Analysis of the portrait of sustainable building management practices used in 2022 by the public sector property asset managers in Quebec

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Abstract

Sustainable development, the fight against climate change and the protection of biodiversity have become essential considerations in all the different business sectors. They particularly affect the construction and real estate sectors, which contribute to nearly 38% of all global carbon dioxide emissions (UNEP, 2023). Sustainable development has been transposed to real estate by the concept of sustainable or green building. Property asset managers must therefore adopt effective practices to comply with good sustainable building practices and to manage the social, economic, and environmental impacts generated by their buildings. Green building literature provides a clear framework on the range of practices, indicators, measures, and methods to assess the sustainable performance of a building (Nilashi et al. 2015; Zhao et al., 2019). However, scientific literature makes few distinctions between private and public sector buildings (Baird et al., 2022).

The purpose of this research is to paint a portrait of the practices used in 2022 by public sector property asset managers in Quebec, who are essential stakeholders to be mobilized to succeed in the transition to more sustainable buildings. They are indeed major owners of real estate portfolios, and they are called upon to demonstrate the State's exemplarity.

Some 88 public sector property asset managers responded to a survey of 188 questions distributed in Quebec between December 2021 and March 2022 relating to: (1) the description of their organization and their real estate portfolio; (2) the practices operationalized by their organization in property management; (3) the practices to manage environmental impacts and (4) the practices to manage social impacts.

The analysis of the responses to the survey shows that respondents consider themselves effective in terms of managing internal risks relating to their buildings without, however, concretely considering the impacts they generate on external stakeholders. Waste, water, and greenhouse gas (GHG) emissions management practices are given more priority than energy management practices. This is explained by the low cost of hydroelectricity in Quebec. These environmental impact management practices are, however, supplanted by the interest in practices for managing the health, safety, comfort, and well-being of internal building stakeholders, which can be explained by the consequences resulting from the COVID-19 crisis. To perform better, respondents point out that they would need training in sustainable building management and budgetary resources, particularly for the maintenance and upkeep of their assets. The sustainable development objectives pursued by the organizations of the respondents still need to be integrated into the contracts with the various suppliers. Finally, the fight against climate change and the development of resilience to natural disasters are not or hardly integrated into the management of their operations.

This research could be replicated in different parts of the world to compare these practices with those used in Quebec. It could also be taken up in Quebec to analyze the evolution in time of sustainable institutional building management practices.

Keywords: Sustainable building, Institutional buildings, Sustainable building management practices, Management of social, economic, and environmental impacts.

Introduction

This research presents a portrait of sustainable building management practices used in Quebec in 2022 by the public sector property asset managers, i.e., properties owned or used by public sector organizations[1].

[1] This research project received financial support from the Mitacs Accelerate program, the Social Sciences and Humanities Research Council (SSHRC) (Canada), l'Association des gestionnaires de parcs immobiliers institutionnels (AGPI) and the Ivanhoé Cambridge Real Estate Chaire, School of Management, Université du Québec à Montréal (ESG UQAM).

Why is sustainable building management a concern?

The real estate sector and its main supplier, the construction sector, together represent more economic activity than the industrial and agricultural sectors combined (Bosvieux, 2018). In addition, almost 38% of carbon dioxide (CO2) emissions are related to the worldwide energy used in the construction and operation of buildings worldwide (UNEP, 2020). In 2015, the Canadian building sector emitted 73 Mt of CO2 equivalent, i.e., 12% of the country's greenhouse gas (GHG) emissions. This figure rises to 17% if the energy consumed by buildings is included (Report of the Standing Senate Committee on Energy, the Environment and Natural Resources Canada, 2018). The real estate sector is thus a major vector of change and scientists estimate that building impact mitigation practices could meet 80 or even 90% of the worldwide objectives for reducing GHG emissions (IPCC, 2022). The buildings indeed hide a significant potential for reducing GHG emissions that is still poorly exploited, since around 70 to 85% of total energy and water consumption occurs during the operational phase (Junnila et al., 2006) whose median duration is 70 years. Therefore, it is necessary to insist on improving management practices of existing buildings, in particular practices that go beyond the technical aspect. The identification, dissemination, and accelerated adoption of best building management practices is thus essential in the fight against climate change (Yau & Hasbi, 2013). This also applies to detect and manage the environmental impacts to which it must also be added the social and economic impacts of buildings as well as the impacts of space layouts on users (Ofek et al., 2020; Pearce, 2017; Sicotte, Delerue & De Serres, 2019; Sundfors et al., 2018).

