



# Perception of Green Facility Management

Assoc. prof. RNDr. Aleš Ruda, Ph.D., MBA

Faculty of Administration and Economic Studies in Uherské Hradiště, Města Mayen 1536,  
Uherské Hradiště 686 01, Czech Republic, e-mail: studium@fves.eu

---

## Abstract

The paper aims to identify the attitudes and opinions of selected types of actors regarding green facility management and its practice. This objective is fulfilled by developing a questionnaire survey among selected groups of actors. Understanding the views and attitudes of actors can inform strategic green facility management, the development of an appropriate regulatory and methodological framework and decision-making processes at different levels.

*Keywords: green facility management; questionnaire survey; perception of actors*

*JEL classification: Q10, Q15*

---

## 1. Introduction

Buildings are distinct entities fulfilling different functions (Collins and Junghans, 2015); they are related to society, safety, comfort of individuals and organizations, environment; so-called green buildings aspire to apply the best environmental and well-being solutions without compromising on social and economic aspects (link to sustainability theory; Lu et al., 2018).

The construction and real estate sectors of the economy, or buildings as a vital part of it, consume up to 40% of global energy production, produce up to 33% of emissions and other environmental pollution (the carbon footprint of buildings) and have negative impacts on the environment - see Alfalah and Zayed (2020); Junghans (2011); Hodges (2005); Rock et al. (2019); Rameezdeen et al. (2019); while they are also required to adapt to overall climate and environmental, social and economic changes (Nielsen et al., 2016). Not only the building itself as a physical object has its influence, but also its use and the behaviour of different actors (Rock et al., 2019 introduces the concept of socio-spatial anchoring). This is also why strategic and green facility management and the building of sustainable, resilient and environmentally friendly cities, settlements, campuses and facilities should be given attention in research and practice (also Nielsen et al., 2016).

In application practice, however, problems can be identified especially in terms of management, risk management, supply and demand chains or the application of possible appropriate solutions, and therefore Alfalah and Zayed (2020) or Nielsen et al. (2016) recommend directing professional work and research into the areas of building performance, sustainability tools and standardisation, actors' perceptions, sustainability management, visions and strategies and capacities to achieve them, construction and

materials, technology, design, urban development and the benefits of 'green' buildings, and a holistic mindset.

Overall, it can be summarized that there is a growing demand and pressure from various actors for environmentally friendly and sustainable solutions in buildings, which are also an indicator of the socio-economic status and maturity of countries (Rock et al., 2019; Nielsen et al., 2016; Collins and Junghans, 2015); building users as well as other actors are interested in reducing consumption and pollutants produced and being environmentally efficient (Nousiainen and Junnila, 2008). However, according to Rameezdeen et al. (2019), despite this interest, there is a significant information and communication gap, especially between owners and facility managers as well as users, and the whole issue is complicated by the fact that each actor emphasizes its own perspective and self-interest more than the general and public interest.

The paper is structured into several sub-units. The first unit focuses on the presentation of relevant literature and research on strategic green facility management. The next unit summarizes the findings of the questionnaire survey conducted among selected groups of facility management actors in the Czech Republic. The last part proposes reaction on formulated hypotheses.

## 2. Theoretical background

Strategic facility management has a positive link to all the pillars of sustainability of building operations and development, but also provides higher and long-term added value to various stakeholders and to the entire construction and real estate market sector (Alfalah and Zayed, 2020; Junghans, 2011; Hodges, 2005; Rameezdeen et al., 2019; Lu et al., 2018). It can be seen as an instrument available to the facility manager in reducing negative (incl. non-financial) impacts of buildings on their users and the environment as a whole (Alfalah and Zayed, 2020; Junghans, 2011); it is an integrated management of a given site to achieve its maximum performance (Collins and Junghans, 2015); it is strongly interdisciplinary and multi-level in nature (the different components are outlined below in Figure 1; Junghans, 2011; Collins and Junghans, 2015). As e.g. Somorova (2014) points out, strategic facility management is a determinant of building sustainability with both direct and indirect impacts (Junghans, 2011; Rameezdeen et al., 2019). Strategic green facility management should provide all functions required by building users and stakeholders and provide services related to the internal environment with links to the external infrastructure and environment (Somorova, 2014); it should mediate the interaction between building users and their market and other interests through the integration of core and non-core building processes (Junghans, 2011; Collins and Junghans, 2015).

Strategic green facility management should be applied throughout the entire life cycle of a building, i.e. from the planning and design phase and the creation of the building, through the period of its use and operation with changing functional use, modifications, renovations and technological upgrades (can extend or completely renew the life cycle of the building) to the demise and physical disposal of the building (Somorová, 2014; Rock et al., 2019; Nielsen et al., 2016; and Rameezdeen et al., 2019 who place particular

emphasis on the operational phase of the life cycle, in which the volume of resource consumption and emissions production is 5 to 7 times higher than in the construction phase).

