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The importance of personnel knowledge in the operation of buildings the example of the MILLARZÓWKA LIFE EDUCATION CENTER

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Abstract

Knowledge takes a priority place among other resources and tends to constantly expand, i.e. to increase its resources, and increase their varies, depends primarily on how it is obtained and, above all, on what problems it concerns.

The article defines potential sources of knowledge supporting the process of exploitation of a building object and proposes actions to identify, preserve, disseminate and use the knowledge of the organization's personnel, collected in the knowledge base, to increase the efficiency and effectiveness of employees' activities in the operation of the building, on the example of the Natural Education Center "Młynarzówka" .

Keywords: construction objects, operation, knowledge, primary research.

1 Introduction: data, information, knowledge and their importance in management

The concept of information has evolved with the development of civilization. Selected definitions of information were taken from the literature and presented in Table 1.

The analysis the above-mentioned definitions of information (Table 1), a relationship between "data", "information" and "knowledge" can be noticed. Simply put, data are symbols used to represent realities that represent facts. Data can be recorded, processed and transmitted as information. The interpreted data is information. In order for data to become information, the recipient is necessary, who decides, firstly, whether he wants to interpret the data, and secondly, whether they are understandable to him and to what extent. Then the data becomes a message for the recipient. Any content that has meaning, on the other hand, is a message. Then the recipient determines whether the message is a repetition of something he already knows or is something new for him, if so, the message becomes information. The information is subjective because it depends on the recipient's interpretative abilities. Knowledge arises from information that is important to the recipient and has been verified in practice. In other words, knowledge is a set of information assimilated by a human in the processes of interpretation and analysis of received stimuli.

Information is an important part of communication and knowledge is a factor necessary for the proper course of the process - the object life cycle [17, 18]. A separate problem is the transformation of human knowledge into data that may or even should increase the knowledge of other people. It is a problem of representing knowledge in the form of data, in a universal way that many recipients would be able to understand this data and then correctly interpret it and assimilate it as their own knowledge. Diagram of information and knowledge formation The relationships between data, information and knowledge are shown in Fig. 1 and the interdependencies in the era of globalization of the modern world in Fig. 2.

Engineering can be helpful in understanding the relationship between data, information and knowledge, as it is the activity of designing, constructing, modifying and maintaining cost-effective solutions to practical problems, using scientific and technical knowledge. Currently, knowledge engineering is becoming an interdisciplinary field in which

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Table 1. Selected definitions of information taken from the literature

Nr.	Authors	Information definitions
1	Milward (1967)	Information is the life-giving blood in the management body - it is the basis for correct management decisions. If the correct information cannot be obtained, decisions must be based on guesswork, feelings or guesswork [11].
2	Langefors (1973)	Information is the process of data interpretation based on the acquired knowledge a priori over time. In this approach, attention is drawn to the subjective nature of information, i.e. the fact that different people can extract different information from certain data [7]
3	Galland (1982)	Information is what arises as a result of certain human thought actions (observations, analyzes) successfully applied to data to discover its essence or meaning [4].
4	Clare, Loucopoulos (1987)	Information are the product of significant data processing [2].
5	Maddison (red.) (1989)	Information is: understandable, useful, adequate communication at the right time; any kind of knowledge about things and concepts in the world of discussion that is exchanged between users; it is content that matters, not a representation of it [9].
6	Knight, Silk (1990)	Information is a meaning for humans related to the observed objects and phenomena [6].
7	Laudon, Laudon (1991)	Information is made up of data that has been shaped or molded by humans into an essential and useful form [8].
8	Martin and Powell (1992)	The information come from data that have been processed to be useful in management decision making [10].
9	Avison, Fitzgerald (1995)	Information matters ... because it comes from selecting data, summarizing and presenting it in such a way that it is useful for the recipient [1].
10	Grabowski and Zając (2009)	Information in the organization are the basis for building the knowledge of all people involved in the process of acquiring and using it. They shape awareness of the phenomena taking place in the organization and its environment. They enable the adaptation of the organization to the changing reality and enable the transformation of this reality in order to function efficiently [5].

engineers, computer scientists, mathematicians and psychologists, using known methods of acquiring knowledge (Table 2), use various sources of obtaining information.

