general principles of implementation and special requirements. The specifics of environmental management contributes to the widespread use of GIS technologies [5], the introduction of evidence bases [6].
Mastering information technologies in nature management bodies in Ukraine touches the effectiveness of their work. Therefore, it is advisable to determine which information systems operate and whether they meet modern challenges.

2. Discussion of experimental results
In the process of management, managers are constantly dealing with information as a necessary means of developing management decisions and their implementation. Productivity and quality of their work largely depend on proper information, the process of getting and processing the necessary information. With its help, circular stages of the management process are carried out: receiving, processing of messages on a condition of the managed object, acceptance of new decisions, and their transfer in the form of management commands [7-9].

Information flow management analysis is carried out in organizations of various fields. For example, Lakhno V and Tretynyk V [10] describe solutions that allow you to create systems to support management decision-making and control of development plans in a large educational institution. There are developments in the use of different methods to solve similar problems in ensuring the rational use of resources [11-15].

State bodies for environmental protection and use of natural resources and other state bodies in accordance with the legislation of Ukraine shall carry out state management of nature use and environmental protection. State governing bodies in the field of environmental protection and use of natural resources is the central executive agencies that ensures the formation of state policy in the field of environmental protection [16].

The Cabinet of Ministers of Ukraine implements the environmental policy determined by the Verkhovna Rada of Ukraine ensures the development of state targeted, interstate ecological programs; coordinates the activities of central executive bodies, other institutions, and organizations of Ukraine in matters of environmental protection; establishes the procedure for the formation and use of the State Fund for Environmental Protection within the State Budget of Ukraine and approves the list of environmental protection measures; establishes the development and approval of environmental standards, limits on the use of natural resources, discharges of pollutants into the environment, waste disposal; decides on the organization of territories and objects of the nature reserve fund of national importance; organizes ecological education and ecological education of citizens; manages Ukraine’s external relations in the field of environmental protection [16].

Local governments manage the use of nature and environmental protection in the region. Executive bodies of the village, settlement, city councils in the field of environmental protection implement the decisions of the relevant councils; coordinate the activities of enterprises, institutions, and organizations located in the territory of the village, town, city, respectively, regardless of ownership and subordination; organize the development of local environmental programs; approve, upon submission of the oblast, Kyiv City State Administration, for enterprises, institutions and organizations limits on the use of natural resources, except for resources of national importance, limits on discharges of pollutants into the environment, except for discharges leading to pollution of natural resources of national importance or environmental nature. environments outside the village, town, city, respectively, and limits on waste generation and disposal; organize the collection, processing, utilization, and disposal of waste on their territory; form and use local funds for environmental protection as part of local budgets; agree on current and future work plans of enterprises, institutions and organizations on environmental protection and use of natural resources; provide systematic and prompt informing of the population, enterprises, institutions, organizations and citizens about the state of the environment, the morbidity of the population; organize ecological education and ecological education of citizens; make decisions on the organization of territories and objects of the nature reserve fund of local significance and other powers in accordance with the laws of Ukraine [16].
The competence of the oblast and Kyiv city state administrations in the field of environmental protection includes ensuring the implementation of state policy in the field of protected areas, formation, preservation, and use of the ecological network, management and regulation in the field of protection and use of territories and objects of nature reserves of Ukraine in the relevant territory; participation in monitoring the state of the environment; participation in the development of standards for regulating the use of natural resources and protection of the natural environment from pollution and other harmful effects; conducting state ecological expertise; approval at the request of the central executive agencies implementing the state policy in the field of environmental protection for enterprises, institutions and organizations of limits on the use of natural resources (except for natural resources of national importance), discharges of pollutants into the environment (except discharges to pollution of natural resources of national importance, the environment outside the relevant territory) and limits on waste generation and disposal, issuance of permits for disposal (storage) of waste (except hazardous), emissions of harmful substances into the environment, special use of natural resources in accordance with legislation, resolution of other issues in the field of environmental protection in accordance with the law [16].

To achieve this goal, we conducted research on information and analytical systems, which are implemented in the management of nature and environmental protection of Ukraine at three levels: regional (oblast), district and urban.

According to the results of the survey, it is established that three types of simple classifiers are used for the systematization of circulating documents – by type of document (66.8 ± 3.0%), by the executor (39.6 ± 3.1%), and by correspondent (36.4 ± 3.0%) (Table 1).

