

Knowledge Management and its Impact on Employee Conduct in Ensuring Safe Operations of Construction Facilities

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Abstract

The issue of knowledge management of organization employees is a relatively new area of scientific interest. This increase results from the growing complexity and complexity of the organization and its environment, which directly translates into an increase in the demand for new knowledge, attitudes and behaviors necessary to maintain or improve the quality of services provided. A company that uses the processes of acquiring, processing, sharing, disseminating and implementing organizational knowledge in a conscious and methodical manner becomes an "intelligent organization". This article adopts the definition of an intelligent organization, according to which an intelligent organization smoothly modifies its attitudes and behaviors, adequately to the acquired knowledge and changes in the external environment. Due to the fact that specialized processes related to the creation, creation and transfer of knowledge take place in it, learning of all its members is facilitated. Shaping employees' attitudes, understood as a conscious influence in order to consolidate or change them so that they are conducive to the safe operation of building objects, should be of significant importance for every organization. Attitude is related to behavior, which is the most elementary form of human activity, which is externally observable. The issue of shaping organizational attitudes and behaviors is connected with the necessity to consider the factors that trigger the process of change. It is important to diagnose whether the engine of changes is the person with a specific attitude or elements from his environment. The article presents a theoretical introduction, the results of diagnostic tests and the results of the research, proposed actions shaping the attitudes and behavior of employees regarding the safe operation of buildings, based on the example of Komunalny Przedsiębiorstwo Komunikacyjne sp. z o.o.

Keywords: knowledge management, save operations, diagnostic tests

1 Introduction

The subject of shaping human attitudes and behaviors takes on special importance in the organizational context. There are many studies on occupational health and safety [17,24], shaping organizational behavior [10,38] and attitudes towards safety [35,36] and knowledge management [1,7,13,14,37] broadly understood security. One of them is the management definition, in which occupational health and safety (OSH) is treated as the state of working conditions and behaviour of employees that ensures the required level of health and life protection against hazards occurring in the work environment [28]. According to practitioners, OSH measures require a systemic approach [9,29].

A systemic approach to OSH must be based on clearly defined rules for workers relating to unsafe working conditions that lead to dangerous behaviour. They should be recognized and used to protect health and life from hazards in the work environment. At the same time, it should be remembered that there is no one right way to achieve security in a given organization [15].

Safe behavior of employees in the workplace is influenced by:

- workplace properties,

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- behavior of superiors,
- working atmosphere,
- knowledge of occupational health and safety [6,33,42].

They treat knowledge as a set of reliable information about reality, along with the ability to use it, it can be divided into theoretical [23,31] and practical [18] knowledge. Theoretical knowledge is knowledge of theory. It consists in having information on a given topic, e.g. legal regulations and health and safety rules [17,19,20,25,26,27]. On the other hand, the basis of practical knowledge is the ability to use theoretical knowledge in reality. Construction is an activity related to the planning, design, construction and use of buildings [20]. It is based on theoretical knowledge in the field of civil engineering. However, it is also a branch of practical knowledge, a safe technique used in the construction and use of objects [2,3,4,5,8,11,16,21,22,23].

2 Legal regulations

Safety and assurance in the undertaking is the responsibility of the employer [40], who ensures that the health and safety requirements relating to, inter alia, the condition of the construction works and, in particular, the technical premises and equipment in which the sites are located are met the work of staff and technical and administrative staff.

The Construction Law Act [41] regulates activities involving the design, construction, maintenance and demolition of buildings and defines the rules of operation of public administration bodies in these areas (Table 1).