Knowledge arises from information that is important to the recipient and has been verified in practice. Knowledge also comes from experiences. When starting the data verification, you should consider whether this information is really useful and whether it will be used. When looking for information on a given topic, one usually uses internet search engines, which make it easy and quick to gather knowledge, e.g. on the history of the city of Białystok, Gdańsk or Toruń. Many facts about these cities can be found quickly and easily. There are also website addresses appearing on the Internet, which should be verified in terms of their usefulness, because often the information obtained on the Internet is not very reliable, incompetent, incorrect and even often false. Detailed and reliable information can be obtained through the publications verified in the publishing process: books and journals, or scientific databases. Searching for appropriate materials is possible thanks to the catalogs of the largest libraries, which are largely available online. Knowledge transfer is an important activity. Sharing knowledge (knowledge transfer), and thus transforming tacit knowledge into knowledge available to each member of the organization, can take place in various planes and configurations. In this way, a "knowledge map" is built, in which data and information are placed in a certain context, subject to categorization, which can be used in making decisions important for the organization [12–18].

The most important action takes place in direct interpersonal communication between the organization's staff. There is a need for cooperation and exchange of information (knowledge) between the indicated entities between employees. This is done through creative discussions, exchange of experiences and ideas regarding, for example, the safe operation of a building object. On the one hand, the so-called socialization - that is, the dissemination of tacit knowledge between individual employees. On the other hand, the flow of knowledge to the external environment
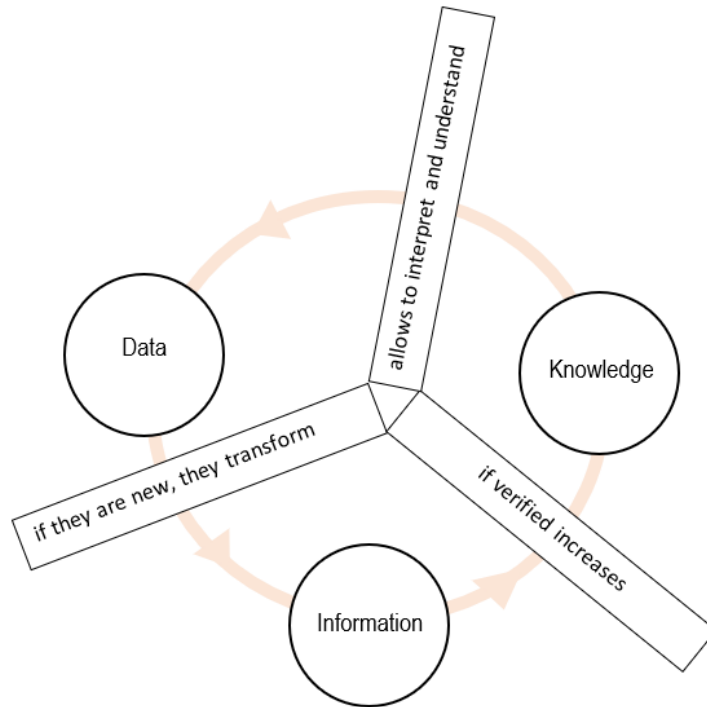
Figure 1. Relationships between data, information and knowledge, own study based on [5]
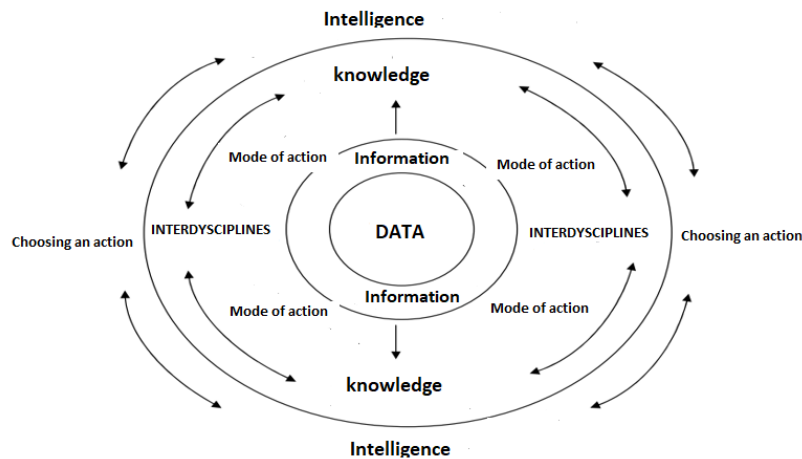