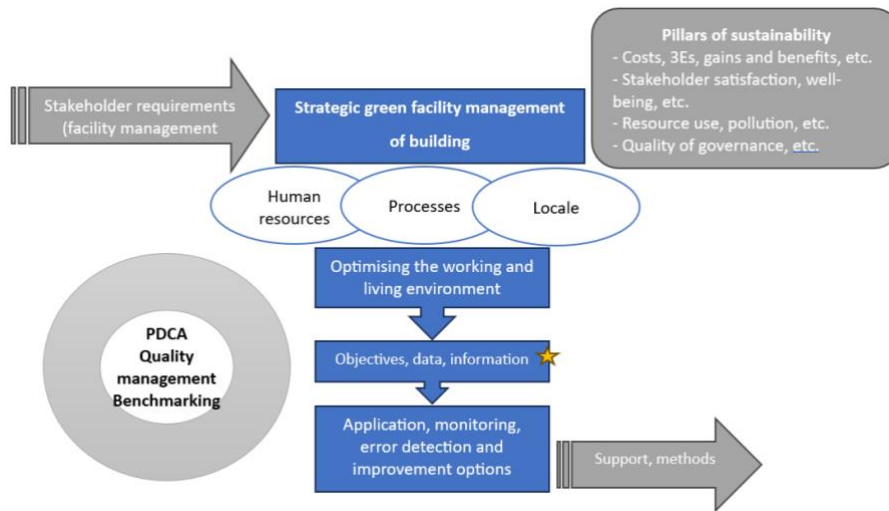
The overall framework of strategic green facility management, which is also reflected in the design part of the presented paper, is shown in Figure 2 (Somorova, 2014; Junghans, 2011; Rock et al., 2019; Lu et al., 2018). According to de Paula et al. (2016) or Lu et al. (2018), the necessary supporting elements of strategic green facility management are clear goal setting, collaboration across the entire supply-customer and other relational chains, human resource training and development, appropriate management tools, planning, evaluation system, process management and quality management. The responsibility for implementing the system and the best possible solutions in the operational phase of the building life cycle and achieving optimal performance rests primarily with the facility manager (should have both system and sector competencies - Lu et al., 2018).

### Figure 1: Structural parts of green facility management



Source: according to Alfalah and Zayed (2020); Hodges (2005); Rock et al. (2019); Nousiainen and Junnila (2008); Rameezdeen et al. (2019); de Paula et al., 2016; Collins and Junghans (2015)

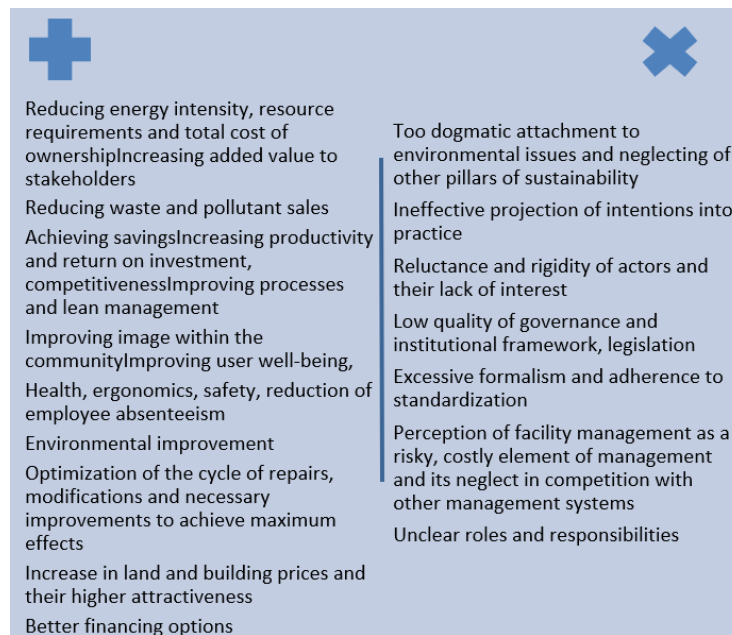
**Figure 2: Overall framework for strategic green facility management**



A wide range of evaluation indicators and criteria can be used, including input prices and investments, frequency and cost of maintenance and servicing, lifetime, energy consumption and the possibility of using alternative energy sources, recycling rates, volume and cost of material storage, water consumption, waste management, volume and cost of cleaning and housekeeping, environmental compliance, light and noise, volume of supply from sustainable suppliers, frequency and quality of communication, communication channels used and communication reach, quality of leadership, degree of sharing and collaboration, quality and composition of teams, frequency of application

Source: own elaboration based on Somorová (2014), Junghans (2011); Rock et al. (2019); Lu et al. (2018) and other cited

**Figure 3: Benefits and risks of strategic green facility management**



Source: according to Junghans (2011); Hodges (2005); Rock et al., (2019); Nousiainen and Junnila (2008); Rameezdeen et al. (2019); de Paula et al., 2016; Collins and Junghans (2015)