Moreover, the regulatory framework to which private or publics buildings are subject is becoming more and more demanding in terms of disclosure of performance and practices adopted to support more sustainable development. For example, the Canadian government increased in 2021 its requirements for reducing GHG emissions, aiming for a 40 to 45% reduction by 2030 compared to their 2005 level (Environment and Climate Change Canada, 2021). In continuity, the city of Montreal in Quebec also implemented in 2022 a new regulation requiring owners of commercial and institutional buildings to disclose their energy consumption and to have their buildings rated (City of Montreal, 2021). On the international scene, the return of the United States to the Paris Agreement was marked by a new plan for the climate which envisages a reduction of GHG emissions of the United States by 40% by 2030 compared to 2005. On the European side, the European Union has also revised its objectives upwards and aims to reduce net GHG emissions by at least 55% in 2030 compared to their 1990 level. While the legislative noose is tightening and citizens become more aware of the negative consequences linked to poor building management, public sector property asset managers represent a vital element in encouraging the change towards more sustainable real estate and embodying exemplarity (Akkouche et al., 2021 National Research Council Canada, 2018; Deschamps, 2012; Department of Energy and Natural Resources, 2022b; Voir Vert, 2021).

Beyond requirements, sustainable building management as an appropriate response

The implementation and integration of the concept of sustainable building within the activities and operations of the real estate and construction sectors contribute to sixteen of the seventeen SDGs (Sustainable Development Goals) of the Organization of United Nations (UN), including those relating to energy, infrastructure, cities, sustainable consumption and production, and climate change (IPCC, 2022). In this context, it can be expected that the provisions of institutional, legal, and regulatory frameworks will continue to evolve to moderate and mitigate the negative externalities generated by human activities. However, the sustainable management of buildings is indeed increasingly guided by legislation and less and less by corporate image (Ayres et al., 2007; Casal, 2006; Shiers et al., 2007). The built environment must therefore evolve to adapt to these various challenges of sustainable development.

Sustainable development is defined for the first time in the Brundtland Report (1987): “Sustainable development is a mode of development that meets the needs of present generations without compromising the ability of future generations to meet theirs”. Sustainable development is based on three pillars, namely the social, economic, and environmental pillars, to which we often add a disclosure of governance to achieve sound reporting. Over the past thirty years, this requirement has become essential, particularly with the efforts of the United Nations Organization for Sustainable Development and its “2030 Agenda” (UN, 2015). It affects all business sectors and particularly those of construction and real estate including investment.

The transposition of sustainable development in the world of construction and real estate has been achieved through the concept of sustainable building. There is no consensus on the definition of a sustainable building. This concept is based on the three pillars of sustainable development: the environment (reducing the environmental burden), the economic aspects (maximizing financial benefits) and the social impacts (improving the quality of life, equity and achieving social protection). A sustainable building thus differs from a traditional or green building due to the consideration of social, environmental, and economic objectives throughout the phases of its life cycle (Dridi & De Serres, 2017; Zhao, 2019).

The concept of sustainable building was first assimilated to environmental performance (Dridi & De Serres, 2017; Nilashi et al., 2015; Suganthi, 2018), aiming in particular at the performance of the technical building management associated with the design of the building, the selection of construction materials, the quality of the construction work, the location of the building, the choice of energy supply source and the operation and maintenance activities (Harris, 1999; Pajchrowski and al., 2014), to then include energy consumption (Christensen, 2018) and GHG reduction (Lu & Lai, 2020), throughout the building's life cycle (Marsh, 2017; Ortiz et al., 2009). We later added water management (drinking water consumption, rainwater, wastewater) (Giwa & Dindi, 2017; Théberge, 2017), waste management (Kamali & Hewage, 2016; Vilcekov & Kridlova Burdova, 2014), mobility (Maldini & De Serres, 2019; Trombin et al., 2020), access to means of public transport and active transport (Mattoni et al., 2018), access to green spaces, urban agriculture and the development of sustainable and smart building certifications (LEED, BOMA Best, Energy Star et al.), making it possible to certify the performance of a sustainable building (Kwon, Kwag & Choi, 2009; Newsham et al., 2013; Newsham, Veitch & Hu, 2018), and demonstrating the commitment of its staff (Gui & Gou, 2020). The challenge was then to adapt this more technical building-related knowledge to the management of property asset, including relations with tenants, insurers, financiers, investors, suppliers, and many other partners (Mueller et al., 2009; Seuring, 2008).

At the same time, there has been a real boom in the concept of sustainable building (Yusoff & Wen, 2014) and in the integration of the principles of the circular economy and sustainable development (Alhola, 2018; OECD, 2020; Thomson & Jackson, 2018). The circular economy is defined as a “production, exchange and consumption system aimed at optimizing the use of resources at all stages of the life cycle of a good or service, in a circular logic, while reducing the environmental footprint and contributing to the well-being of individuals and communities” (Québec Circulaire, 2019). More recently, the concept of sustainable building has evolved towards a new trend: from an approach centered on the physical environment, it mutates towards the Anthropocene approach where the occupants are at the heart of the building (Clements-Croome, 2014 a). Property managers' concerns now include managing the impacts generated by the building on its occupants. They were first interested in the impacts on productivity (Sicotte, De Serres & Delerue, 2019; Wood, 2003). This trend has been accentuated with the COVID-19 crisis (Semsari & De Serres, 2021), prompting owners or tenants to manage the impacts generated by a building both on health, safety, comfort, and well-being of occupants and users. They are now called upon to combine several functions and uses of a building and to optimize its occupation (housing – work – service – retail, etc.).