Figure 2. The interdependence of data, information, knowledge and wisdom in the era of globalization of the modern world [21]

of the organization takes place through the conversion of tacit knowledge into available (explicit) - the so-called externalization of knowledge, which may increase the value of the organization in the "eyes" of the environment. This can be done by developing offers of educational services, using solutions for example for tourists, or disseminating knowledge during science festivals for people who are interested in nature, etc. Forms of improving the flow of knowledge from organizations to the outside also include the exchange of information between tourists. They are often seminars, symposia or conferences. The communication skills of the personnel play an important role both during the transfer of knowledge inside and outside the organization.

The communication process is complex. It has a multi-element and multi-phase form. Each communication process consists of context, participants, message, channel, noise, and feedback [20].

The term "communication" comes from the Latin word „comminicatio" and means "Communication, conversation,

Table 2. Selected methods of acquiring knowledge

No.	Method	Description
1	Direct saving of knowledge – „rote learning"	It does not require an advisor, any inference or data transformation. An example of the use of such a learning algorithm could be the direct use of the knowledge base and storage in memory.
2	Based on examples	The method is a special method of inductive learning, it consists in generating a general description of concepts or concept classes, based on examples and counterexamples representing the concepts to be learned.
3	Based on the instructions - „learning by being told"	Obtaining knowledge in this case consists in using the sources of knowledge indicated by the expert, for example, book materials, lexicons, etc. and their transformation into a language understood by the system. Then it is necessary to aggregate with the knowledge given a priori, which is necessary for its effective use.
4	Based on observation - "learning without a teacher".	This method is a generalized form of inductive learning, where the teacher's help is not used in the knowledge acquisition schemes. The learner's participation in the learning process is significant here.
5	Based on analogy	The method consists in transforming the existing knowledge base in such a way that it can be useful for descriptions of facts similar (but not the same) to those already included in the knowledge base of the system. This method of acquiring knowledge requires a much greater participation of the learner in the learning process, because a fact analogous to the currently analyzed situation must be found in the database; after which this fact must be transformed so that it can be useful in a given situation; the transformed fact is then saved to a knowledge base for reuse.

exchange". In the traditional sense, "communicating" means transmitting and receiving information between the "sender" and "recipient" [12]. In terms of information technology, the communication process is a set (system) of interconnected parts that make up a specific organizational whole. The whole is made up of the following elements: participants: sender, recipient; message (signal); canal; feedback and the environment (context).

According to the organizational principle of prof. Kotarbiński - the success of the part affects the success of the whole and the success of the whole affects the success of the part. The diagram of the anthropogenic communication process is shown in Fig.3, 4 and 5.
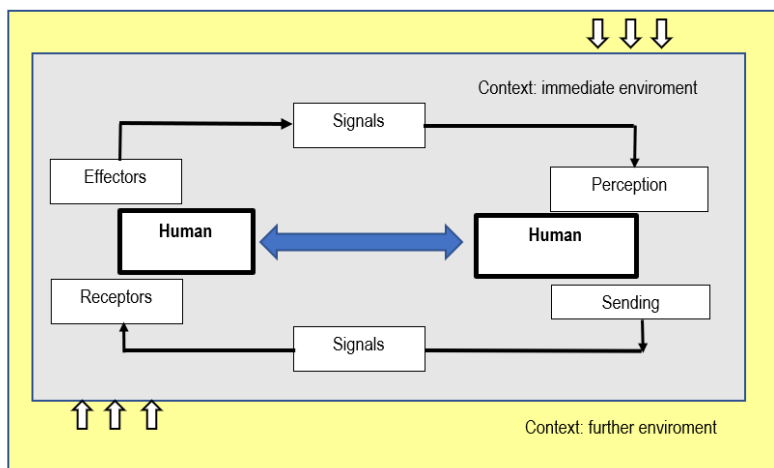