Figure 3 shows the most frequently mentioned benefits and risks of strategic green facility management by expert sources. According to Rock et al. (2019), the main barriers to the application of sustainable approaches and strategic green facility management are financial, technological, regulatory, architectural, barriers in terms of actors' relationships and different interests as well as unclear responsibilities and roles (de Paula et al., 2016 as well as Rameezdeen et al, 2019, who also highlight the issue of environmental uncertainty, unclear evaluation and rating, as well as the issue of quality and competences of human resources - also Lu et al., 2018; and the understanding of the concept by different actors), however, as the authors mention, facility management, public and other authorities do not have a clear understanding of the importance of the different barriers and thus of the opportunities for improvement in the implementation of sustainable and green solutions (e.g., similarly, e.g., Nielsen et al., 2016). The impaired possibility of effective application is indicated (according to Rock et al., 2019) more by existing buildings in which the sustainability and green approach has not been considered in the planning and design phase of the life cycle and there is only limited possibility for modifications or technological changes, usually with lower interest of owners and other stakeholders in improvements. For new buildings there is already more emphasis on green planning (Rock et al., 2019).

### 3. Questionnaire survey

In order to identify the needs of real estate market actors in the field of green facility management in the Czech Republic and in accordance with the findings of the literature, the method of cognition was a questionnaire survey. Thus, the aim of the survey was to find out the knowledge on which the green facility management methodologies could be based.

Several hypotheses were formulated for the questionnaire survey, which were subsequently responded to in the conclusion (see later sections). The hypotheses were formulated as follows:

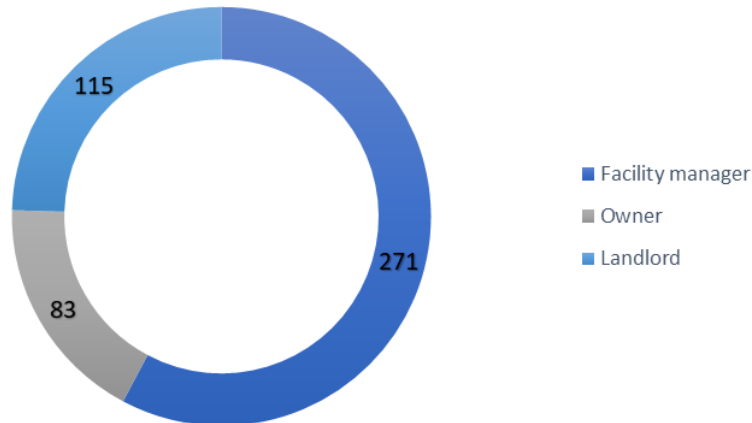
- H1: Actors are equipped with knowledge regarding the concepts of green building, green facility management and sustainability as well as their implementation and are interested in applying the concepts in practice.
- H2: Actors apply tools to achieve sustainability objectives and project appropriate approaches also in strategic, tactical and operational management.
- H3: Relationships between different groups of actors do not show problematic elements.
- H4: Barriers to the application of green and sustainable concepts lie mainly in the area of resources and technological solutions.
- H5: There are no statistically significant differences in the assessment of appropriate support areas from the perspective of different actors.

A total of 1,134 entities operating in the real estate market from three defined groups - owners of real commercial properties, landlords of real commercial properties and facility managers operating in real commercial properties - were contacted via an e-mail contact database. The questionnaires were collected over a two-month period and the interviews were conducted in the Survio environment. A total of 469 fully completed questionnaires subsequently entered the evaluation (the composition of the total sample with respect to each group is shown in Figure 4). A questionnaire with all open and closed questions completed, with the exception of the last open-ended question providing the opportunity for further free expression by respondents, was marked as fully completed.

The survey instrument was based on traditional approaches to conducting questionnaire surveys (e.g., Taherdoost, 2022; Glasow, 2005) and structured into several sections:

- Characteristics of respondent
- Information area
- Management area
- Relationships area
- Area of barriers
- Support area

**Figure 4: Structure of respondents**



Source: own elaboration

The following text summarises the evaluation of the questionnaire survey, distinguishing the different areas (see above). Regarding the characteristics of the respondents of the questionnaire survey (Table 1), it is noticeable that most of the respondents have at least two years of experience in their activities, their activities are mostly implemented in the urban area or its surroundings. Most of the respondents are also male, which may indicate the persistent dominance of this gender in the real estate sector and thus the sector may be more performance and technical oriented (performance orientation, technology orientation and less on soft issues; Staffansson Pauli, 2013 on masculinity and gender structure of the real estate sector). The above basic characteristics may be related to the socio-economic status of the respondents and thus their views, mode of practice and stated conclusions.