Table 1. General requirements for construction works

No	Requirements and rules	Characteristics of requirements and principles
1	Basic	The basic requirements concern: a) load-bearing capacity and stability of the structure, b) fire safety, c) hygiene, health and the environment, d) safety of use and availability of facilities, e) noise protection, f) energy saving and thermal insulation, g) the sustainable use of natural resources.
2	related to the purpose and use of the facility	The requirements concern: a) the supply of water and electricity and heat and fuels, assuming efficient use of these factors; b) waste water, rainwater and waste disposal, including the possibility of access to telecommunications services, in particular broadband Internet access.
3	concerning the possibility of maintaining proper technical condition	The provisions of the Construction Law impose on the owner or manager of a building the obligation to maintain and use the object in a manner consistent with its purpose and environmental protection requirements and require these entities to maintain the facility in proper technical and aesthetic condition, not allowing excessive deterioration of its functional properties and technical efficiency.
4	including the necessary conditions for the use of the facilities	These requirements result from the Convention on the Rights of Persons with Disabilities, signed in New York on 13 December 2006. and concern the use of public utility buildings and multi-family housing by people with disabilities, including the elderly [12].
5	in terms of health and safety conditions	According to the Labour Code, a construction object in which work rooms are located should meet the requirements for occupational health and safety [40].
6	concerning civil protection, in accordance with civil protection requirements	Civil protection aims to protect people, cultural goods, workplaces and public utility facilities, to rescue and assist victims of war, and to cooperate in combating natural disasters and environmental threats and remedying their effects [32].
7	concerning historic and conservation-protected objects	The protection of monuments and the care of monuments are regulated by law [39].

No	Requirements and rules	Characteristics of requirements and principles
8	concerning the location on a building plot	The location of a building on a plot of land is regulated by law [30].
9	in the protection of the interests of third parties	The protection of the interests of third parties in the investment process must not lead to a situation in which these persons, and not the owners of real estate, will decide on the admission to the construction of buildings in the place where such objects are located.
10	concerning safety and health conditions of the construction site	According to the Construction Law [41]. All participants of the construction process are indirectly responsible for the organization and execution of works in a manner safe for both employees and other people, and directly the construction manager and works managers.

2.1 General rules for the use of buildings

The Construction Law Act lays down the basic principle that the owner or manager of a building is obliged to use a given building in accordance with its intended purpose and environmental protection requirements and to maintain it in proper technical and aesthetic condition. The regulations cover issues such as:

- control of the technical condition of the building,
- documentation and book of the building,
- counteracting irregularities in the maintenance of the building,
- change in the use of a building.

Each property owner is also obliged to maintain cleanliness and order in his property by:

- aesthetic maintenance of real estate,
- disposal of waste on an ongoing basis and its collection in special containers,
- equipping the property with containers for collecting waste and maintaining it in proper technical and sanitary condition,
- disposal and neutralization of municipal waste by concluding an appropriate agreement with export bodies,
- Clearing from snow, ice, mud and other debris of sidewalks located along the property.

The owner of a building is obliged to maintain the object in accordance with the rules set out in the Construction Law [41] should be inspected by the owner or manager.

The inspection of the building consists in an ongoing check of the technical condition of the facility and fixed technical devices and is combined with the removal of minor defects and damage. Damage found during the inspection that the operating personnel and maintenance technicians are unable to remove should be immediately reported to the immediate superior. In addition, the review should be carried out each time after heavy rains, storms, hurricanes.

A distinction is made between the following types of reviews:

- *Working inspections* are carried out by personnel operating the equipment and maintenance technicians. The results of the review should be recorded in the work book of the devices,
- *Periodic reviews* should be carried out on an annual and five-yearly basis.

Annual inspections consist in checking the technical condition of:

- elements of the object exposed to harmful atmospheric influences and destructive effects of factors occurring during its use,
- installations and equipment for environmental protection,
- gas installations and chimney ducts (smoke, flue gas and ventilation).

Five-year inspections, it consists in checking the technical condition and suitability for use of the building, aesthetics and its surroundings. Kontrol should also cover the examination of electrical and lightning protection installations in terms of the state of efficiency of connections, accessories, protection and means of protection against shock, resistance of wire insulation and earthing of installations and apparatus.

According to labour law, the employer and employees are responsible for the safety of work that is taken care of in construction works [40]. The employer is obliged to protect the health and life of employees by:

- ensuring safe and healthy working conditions with appropriate use of scientific and technological developments;
- providing employees with information, m.in. about threats to health and life occurring in the workplace and protective and preventive actions taken to eliminate hazards;
- the appointment of a coordinator to supervise occupational safety and health for all workers employed at the same workplace where workers from different employers work at the same place at the same time.

Due to the variety of works performed simultaneously on the premises of the plant, it is necessary to coordinate the implementation of individual tasks. According to the law[40], when employees employed by different employers work simultaneously in the same place, these employers are obliged to:

- cooperate with each other,
- appoint a coordinator to supervise the health and safety of all workers employed in the same place,
- establish rules of cooperation taking into account the procedures in the event of a threat to the health and life of employees,
- inform each other and workers and their representatives of measures to prevent occupational risks arising in the performance of their work.