Figure 3. Diagram of the communication process: human - human, the so-called interpersonal communication

The sender and receiver are involved in the process of communication. The sender and recipient can be both a person and an anthropogenic object. It depends on the context of the process.
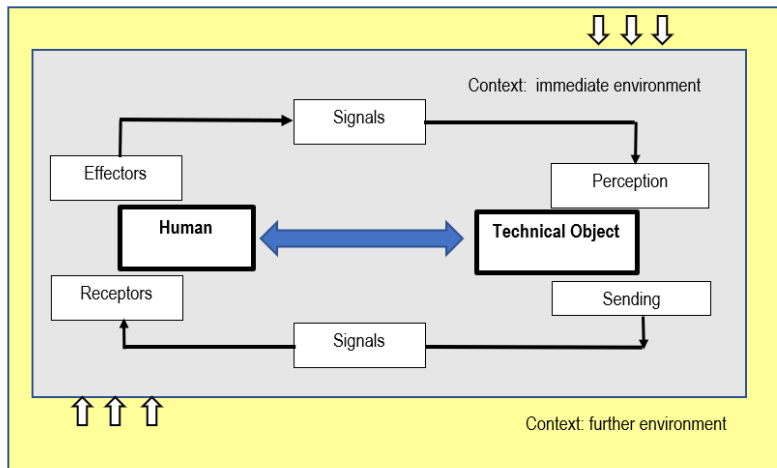
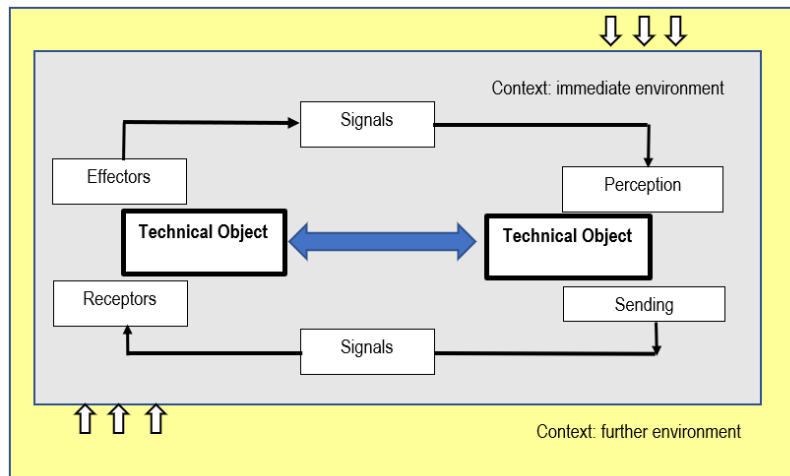Figure 4. Diagram of the communication process: human - technical object

Figure 5. Diagram of the communication process: technical object - technical object

In the case of the "human - human" system, it is a typical interpersonal communication and the roles of people are clearly defined and often asymmetrical, eg supervisor and subordinate. Participants in the process of interpersonal communication differ in three basic elements: attitude to others, gender and culture. People who communicate always have a specific attitude towards other participants in the process. Women and men, as well as people who come from different cultures, have such a diverse experience that it is an obstacle to bringing together and sharing knowledge [3].

In the case of systems: "human - technical object", "technical object - technical object", "technical object - human" is the so-called indirect interpersonal communication.

Signal / message

A signal (message, information) is an encoded message that plays a central role in the communication process between the sender and the recipient.

Feedback Feedback is treated as the recipient's reaction to the message after it has been decoded. We can distinguish several types of feedback, e.g. direct feedback occurs immediately, and in the case of indirect or media communication, there is delayed feedback [12]

[19] .