**Table 1: Characteristics of respondents**

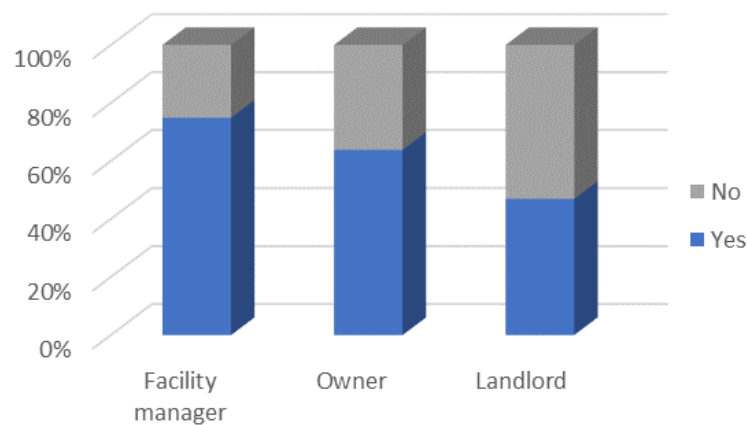
	Less than 2 years	2 to 5 years	5 to 10 years	10 years and more
<b>Praxis length</b>	13	42	31	14
	<b>Urban</b>	<b>Sub-urban</b>	<b>Rural</b>	
<b>Location of praxis</b>	63	28	9	
	<b>Male</b>	<b>Female</b>	Higher representation in the group of tenants and facility managers (female representation 38 and 42% respectively)	
<b>Gender</b>	76	24		

Source: own elaboration

## Information area

The first question of the thematic area, which measured respondents' general awareness of green facility management and sustainability topics within their professional role, directly addressed their awareness and understanding of selected supporting concepts (Figure 5). A brief description of what is meant by "can you define" was also attached to the question so that the understanding of the question was, as far as possible, consistent across the sample. The highest proportion of agreeing responses was recorded for facility managers, which may be due to their direct exposure to modern trends and requirements in sustainability and green concepts in building design and management. On the other hand, the lowest proportion of agreeing responses was recorded for tenants who focus more on their market sector and their business than on the sustainable operation of the premises where they carry out their business activities.

**Figure 5: Perception of concepts**

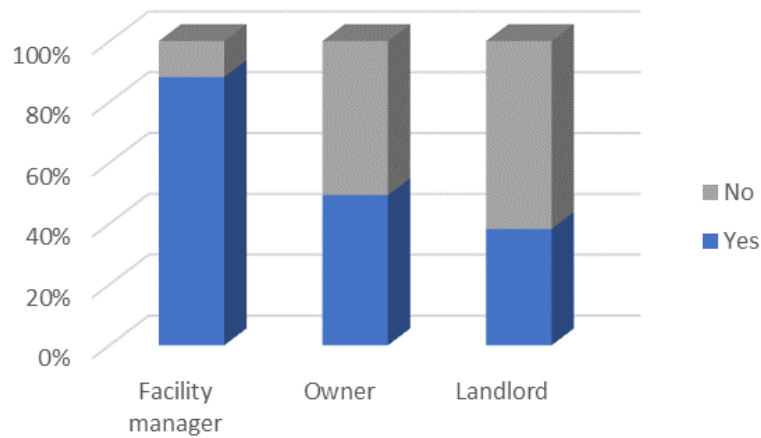


Source: own elaboration

A clear majority of facility managers identified an interest in applying the tools and principles of sustainability, green facility management and green building design and operation (Figure 6). Again, this can be linked to the pressure from different stakeholder groups to improve on environmental sustainability as well as the changing regulatory environment. Conversely, the relatively lower interest of building owners and tenants (or their tendency towards persistence and conservative attitudes) can be linked mainly to the perception of the resource intensity of sustainable and green solutions (see also the assessment of perceived barriers below).



**Figure 6: Interest in the application of sustainable and green solutions in daily practice**



Source: own elaboration

Respondents were also asked to identify the most important source of information on the topics of sustainability, green facility management and green buildings etc. and how they can be applied in practice (Table 2). The average score for each source of information is given, with the rating scale set from 1 (least significant) to 5 (very significant). As can be seen, the main sources of information are the respondents' contacts and the Internet, which is, however, replaced by more professional and educational organizations in the case of facility managers.

**Table 2: Sources of information**

	Facility manager	Owner	Landlord
<b>Contacts</b>	4,2	4,4	4,6
<b>Professional organizations</b>	4	2	0,8
<b>Education organization and courses</b>	3,8	1,6	2,1
<b>Internet</b>	3,5	4,6	4,2
<b>Print and literature</b>	1,3	1,5	1,2
<b>Others</b>	0,3	0,8	1,3

Source: own elaboration

Table 3 shows the awareness of each group of the activities, responsibilities and competences of other actors in the whole life cycle of buildings. Again, the average score is given, where the rating scale was set as follows: 1 not at all; 2 vaguely; 3 average awareness; 4 rather yes; 5 completely accurate; NA expresses the logical irrelevance of the self-assessment. It is quite clear that there is less awareness of the overall role of public actors and also that building tenants are generally the least informed about the

roles of other actors. With regard to the job role, facility managers have the best overall awareness.