An ecosystem-based approach

The performance of a sustainable building must now be assessed not only by the quality of its management of environmental impacts but also by the quality of the management of its impacts on health (physical (Bako-Biro, 2004; MacNaughton et al., 2017), and psychological (Breheny, 1996; Houtman et al., 2008) safety, comfort and well-being of occupants and users (Fassoulis & Alexopoulos, 2016; Lou & Ou, 2019; Pearce, 2017; Rasheed & Byrd, 2017).The social performance of a sustainable building places the well-being and comfort of the building’s occupants at the forefront, based on performance indicators such as the quality of the internal air (Simonson, 2002; Wolkoff, 2007), thermal comfort, acoustic comfort (Lee, 2010), visual comfort, space layout and internal environmental quality for materials (Geng et al., 2019; Hudnell et al., 1992; Vats & Vaish, 2019) and healthy buildings (De Dear & Brager, 2002). Certifications dedicated specifically to the well-being and comfort of occupants have also emerged (Well, Fitwell et al., 2014), reflecting an increased interest in the management of social impacts towards a caring and sensitive building that are no longer the prerogative of high-end buildings (Arif et al., 2016), generating at the same time opportunities to save energy costs (Dooley, 2011). These attributes are now required in all building types for private or public use.

New technologies are also used in the continuity of the “Smart” building concept with applications supported by management software and sensor systems (Clements-Croome, 2014b; Suryadevara et al., 2015). This involves monitoring and managing living conditions in the building in real time, as well as its consumption and its social, environmental, and economic impacts (Dong & Andrews, 2009). Optimized well-being and comfort can indeed reduce staff turnover, absenteeism and increase productivity (Agha-Hossein et al., 2013). New technologies also allow regular monitoring of the overall performance of a building from its design stage and throughout its life cycle, which generates opportunities to improve the performance of building components, if only by real-time preventive maintenance (Boton et al., 2020).

This social dimension is more broadly reflected in the consideration of the impact generated on a larger scale by a building on the quality of life of the inhabitants of its neighborhood by using performance indicators such as cultural diversity (which can be decline according to the history, heritage characteristics, art, architecture of a space or a neighborhood, etc.), the mix of services and uses, mobility that includes access to public transport, as well as social inclusion in the management of all the stakeholders of the building (Dridi & De Serres, 2017; Wu et al., 2016), and aesthetics (Kamari & Kirkegaard, 2019; Maldini & De Serres, 2019; Mattoni et al., 2018). Similarly, the consideration of environmental impacts must also be broader by integrating the indirect impacts generated by the building, whether these are its GHG emissions or its interactions with the neighborhood in which it is located (Łupieżowiec, 2021), the natural territory and its biodiversity (Gunnell et al., 2019). It is a matter of developing the resilience of the building by widening its scope of management since the building maintains interdependent relations with its neighborhood and its natural territory (Lagnika & De Serres, 2009). However, managing the impacts of a building alone is not enough to manage it sustainably. It is also necessary to manage the risks, whether they are the risks that may be undergone by the building or the risks that may be caused by it (De Serres et al., 2018a). Social and environmental risk management is essential to prevent the multiple potential impacts that can reach different degrees of severity and generate other risks such as reputational or financial risks affecting the sustainability of the organization (ISO31000, 2018; St Lawrence, 2004).

Sustainable building management as social innovations

To succeed in the transition to sustainable buildings, the development and integration of new knowledge and practices in sustainable building management become essential (Choi, 2009; Elmualim et al., 2012). It is in this perspective that this research aims to carry out a diagnosis of the state of sustainable building management practices in the public real estate sector in Quebec and Canada, which can help accelerate the pace of adoption of this organizational and social innovation (Martins et al., 2015; Rogers, 1983; Volberda, Van Den Bosch & Heij, 2013;).

The transfer and use of recent knowledge in sustainable building to property managers encounter significant but not insurmountable obstacles (Hoffman & Henn, 2008; Mohammadi & Birgonul, 2016; Wilson et al., 2006; Zuo & Zhao, 2014). The main barrier is a lack of cooperation and collaboration between the various real estate and construction players (Herazo & Lizarralde, 2015; Holmén et al., 2017; Senaratne et al., 2015). In addition, the adoption of new practices is perceived as a problem in the decision-making process of senior management since it involves changing the ways of doing things at all management levels (De Serres et al., 2018b). Therefore, this study is part of a research program that aims to raise awareness among public sector property asset managers of the need to opt for a systemic and ecosystem approach and to use indicators, measures, and practices to integrate sustainable development into their business model as well as in their activities. We can also imagine the difficulty of setting up benchmark measures for these many indicators when buildings are unique, among other things, in their architecture, location, history and management.