The employee must:

- know the regulations and principles of health and safety, take part in training and instruction in this field, as well as undergo the required examinations;
- perform work in a manner consistent with the principles of health and safety and comply with the orders and instructions issued in this respect by superiors;
- take care of the proper condition of machines, devices, tools and equipment as well as order and order in the workplace;
- apply collective protection measures, as well as use the allocated personal protective equipment in accordance with their intended purpose;
- undergo initial, periodic and follow-up examinations and other prescribed medical examinations and comply with medical indications;
- immediately notify the supervisor about an accident or threat to human life or health noticed in the workplace and warn co-workers and other persons in the danger area;
- cooperate with the employer and superiors in fulfilling their obligations regarding health and safety at work [40].

The analysis of the causes of accidents according to the National Labour Inspectorate showed that the main causes of accidents are human and organizational causes to which special attention should be paid [34].

3. Research on employees' knowledge regarding the safe operation of construction facilities of KPK Sp. z o.o. in Białystok

3.1. Conduct and analysis of test results

The research was conducted among people managing employees, in the form of a voluntary survey (Appendix 1) to be completed in the Forms MS Teams application. The research involved 25 employees belonging to the group of people managing employees and the group of office and administrative employees of the organization. The characteristics of respondents are presented in Table 2.

Table 2. Characteristics of respondents

No	Category	Characteristics of respondents
1	Sex	Women – 52% / men -48%
2	Age	50 years and more – 52% 41-50 years – 12% 31-40 years – 24% 21-30 years – 12% ≤ 20 - 0%
3	Seniority	> 20 years – 56%

No	Category	Characteristics of respondents
		10-20 years – 20% 6-10 years – 12% 1-5 years – 12% up to 1 year – 0%
4	Education	Higher – 88% Medium – 12%
5	Position	Top management of the company – 8% Middle management level (technical and operational department) – 16% Middle management level (champions) – 12% Office and administrative worker – 64%

1372 responses were obtained in four categories (Fig. 1) and are compiled in percentage terms according to the Pareto principle (Fig. 2).

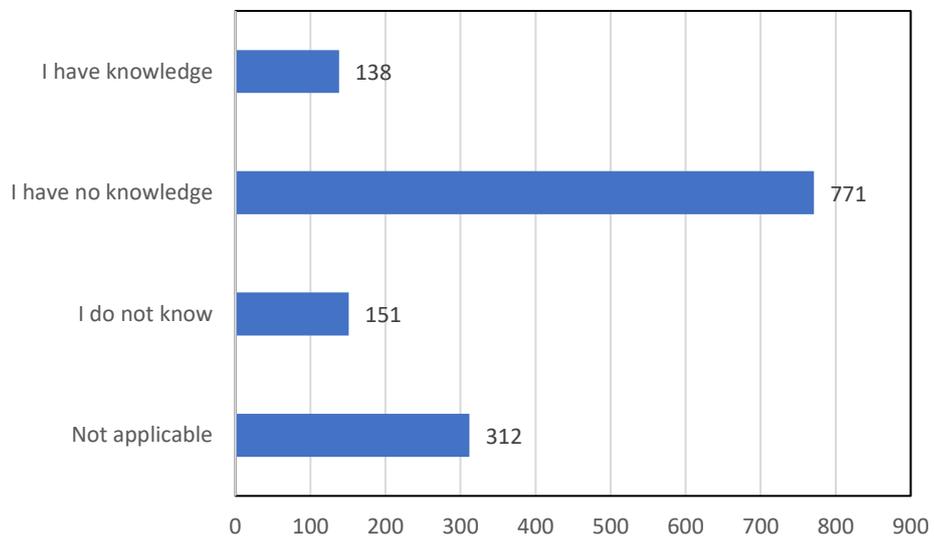


Fig.1. Summary of responses broken down into four categories in the research areas together (A-F)