Table 1. Classifiers for systematization of circulating documents, %.

| Classifier                  | Level of management |         |         |         |         |
|-----------------------------|---------------------|---------|---------|---------|---------|
|                             | regional            | district| urban   | all levels|
|                             | % ±m | % ±m | % ±m | % ±m | % ±m |
| By document type            | 94.7 | 1.4 | 59.0 | 3.1 | 77.1 | 2.7 | 66.8 | 3.0 |
| According to the correspondent | 68.4 | 2.9 | 28.0 | 2.8 | 47.1 | 3.2 | 36.4 | 3.0 |
| On the theme                | 57.9 | 3.1 | 23.0 | 2.7 | 34.3 | 3.0 | 28.8 | 2.9 |
| By performer                | 73.7 | 2.8 | 34.8 | 3.0 | 41.4 | 3.1 | 39.6 | 3.1 |
| By status                   | 36.8 | 3.1 | 8.1  | 1.7 | 14.3 | 2.2 | 12.0 | 2.1 |
| Other                       | 0    | 0   | 3.1  | 1.1 | 2.9  | 1.1 | 2.8  | 1.0 |
| Not used                    | 5.3  | 1.4 | 23.0 | 2.7 | 11.4 | 2.0 | 18.4 | 2.5 |

According to the frequency of use of classifiers in the first place are regional authorities (94.7 ± 1.4%), in the second – city (88.6 ± 2.0%), and in the third - district (77.0 ± 2.7%) governing bodies.

Only almost 19% of managers at all levels do not use any of the classifiers. Most of these leaders at the district level – 23%.

According to the study, 51% of governments at all levels have a computerized document management system, including 63% of regional, 47% – district, and 99% of city governments. The main functions of this document management system are archiving and registration of documents (Table 2).

This is confirmed for both the district and city levels. In the regional authorities, almost all the functions of the document management system are represented to the same extent. It should be noted that such a function as “coding and classification of documents” is implemented in computer document management systems the least. When studying the functions of the information-analytical system or its elements, which are implemented in the management of nature management and environmental protection, it was found that most often at all levels of management is monitoring emissions into the atmosphere (Table 3).
Table 2. Functions of the computer document management system, %.

| Function                                                                 | Level of management | %    | ±m | %    | ±m | %    | ±m | %    | ±m |
|--------------------------------------------------------------------------|---------------------|------|----|------|----|------|----|------|----|
| Registration of documents                                                | regional            | 63,2 | 3,1| 16,8 | 2,4| 27,1 | 2,8| 23,2 | 2,7|
| Coding and classification of documents                                   | district            | 57,9 | 3,1| 8,1  | 1,7| 14,3 | 2,2| 13,6 | 2,2|
| Sending notices or reminders to reporting deadlines                      | urban               | 73,7 | 2,8| 11,2 | 2,0| 12,9 | 2,1| 15,2 | 2,3|
| Registration of information on measures taken to execute documents       | all levels          | 52,6 | 3,2| 12,4 | 2,1| 18,6 | 2,5| 17,6 | 2,4|
| Recording the decision to remove documents from the control              | regional            | 63,2 | 3,1| 7,5  | 1,7| 18,6 | 2,5| 14,8 | 2,2|
| Document archiving                                                       | district            | 47,4 | 3,2| 19,9 | 2,5| 38,6 | 3,1| 27,2 | 2,8|
| No computerized (automated) document management system                   | urban               | 36,8 | 3,1| 59,0 | 3,1| 41,4 | 3,1| 52,4 | 3,2|

Table 3. Functions of the information-analytical system, which are implemented in the management agencies of nature management and environmental protection, %.