2   Primary research

The primary research concerned the operation stage in the life cycle of the building object of the "Młynarzówka" Nature Education Center (Fig. 6). The life cycle of a building object should be considered as all possible consecutive or related phases of the existence of the object, in particular: research, development, design, use, repair, modernization, modification, lifetime maintenance, logistics, staff training, wear, demolition, decommissioning and disposal. This term clearly shows that the area of interest should include not only the execution, but also the phases of the project leading to the creation of the object, e.g. analysis, research, design or phases following construction related to use, e.g. operation, renovation, modernization or decommissioning and demolition [17].
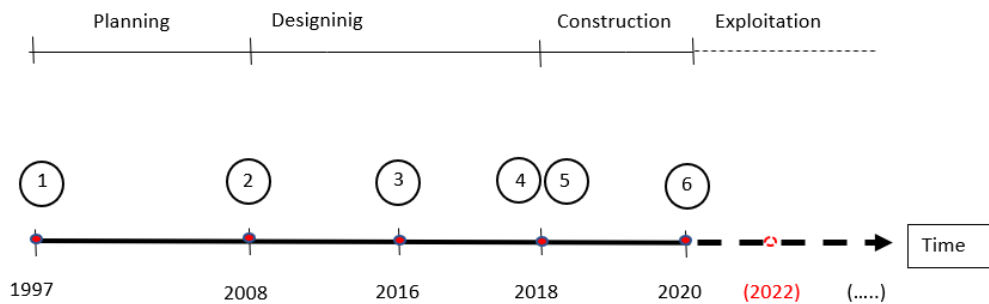

Figure 6. The life cycle of a building object - the Młynarzówka Nature Education Center

Where:

1 - The idea for the development of the former "Młynarzówka" for business housing

2 – The changing the idea and developing the project into an educational center

3 - Application for project co-financing from NFOŚiGW

4 - Signing a contract for the construction part (27.03.2018r)

5 - Signing a contract for equipping the facility (14.04.2018r)

6 - Putting the facility into use (03.10.2020r)

Research Hypothesis

Proper perception and knowledge about the operation of building facilities by members of the organization is a form of (prevention) preventing violations of the standards for the use and maintenance of the facility in a proper technical and aesthetic condition, preventing excessive deterioration of its functional properties and technical efficiency.

Main Objectives

The main objectives of the primary research were set as follows:

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- increasing awareness of the operation and use of the building and commitment to improving the standards of use and maintenance of the facility by management, employees and the environment,
- increasing the level of staff knowledge in the field of standards for the use and maintenance of the facility in a proper technical and aesthetic condition, preventing excessive deterioration of its functional properties and technical efficiency,
- building a system of communication and obtaining information for knowledge management (all activities aimed at identifying, maintaining, disseminating and using personnel to increase the efficiency and effectiveness of employees' activities,
- forming a knowledge base, treated as a set of data about the construction object in use, in which the information contained will allow for analysis, elimination of errors, improvement, and introduction of innovations in the operation process

- disseminating knowledge on the proper operation of building structures.

The scope of the research questionnaire

The survey questionnaire consisted of two parts. The first part contained the respondent's content, such as: gender and age, seniority and education, as well as data on the position held in the organization. The second part of the questionnaire included questions that covered the following issues:

A - Scope of the previous (annual) inspection and description of the implementation of recommendations from the course of the previous inspection,

B - General information about the currently examined building structure,

C - Checking the implementation of recommendations from previous inspections,

D - Findings regarding current elements of the technical condition to be checked,

E - Post-inspection findings,

F - Post-inspection documentation.

The respondents answered the questions by selecting one of the four possibilities: yes, no, I do not know, not applicable in individual A-F areas.

Data collection method

The respondents filled in and sent the completed questionnaire to the indicated internet address or handed it over to the organizer.