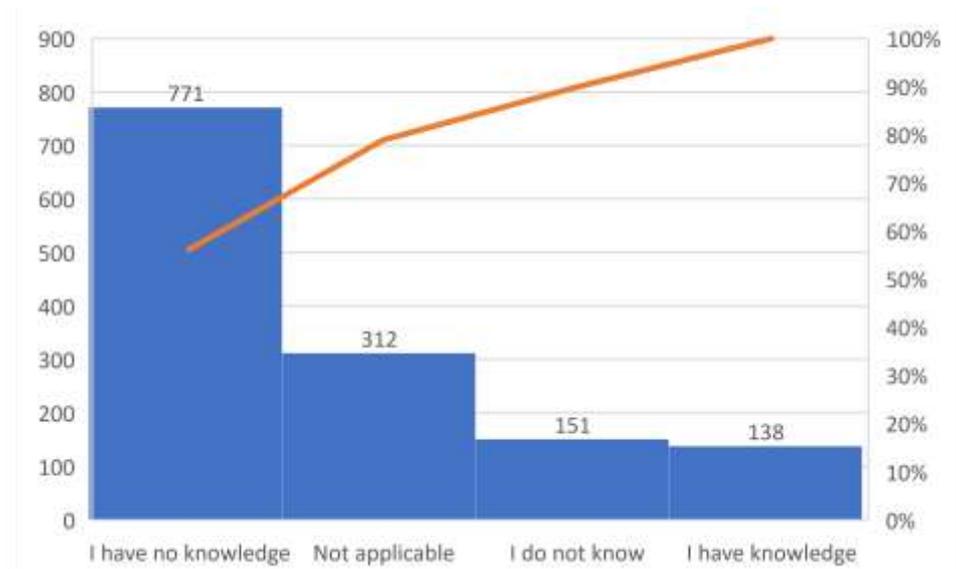


Fig.2. Overall percentage breakdown of responses broken down into four categories in research areas together (A-F) according to the Pareto principle.

The Pareto principle made it possible to identify areas that should be taken into account in order to increase the safe operation of the construction work with the least possible use of available funds (Fig. 3, Fig. 4).