**Table 3: Respondents' awareness of the roles of other actors**

	<b>Facility manager</b>	<b>Owner</b>	<b>Landlord</b>
<b>Facility manager</b>	NA	3,2	3,8
<b>Owner</b>	4	NA	4
<b>Landlord</b>	4	4,5	NA
<b>Municipality and region</b>	3,5	1,8	2
<b>State and its organizations</b>	3,5	2,3	2

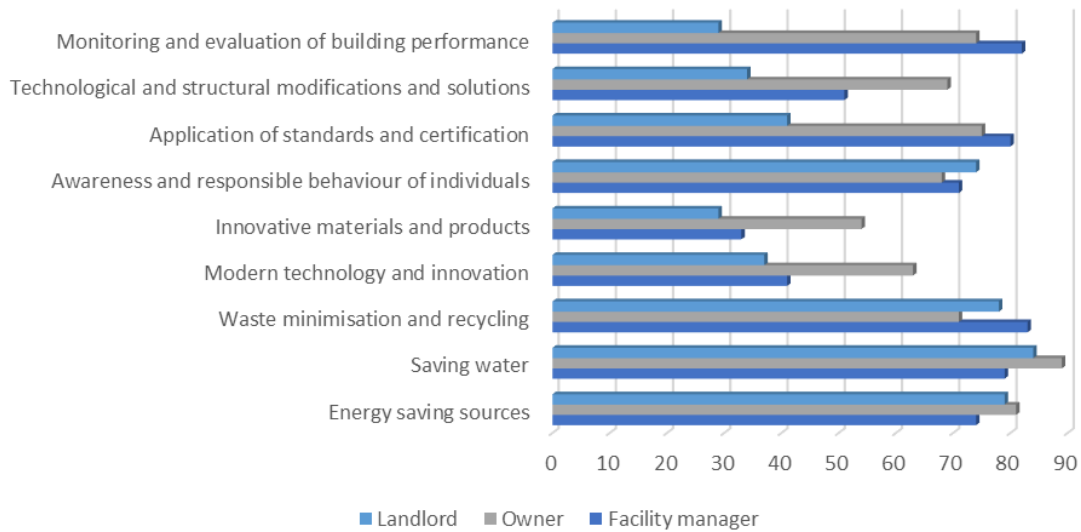
Source: own elaboration

### **Management area**

Another area evaluated was the actual management and management of the activities of individual groups of respondents in the context of sustainability, green facility management, etc. Figure 7 shows the proportion of 'yes' responses to whether the respondent is applying the relevant tool or activity to achieve the intentions of sustainable building operation and development. The responses indicate that the largest portfolio of tools and activities is applied by facility managers (this is expected given their role in the life cycle of buildings); then a relatively larger proportion of owners apply tools and activities related to building design; in the case of tenants, it is the application of tools and activities that are related to day-to-day operations and have a direct impact on tenants' costs (water and energy consumption, waste).

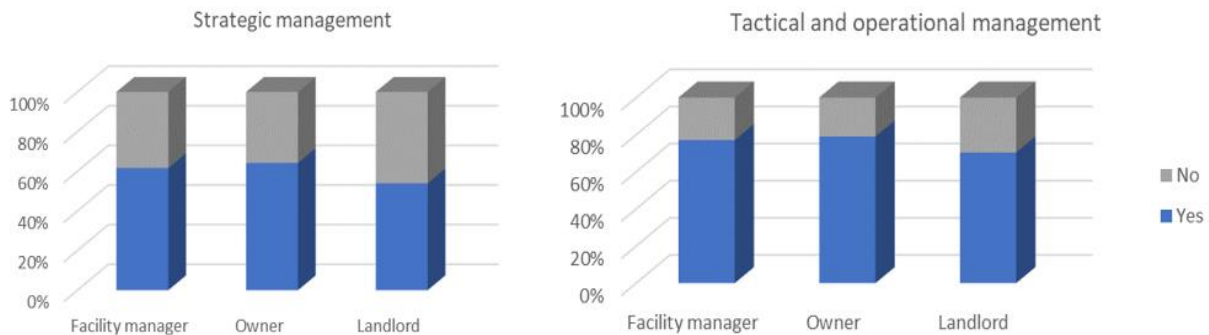
Figure 8 further shows that the concepts of green facility management, green buildings and sustainability are mainly projected at the tactical and operational (day-to-day) management and leadership levels for all groups of respondents. At the strategic level, the concepts are mainly projected in the case of owners and facility managers. In the case of tenants, a possible justification for the lower average can be seen mainly in the fact that their business strategies are oriented towards relevant other areas of the economy and the market.