Findings

The research was conducted among the staff of the "Młynarzówka" Nature Education Center in Kurowo, which is an organizational unit of the Narew National Park. The center was awarded by the IBOA Scientific Institute in Warsaw in the National Open Competition - Modernization of the Year and Construction of the 21st Century, XXV Jubilee Edition (Fig. 7).

Figure 7. Scientific Institute Award IBOA

The personal staff of the center are mostly female employees (Fig. 8), aged 41 and more (Fig. 9), with a long work experiences (Fig. 10), with higher education (Fig. 11), who mainly join the ranks of employees administration and management of the organization (Figure 12).

The analysis of the research results allowed to define the areas of knowledge in which no actions were taken (Fig. 13). These were mainly issues related to:

- area B, including general information about the tested object, in particular concerning the current parameters of the object: usable area, roof area, height and number of storeys (Fig. 14);
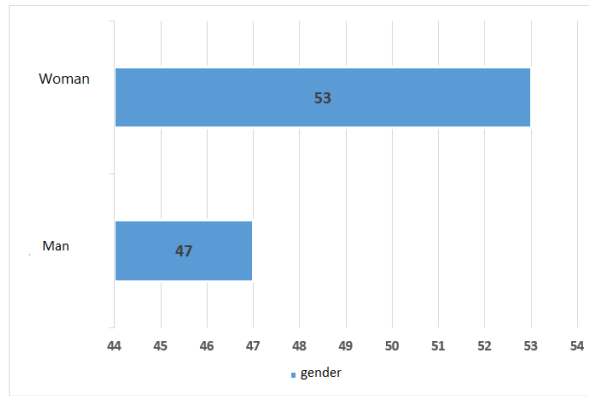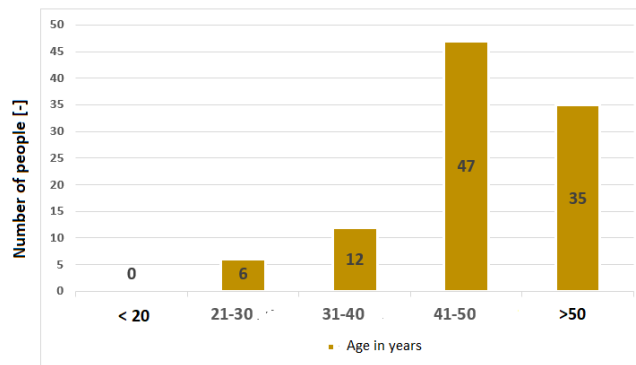
Figure 8. Gender of respondents
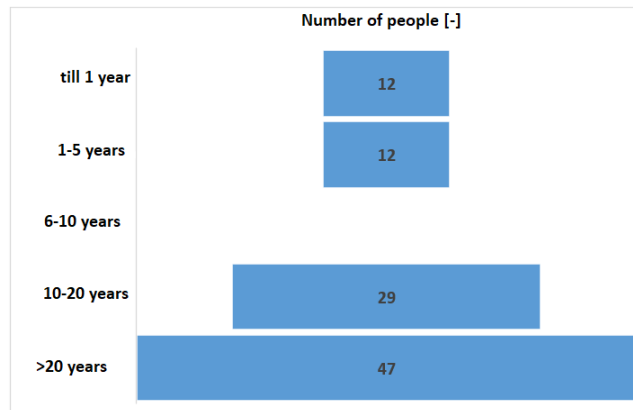