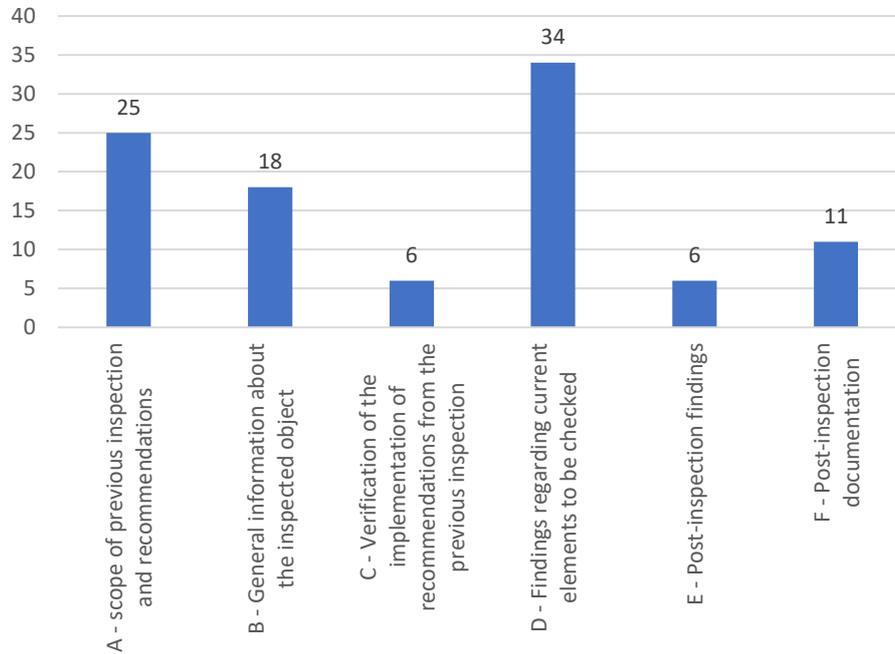


Fig.3. Areas of which employees have no knowledge

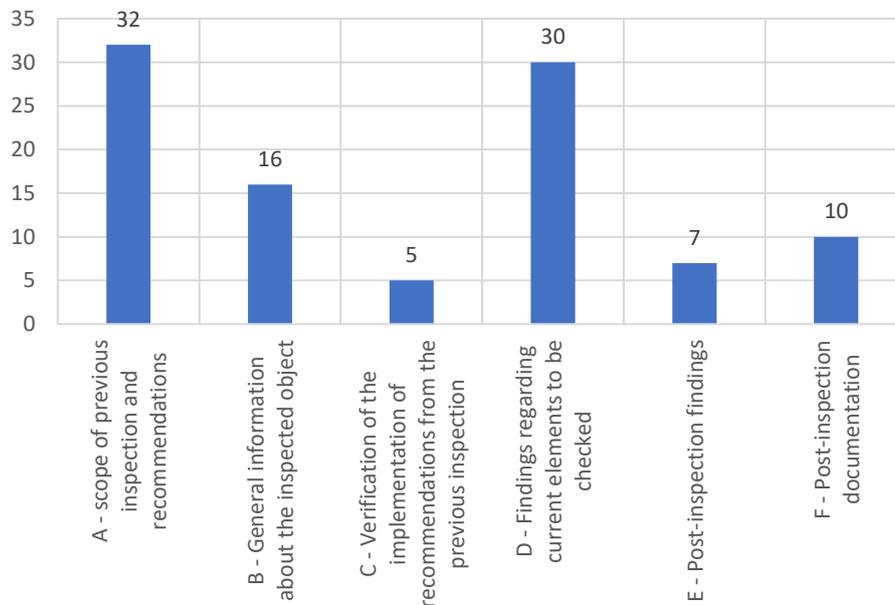


Fig.4. Areas that employees consider as not applicable

The analysis of the categories "I have no knowledge" and "not applicable" to area **A** (Fig. 5, Fig. 6) and area **D** (Fig. 7, Fig. 8) allowed to determine the detailed issues of these areas. The issues of area **A** and **D** are presented in Table A and D. 3 and Table 4).