| Function                                                                 | Level of management | %    | ±m | %    | ±m | %    | ±m | %    | ±m |
|--------------------------------------------------------------------------|---------------------|------|----|------|----|------|----|------|----|
| Monitoring the state of land resources                                   | regional            | 88,9 | 2,9| 99,7 | 3,1| 75,7 | 2,7| 85,2 | 3,1|
| Monitoring the state of water resources                                  | district            | 83,2 | 3,1| 79,0 | 3,1| 52,9 | 2,8| 83,2 | 3,1|
| Monitoring emissions into the atmosphere                                  | urban               | 83,2 | 3,1| 79,7 | 3,1| 75,7 | 3,1| 89,2 | 3,2|
| Monitoring waste disposal                                                | all levels          | 88,9 | 2,9| 92,2 | 3,1| 82,9 | 3,1| 84,0 | 3,2|
| Monitoring the implementation of:                                        |                     |      |    |      |    |      |    |      |    |
| - national programs                                                      |                     |      |    |      |    |      |    |      |    |
| - state programs                                                         |                     |      |    |      |    |      |    |      |    |
| - regional programs                                                      |                     |      |    |      |    |      |    |      |    |
| - management plans of the governing agencies                             |                     |      |    |      |    |      |    |      |    |
| Monitoring the implementation of:                                        |                     |      |    |      |    |      |    |      |    |
| - national programs                                                      |                     |      |    |      |    |      |    |      |    |
| - state programs                                                         |                     |      |    |      |    |      |    |      |    |
| - regional programs                                                      |                     |      |    |      |    |      |    |      |    |
| - management plans of the governing agencies                             |                     |      |    |      |    |      |    |      |    |
| Formation of information and analytical reports on requests              |                     |      |    |      |    |      |    |      |    |
| Computer information and analytical systems or their elements are not    |                     |      |    |      |    |      |    |      |    |
| implemented                                                              |                     |      |    |      |    |      |    |      |    |

At the same time, regional management bodies of nature management and environmental protection pay considerable attention to the monitoring of state programs (74%). The smallest, but significant percentage of respondents – managers at the regional level (58%) noted the function of “formation of information and analytical reports on request”.

The first position in the implementation of all functions of the information and analytical system is occupied by the city level of management of nature management and environmental protection (85.7 ± 2.2%), the second – regional (78.9 ± 2.6%), and the third - district (68, 3 ± 2.9%).
At the same time, most of the governing bodies are registered at the district level where the computer information and analytical system or its elements have not been implemented (31.7 ± 2.9%). The last position on this indicator is occupied by urban management bodies of nature management and environmental protection (14.3 ± 2.2%).

The study showed that 64.4 ± 3.0% of authorities are developing computer databases, including 68.4 ± 2.9% of regional, 58.4 ± 3.1% of district and 77.1 ± 2.7% of city governments. Such resources are absent in 10.0 ± 1.9% of city governments and 24.2 ± 2.7% of district ones. At the same time, it should be noted that 21.1 ± 2.6% of regional and 12.9 ± 2.1% of city managers did not answer the questions.

According to the data presented in Table 4, the majority of managers (52.8 ± 3.2%) of different levels could not answer questions about the quality of software products used to support management, which indicates the low level and disinterest of managers in the use of information support in the adoption process management decisions and their unpreparedness. At the same time, the percentage of those who are satisfied with the quality of programs (29.2 ± 2.9%) exceeds the percentage of dissatisfied (16.0 ± 2.3%).

Table 4. Level of satisfaction with the quality of software products used to support management activities in the management agencies of nature management and environmental protection, %.

| Indicators     | regional | ±m | district | ±m | urban | ±m | all levels | ±m |
|----------------|----------|----|----------|----|-------|----|------------|----|
| Satisfies      | 63.2     | 3.1| 47.8     | 3.2| 68.6  | 2.9| 59.2       | 3.1|
| Not satisfied  | 31.6     | 2.9| 46.0     | 3.2| 22.9  | 2.7| 36.0       | 3.0|
| Not determined | 5.2      | 1.4| 6.2      | 1.5| 8.5   | 1.8| 4.8        | 1.4|

Urban managers are more satisfied with the software (47.1 ± 3.2%), slightly less - regional (42.1 ± 3.1%). The number of satisfied and dissatisfied with the quality of programs in district management bodies of nature management and environmental protection is approximately the same (19.9 ± 2.5% and 18.0 ± 2.4%).

According to the results of the study, it is established that for information support of management activities the most necessary are databases on financial and economic activities, regulatory, personnel, resource, logistics, and environmental statistics.

3. Conclusions

The main tasks to be solved by the information and analytical system on environmental protection of Ukraine are compliance with the unified system of collection, processing, systematization, and transmission of ecological and statistical information; a centralized collection of reporting and administrative information from subordinate institutions, processing, and analysis of environmental indicators of the environment and natural resources; formation of single information space in administrative territories; information and analytical support of the main organizational measures of nature management; conducting information support for the implementation of national, regional and local environmentally oriented programs; promoting the search for and dissemination of new environmentally friendly production technologies.

The information and analytical system should be differentiated and focused on modern needs of nature management; a combination of environmental, economic, and regulatory subsystems to provide a comprehensive analysis of information; standardized at the state level in a set of indicators for assessing the quality of the institution; focused on the prospects for the development of environmental protection.
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