Figure 9. Age of respondents

Figure 10. Respondents' work experiences

- area A, including information on the previous inspection and description of the implementation of post-inspection recommendations (Fig. 15);
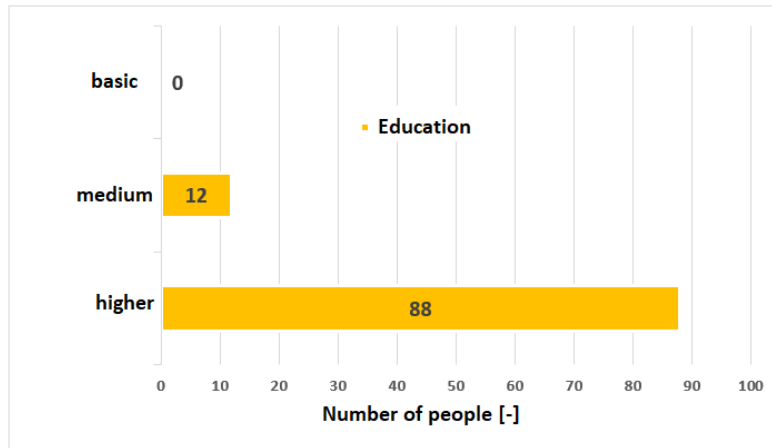- area F, relating to post-inspection documentation (Fig. 16).

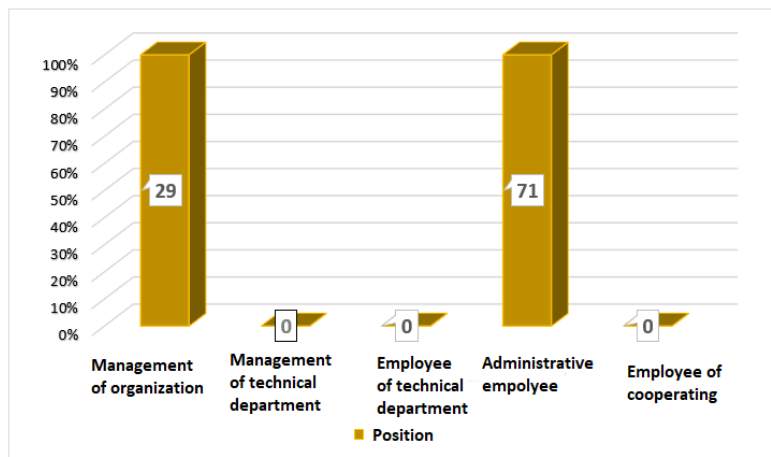Figure 11. Education of the respondents

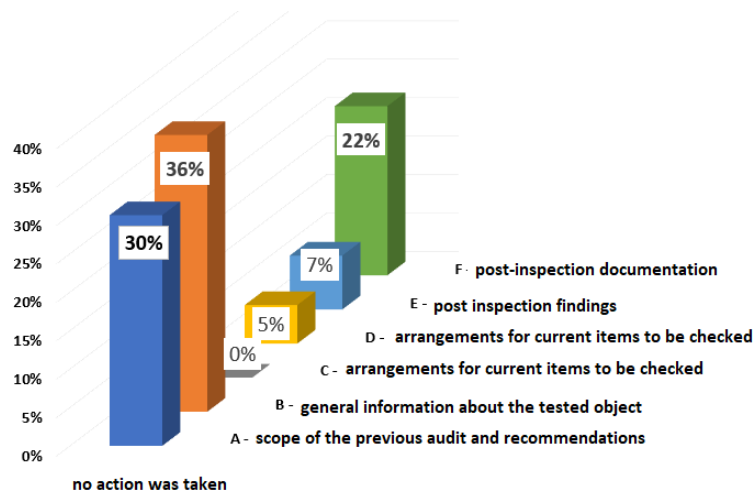Figure 12. Position held in a cooperating organization or institution

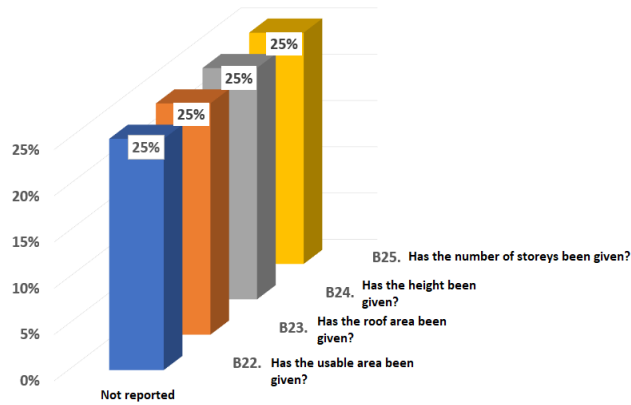Figure 13. Research areas where no action was taken