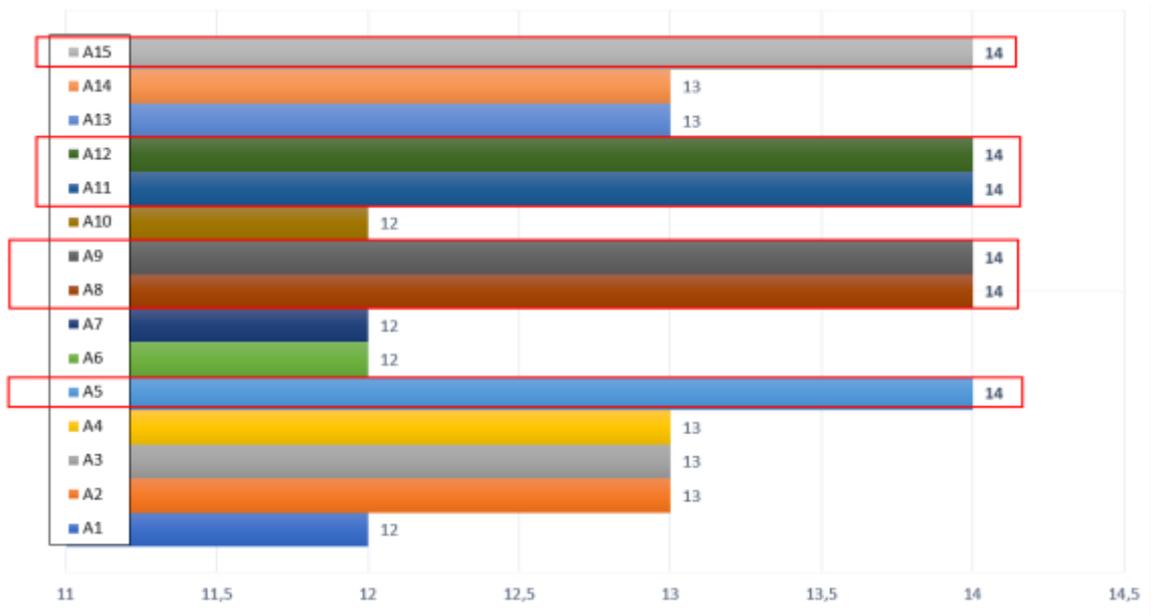


Fig.5. Analysis of the " I have no knowledge" category in area A

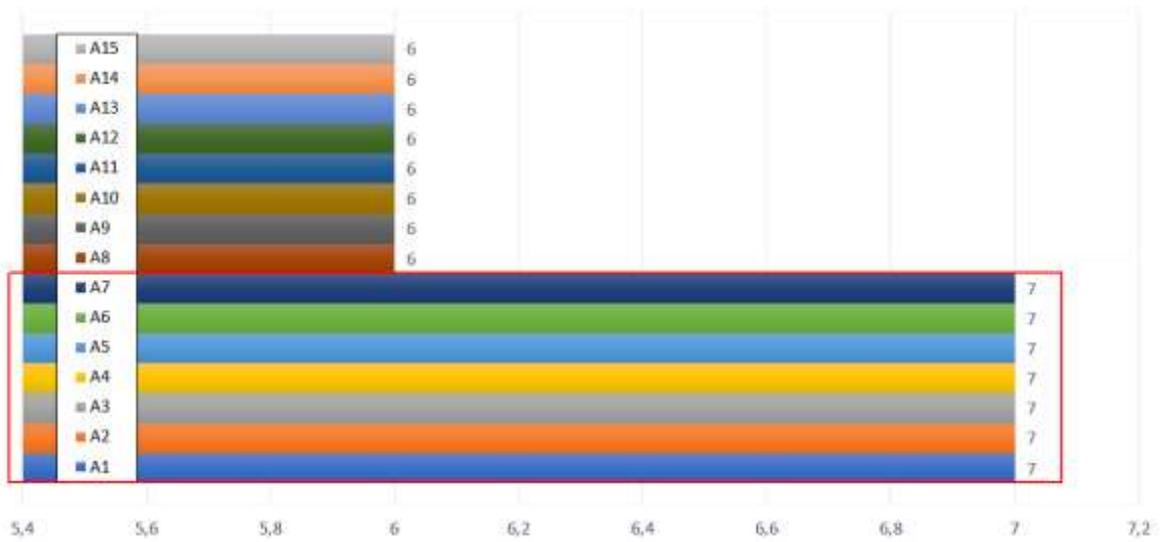


Fig.6. Analysis of the "not applicable" category in area A

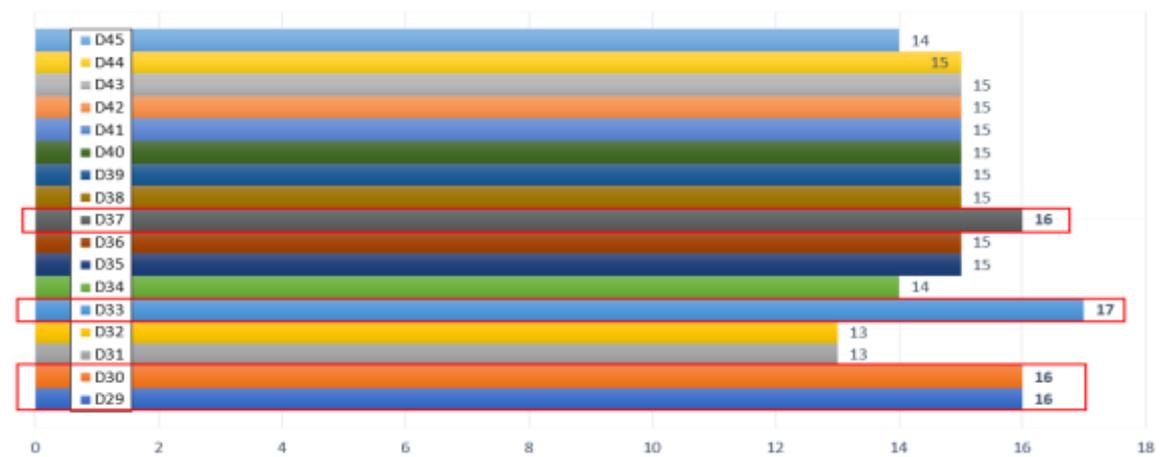


Fig.7. Analysis of the " I have no knowledge" category in area D

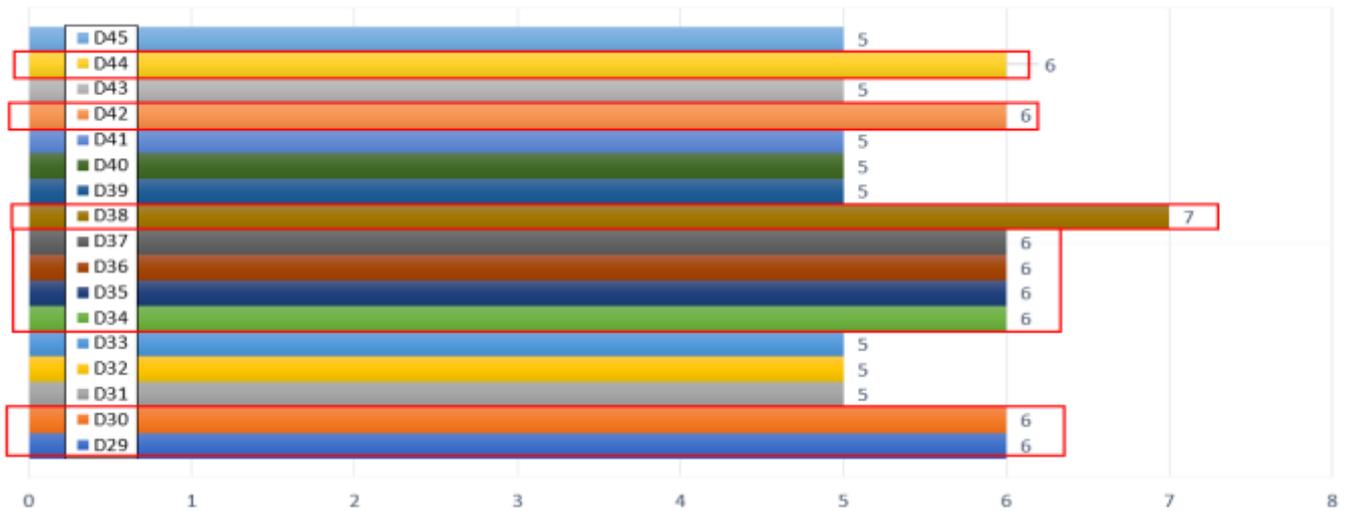


Fig. 8. Analysis of the "not applicable" category in area D

Tab.3. Issues (questions) of area A

A.1	Control of the implementation of recommendations from previous inspections, including control of possession and correctness of keeping the Construction Object Book
A.2	Control of building elements, structures and installations exposed to harmful weather influences and destructive effects of factors occurring during the use of the building, the damage to which may cause a threat to: the safety of persons, the environment and the structure of the building
A.3	Inspection of installations and equipment for environmental protection
A.4	Control of gas installations and flues (smoke, flue, ventilation)
A.5	Is the date of the audit, the conduct of the audit given?
A.6	Is the date of the next inspection given?
A.7	Has the scope of renovation works and the order in which they are to be carried out specified?
A.8	Have there been final conclusions?
A.9	Have the hazards to people and property been identified and the deadline for their removal given?
A.10	Has the graphic documentation produced during the audit been developed?
A.11	Are there any statements of compliance with the facts of the findings contained in the protocols concerning the signatures of authorised persons carrying out technical inspections?
A.12	Are there any statements of compliance with the facts of the findings contained in the protocols concerning the signatures of authorised persons inspecting the technical condition of the elements of the building / building?
A.13	Are there any statements of compliance with the facts of the findings contained in the protocols concerning the signatures of authorised persons inspecting the technical condition of sanitary installations?
A.14	Are there any statements of compliance with the facts of the findings contained in the protocols concerning, together with the signatures of authorized persons inspecting the technical condition of chimney and gravity ducts?
A.15	Are there any statements of compliance with the facts of the findings contained in the protocols concerning the signatures of authorized persons inspecting the technical condition of other cables or installations?