**Figure 7: Applied tools and activities for achieving sustainability**



Source: own elaboration

**Figure 8: Integration of relevant concepts into strategic, tactical and operational management**



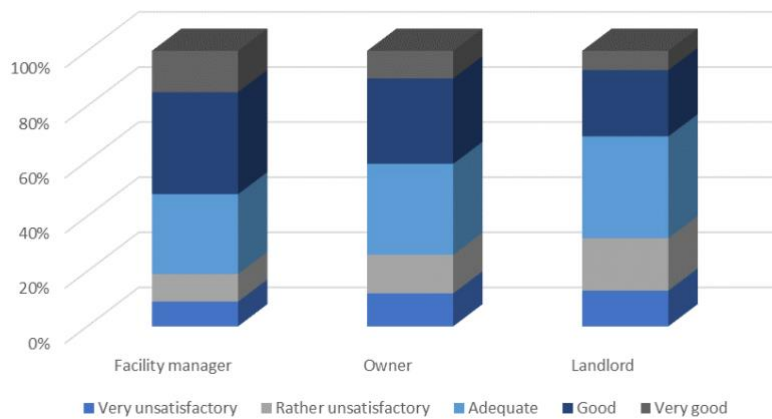
Source: own elaboration

The level of facility management in the buildings of interest to the respondents (in any of the three ratios) is perceived relatively positively, especially by the facility managers themselves (who rated the conditions for doing their job as such); it was rated slightly worse by the tenants. Figure 9 gives an indication of the situation.

For a significant proportion of respondents, sustainability is a topic that is part of their other strategic business priorities (Figure 10) or a sub-priority. It is most often identified

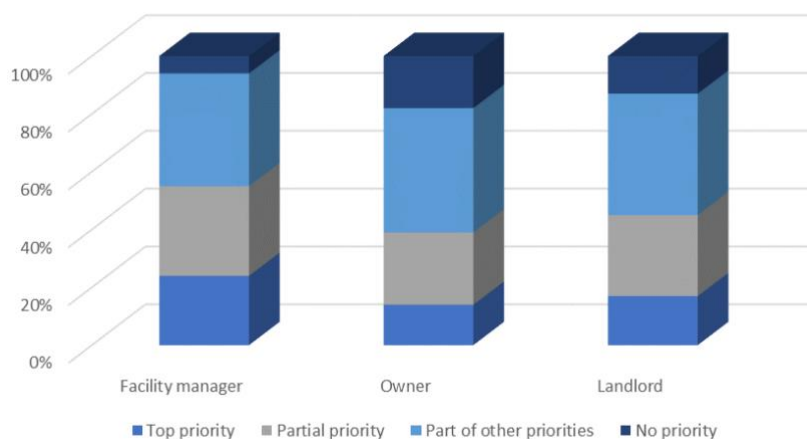
as a top priority by facility managers. For property owners, sustainability is a concern that is overshadowed primarily by economic and technical concerns and priorities. A significant proportion of respondents from the facility managers and property owners group are inclined to the view that sustainable and green solutions are more applicable in new developments than in existing facilities. The main reasons for this are seen to be lower economic costs, infrastructure readiness, lower time requirements and better technical feasibility. The opposite opinion is held by the majority of tenants, who, however, are not primarily concerned with the technological and design aspects of such solutions (unlike owners).

**Figure 9: Quality assessment of facility management**



Source: own elaboration

**Figure 10: Sustainability position within the priorities**



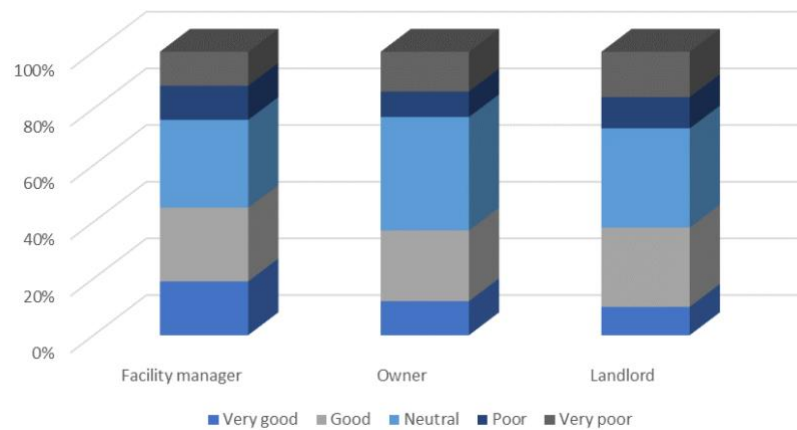
Source: own elaboration

## Relationships area

In the next section of the survey, respondents were asked to rate the quality of their relationships with other stakeholders, i.e. facility managers, owners and tenants of the facilities (Figure 11). Logically, respondents always omitted their own position. Respondents are largely neutral to optimistic in their attitudes towards other actors. Facility managers have a better view of the relationship, while owners and tenants have a slightly worse view. The latter group also shows the highest proportion of responses in the worst category. Respondents indicated the greatest conflicts in tenant-owner relations.

The main bottlenecks in the context of interrelationships were indicated as communication flows, cooperation, misalignment of interests, lack of and quality of sources and unclear responsibilities and competencies.