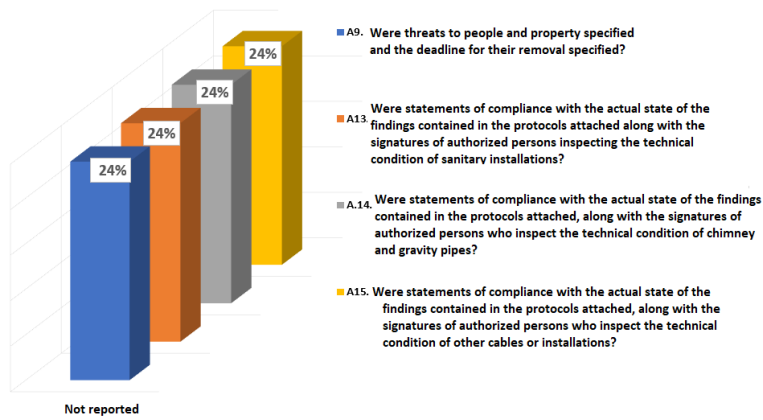Figure 14. General information about the tested object from area B

Figure 15. Information on the previous inspection and description of the implementation of post-inspection recommendations in area A
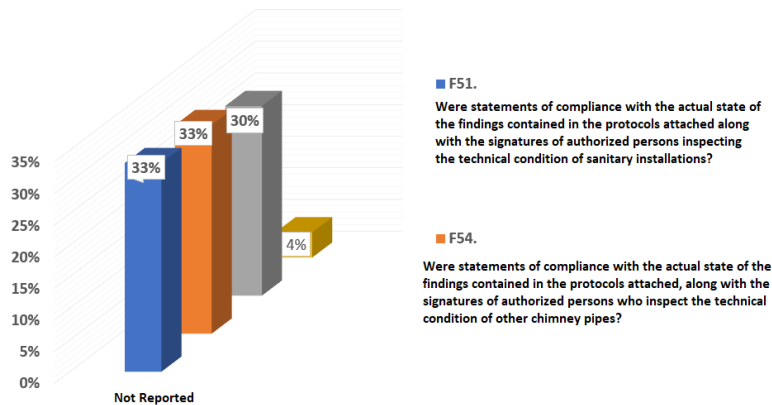

Figure 16. Information on post-inspection documentation in area F

3 Summary

Knowledge of the technical condition of a building is necessary for its proper operation. This is because it enables the planning of necessary maintenance and repair activities and reduces the risk of breakdowns during use.

There are currently a number of methods and systems for diagnosing the technical condition of buildings, developed both by research centers and by users. The main disadvantage of most modern solutions is that they are non-uniform systems. Models of construction processes and algorithms for the assessment of technical condition implemented at the stage of creating the process may not be modified during the subsequent operation. Taking into account the long period of use of the structure, this state of affairs should be considered insufficient. It is hard to expect that the operational processes course models developed for the new facility will be up-to-date after twenty or fifty years of its operation.

Another disadvantage of modern systems for diagnosing building objects during their operation is that the persons participating or responsible for the operation do not have up-to-date knowledge of the object in use. They have knowledge from the past that has not been extended or modified. An alternative to such a state of affairs may be the development of an open system supporting the diagnosis of an object with a modular structure, in which the diagnostic knowledge can be easily updated and extended. An important advantage of such systems is also the possibility of representing knowledge coming from various sources. In the most general situation, knowledge for the building facility diagnosis system may be obtained from experts (specialists in the field of operation) and from diagnostic databases.

Taking into account the conditions presented in the article and, above all, the possibilities of practical implementation of research of the centre's staff, the tests should cover all employees using the building in the field of basic knowledge about operation, in order to enable the assessment of the technical condition and ensure its failure-free operation in accordance with the legal requirements and user requirements, thus creating a knowledge base about the object.

The proposed knowledge base will be an excellent tool supporting the management of the facility during its use.

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