Table 4. Area **D** issues

D.29	Outer layers of external partitions regarding plasters: material, method of execution, fastening; equipment; Condition; consumption; other object-specific
D.30	External layers of external partitions related to wall cladding: material, method of execution; Mounting; equipment; Condition; consumption; other object-specific
D.31	Elements of external walls: cornices; Attica; Pillars; balconies, loggias; Railings; Window; doors, other
D.32	Appliances, installations mounted to walls and roofs: signboards and advertisements; Air conditioners; Antenna; lighting; transmitting and receiving stations; Other
D.33	Roofing and drainage elements: roof covering; chimneys, chimney sweep benches; flashings; Gutter; drain pipes; Other
D.34	Installations co: risers; horizontal; hydrophores, pumps; Valves Vent; control and measurement equipment; insulation; circulation; connection to an external network; Other
D.35	Hot water installations: risers; horizontal; hydrophores, pumps; Valves; water cycle; insulation; connection to an external network; Other
D.36	Installations and equipment for environmental protection: sanitary sewerage; storm water drainage; non-drainage tanks; wastewater treatment facilities; filtering devices; soundproofing devices; Other
D.37	Gas installation: wires; Valves; signalling installations; shut-off devices ; main valve; reducing devices; gas meter; ground; Other
D.38	Chimney ducts: smoke; petrol, gravity; ventilation, gravity; mechanical combustion engine; ventilation, mechanical; Other
D.39	Fire protection: hydrants
D.40	Fire protection: escape routes
D.41	Fire protection: other, including escape routes
D.42	Building connection
D.43	Passage through the walls of the building / connector
D.44	Other passages, installation connections
D.45	Other elements, devices, specialized installations, e.g. multimedia

The analysis of the obtained research results allowed to determine the following conclusions. Please note the following topics:

— area concerning the *findings of the current elements of the technical condition to be checked*:

- in the research category "*I have no knowledge*", which includes:
 - proofing and drainage elements: roof covering; chimneys, chimney sweep benches; flashings; gutters; downspouts; other elements of covering;
 - from the outer layer of external partitions regarding plasters: material, method of execution, fastening; equipment; technical condition; wear; other typical for the object;
 - of the outer layer of the partitions concerning wall cladding: material, method of execution; fastenings; equipment; technical condition; wear; other typical for the object;
 - and gas station: ducts; valves; signaling installations; shut-off devices ; main valve; reducing devices; gas meter; grounding ; other;
- in the research category '*not applicable*', which includes:
 - flues: smoke; petrol, gravity; ventilation, gravity; mechanical combustion engine; ventilation, mechanical; Other;
 - building installation connection;
 - installations and equipment for environmental protection: sanitary sewerage; storm water drainage; non-drainage tanks; wastewater treatment facilities; filtering devices; soundproofing devices; Other;
 - hot water installations: risers; horizontal; hydrophores, pumps; Valves; water cycle; insulation; connection to an external network; Other;

- installations CO: risers; horizontal; hydrophores, pumps; valves, vents; control and measurement equipment; insulation; circulation; connection to an external network; Other;
- Area concerning the *scope of the previous audit*:
- in the research category "*I have no knowledge*", which includes:
 - the date of the next inspection;
 - conclusions;
 - risks to people and property and the deadline for their removal;
 - statements of compliance with the facts of the arrangements contained in the protocols concerning the facility together with the signatures of authorized persons inspecting the technical condition of the elements of the building / construction object; other ducts; other installations;
 - in the research category '*not applicable*', which includes:
 - checking the implementation of recommendations from previous inspections, including possession and correctness of keeping the Construction Object Book; elements of the facility and installations exposed to harmful atmospheric influences and destructive effects of factors occurring during the use of the building, damage to which may pose a threat to: safety of persons, the environment and the structure of the building; installations and devices for environmental protection; gas installations and ducts chimneys (smoke, flue, ventilation);
 - the date on which the check was carried out and the date of the next inspection;
 - the scope of repair works and the order in which they are carried out.

4 Conclusion

The classic approach to the issue of safeoperation of buildings focuses primarily on meeting legal and engineering requirements. Workers, project owners, contractors and users of buildings also strive to ensure that they do not pose a threat to health and life, especially during the operation of the facility.

At the same time, it should be remembered that the safe operation of the facility is determined by the behavior of the users of the facility, because human and organizational factors are among the main causes of accidents. Therefore, this is where the still unused reserves of raising the health and safety of users of the building to a higher level are hidden.

One of the fundamental factors that significantly influence how an individual will behave when he is in a situation of danger is how he perceives the existing risk, because people's beliefs about things can influence their behavior more strongly than objective reality itself. In order to activate the reserves hidden in human behaviour to the benefit of improving the level of safety of buildings, it is necessary to fully identify the causes and mechanisms leading users to risky activities. The analysis of these behaviors enables the use of appropriate training and supervision methods, more broadly - directing, which would encourage users to behave in a safe manner and react consciously, directly or indirectly, to emerging threats during the operation of the building.

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