**Figure 11: Evaluation of relations with other actors**



Source: own elaboration

## Area of barriers

Table 4 shows the main identified barriers perceived by each group of respondents to the application of sustainable and green solutions. Respondents were asked to rate each barrier on a scale of 1 (least problem) to 5 (greatest problem) and the average score for each barrier offered is given. It is quite clear that the main barriers to the application of sustainable and green solutions are seen in the level of cooperation, information flows and conflict of interests of the different actors, as well as in the level of resources (especially in the case of owners); in the case of facility managers and partly owners on the knowledge and competence side, and also the lack of a comprehensive methodological framework and quality strategic management to perform their work. On the other hand, legislation and regulations are not perceived as major barriers, despite the generally accepted and media-supported assumption regarding administrative barriers to the performance of activities (not only) in the real estate market. The assessment also

revealed that there are relatively deteriorated relations, especially between tenants and property owners, in which mutual disputes and misunderstandings occur. Relationships between the two groups and facility managers can also be seen as rather problematic, as they are seen as a 'somewhat redundant' link that does not perform the expected functions sufficiently. These problem areas may have their origins in a lack of communication and sharing of information and needs and interests (author's note).

**Table 4: Barriers to the application of sustainable and green solutions**

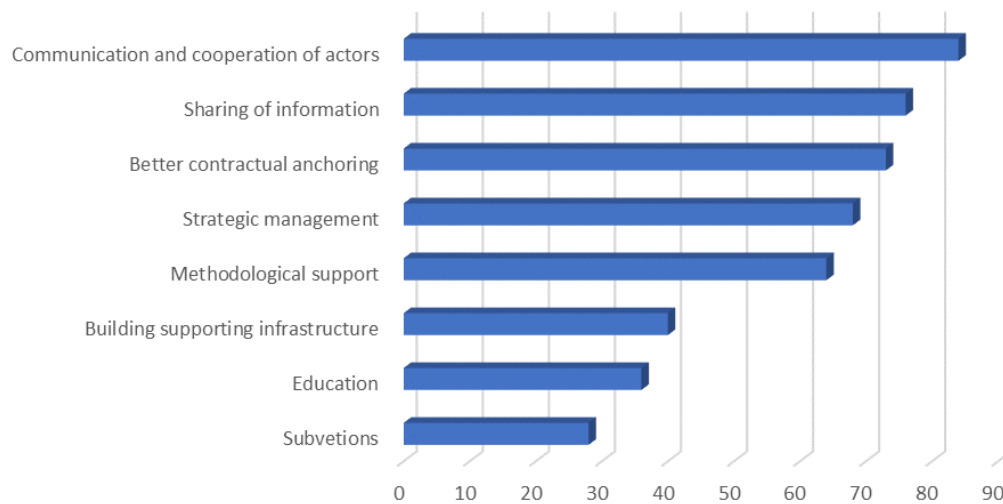
	<b>Facility manager</b>	<b>Owner</b>	<b>Landlord</b>
<b>Knowledge and competences, methodology and strategic management</b>	4,1	3,2	2,6
<b>Sources</b>	3,3	4,3	3,8
<b>Cooperation and information, conflict of interest</b>	4	3,9	4,2
<b>Building technology and technical solutions</b>	2,7	3,5	2,9
<b>Regulation and legislation</b>	2	2,4	1,6
<b>Barriers on the owner's side</b>	2,8	NA	3,4
<b>Barriers on the landlord's side</b>	3,1	2,8	NA
<b>Barriers on the facility manager's side</b>	NA	3,8	3,2

Source: own elaboration

### **Support area**

In terms of the area of support that would be most appreciated by each respondent group in terms of simplifying the application and actual implementation of sustainable and green solutions to their activities and interests, the most frequently mentioned type of support was shown in Figure 12. It can be seen that the respondents would appreciate soft support in strengthening mutual communication and cooperation as well as information sharing as the most beneficial, but also better contractual embedding of issues in mutual relations, methodological support and quality strategic management. The last three mentioned were relatively more frequent in the responses of facility managers, which is relevant for the design part of the thesis. On the other hand, the availability of subsidies, especially from public sources, does not appear to be a major decisive factor in the application of sustainable and green solutions; the offer of training programmes or the building of supporting infrastructure is also perceived as relatively less necessary (this support is only more important in the case of property owners). From this it can be concluded that within the framework of the so-called hard measures and the basis for the application of sustainable and green solutions, the individual actors rely more on themselves.

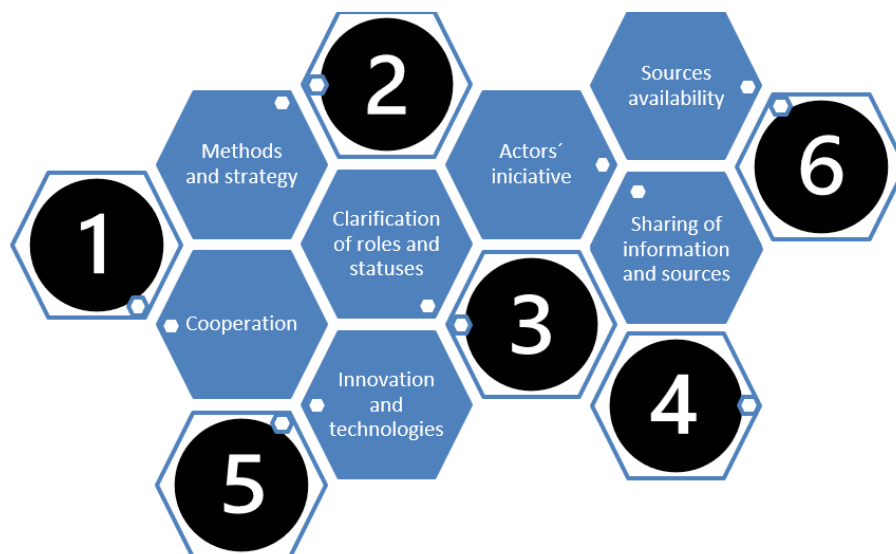
**Figure 12: Preferred areas of support for the application of sustainable and green solutions**



Source: own elaboration

Figure 13 visualizes the most frequently appearing slogans that were captured in the final, open-ended question, which gave respondents the opportunity to freely comment and add to the entire surveyed issue. In particular, the question of roles and cooperation between the different actors and the need for an appropriate methodological and strategic framework were again commented on.

**Figure 13: Word cloud of free expression of respondents**



Source: own elaboration

## 5. Conclusion

Table 5 shows the results of the evaluation of the formulated hypotheses (see text above). Based on the evaluation of the statistical differences between the responses of the main three groups of respondents (see e.g. Kladivo, 2013), it was found that there were only some statistically significant differences (related to the refutation of the fifth formulated hypothesis):

Facility managers prefer relatively more so-called soft measures and solutions that lead to the application of sustainable and green solutions; property owners are more oriented towards so-called hard, technological and economic solutions. There are relatively poorer relations between tenants and property owners on the one hand and facility managers on the other. Sustainability is a priority especially for facility managers.

No statistical significance was indicated in the assessment of the statistical significance of the differences between the responses of the sub-groups of respondents according to their characteristics (see Table 5; first area of the questionnaire survey), except for the greater interest in the application of sustainable and green solutions in the case of women and respondents with shorter length of experience.

**Table 5: Evaluation of hypotheses**

	Evaluation		Significance of the difference
<b>H1</b>	Confirmed:	Facility manager	0,00** (significance level 5 %)
	Unconfirmed:	Owner, landlord	
<b>H2</b>	Confirmed		No differences in significance between groups
<b>H3</b>	Rejected		No differences in significance between groups
<b>H4</b>	Rejected		No differences in significance between groups
<b>H5</b>	Rejected		0,00** (significance level 5 %)

Source: own elaboration



## References

- Alfalah, G., Zayed, T. (2020). A review of sustainable facility management research. *Sustainable cities and society*, 55, 102073.
- Collins, D., Junghans, A. (2015). Sustainable facilities management and green leasing: The company strategic approach. *Procedia Economics and Finance*, 21, 128-136.
- de Paula, N. et al. (2017). Managing sustainability efforts in building design, construction, consulting, and facility management firms. *Engineering, Construction and Architectural Management*, 24(6), 1040-1050.
- Glasow, P. A. (2005). Fundamentals of survey research methodology. Retrieved January, 18, 2013.
- Hodges, C. P. (2005). A facility manager's approach to sustainability. *Journal of facilities management*, 3(4), 312-324.
- Johansson, J. et al. (2020). Gendering the digitalized metal industry. *Gender, Work & Organization*, 27(6), 1321-1345.
- Junghans, A. (2011). *State of the art in sustainable facility management*.
- Kladivo, P. (2013). *Základy statistiky*. Olomouc: Univerzita Palackého v Olomouci.
- Lu, Y. et al. (2018). Transition towards green facility management: Bridging the knowledge gaps of facilities managers. *Journal of Green Building*, 13(3), 122-143.
- Nielsen, S. B. et al. (2016). Sustainability in facilities management: an overview of current research. *Facilities*, 34(9/10), 535-563.
- Nousiainen, M., Junnila, S. (2008). End-user requirements for green facility management. *Journal of Facilities Management*, 6(4), 266-278.
- Rameezdeen, R. et al. (2019). Ensuring environmental performance in green leases: the role of facilities managers. *Facilities*, 37(9/10), 527-549.
- Rock, S. et al. (2019). Barriers to “green operation” of commercial office buildings: Perspectives of Australian facilities managers. *Facilities*, 37(13/14), 1048-1065.
- Somorová, V. (2014). Optimization of the operation of green buildings applying the facility management. *Selected Scientific Papers-Journal of Civil Engineering*, 9(1), 87-94.
- Staffansson Pauli, K. M. (2013). „All of my bosses have been men”–on gender structures in the real-estate industry. *Property management*, 31(5), 420-434.



- Taherdoost, H. (2022). Measurement and scaling techniques in research methodology; survey/questionnaire development. *International Journal of Academic Research in Management*, 6(1), 1-5.