The issue raised is not only reflected in terms of technological innovations, but also in terms of social innovations, including innovations in management sciences and real estate management. It is a question of succeeding in modifying the habits of managers, but also those of citizens and users of buildings. It is a matter of recognizing the duality between promising new technologies and their integration into the functioning of the ecosystem, or temporary multi-organization (Blois, 2012), which is the level of analysis and intervention to be favored (Powell, 1990) to adopt and reinvent practices that will make the building, the city, and its citizens more sustainable.

Methodology

This research presents a diagnosis of the state of sustainable building management practices in the public sector property asset in Quebec and Canada. To do this, a pre-tested survey was sent from December 20, 2021, to March 7, 2022, to public sector property asset managers in Quebec and Canada. The preferred tool chosen for collecting data relevant to this project is the survey, which is the most effective methodological approach to obtain an overall portrait of a population (Gingras & Belleau, 2015; Stern, Bilgen & Dillman, 2014). This approach is indeed less expensive than interviews: it can be adapted to the health context of the COVID-19 crisis and makes it possible to target a more geographically dispersed sample. In addition, questionnaires have the advantage of being easy to collect descriptive data by limiting measurement bias (Kristen, 2006). The sampling frame was put together by the researchers.

This survey has 188 questions, based on an exhaustive literature review on the concept of sustainable building conducted by the research team of the Ivanhoé Cambridge Chair in Real Estate at ESG UQAM. These are mainly Likert scales, probing the implementation of a generic practice, followed by a single or multiple choice of response as to practices operationalized in a more specific way. The section ends with an open question allowing the respondent to mention other practices if he does not find his own in the list. The subsequent analysis thus provides a large-scale portrait of sustainable building management practices (property management, including contracts with suppliers and personnel management; environmental impact management; social impact management) and their implementation in the management processes of the organization. This portrait also presents more specific practices that address these different dimensions of sustainable building, as well as specific and often innovative practices that possibly prefigure a trend.

Findings

Some 88 public sector property asset managers completed the survey, including a description of: (1) their organization and their real estate portfolio; (2) practices operationalized by their organization in property management; (3) practices in managing environmental impacts and (4) practices in managing social impacts. The results of this survey made it possible to identify the state of sustainable building management practices in 4 sectors of activity: (1) the school sector; (2) the higher education sector; (3) the health and social services sector and (4) the administrative sector.

Respondents from all asset owners in the public sector consider that their property management and social impact management practices are better integrated into their operations than their environmental impact management practices. There is also a tendency to prefer the management of internal social and environmental impacts, affecting buildings, their tenants, occupants, and users, to the management of impacts that may affect external stakeholders or the environment and biodiversity [Figure 1].

Property management risks are assessed and managed by 90% of organizations among survey respondents, making it the most implemented practice. However, in questions of precision, only 50% of them consider that the diagnosis of environmental risks (caused and undergone by buildings) is effective and 30% consider that the management of social risks is well operationalized by their organization. In addition, 56.3% of respondents manage social risks, 48.4% governance risks and 62.5% major risks and catastrophes. These risks are among the least managed risks in property management.

Social impact management practices seem to be among the most implemented practices, particularly regarding the management of the health, safety, well-being and comfort of tenants, occupants, and users as well as the management of relations with such internal stakeholders. The optimization of thermal comfort as a specific practice is the statement that obtained the highest average in the management of social impacts. However, 46% of respondents state that they provide the possibility for occupants to adjust the temperature and 19% of respondents measure thermal insulation. Strict air management is the second question with the highest overall averages, with 60% of respondents claiming to minimize pollution sources and pollutant entry and 49% claiming to reduce the concentration of pollutants in the air.

Tenant, occupant, and user satisfaction is rated by 57% of respondents. However, the management of social impacts includes a broader scope than the internal stakeholders of the building and the results show that the management of relations with external stakeholders as well as the management of the social, economic, and environmental impacts generated by the building on the local community and the neighborhood are not yet very widespread practices.

Regarding social and environmental sustainability clauses in contractual relations with their suppliers and partners, 39% of respondents consider including them in their contracts, which makes it one of the least implemented practices. This practice nevertheless constitutes a pillar for the proper implementation of management practices in sustainable buildings. Compliance with sustainable performance standards and norms in the process of purchasing and supplying buildings is required by 52% of respondents.

The life cycle of buildings, their equipment and their facilities are considered in the property management process of 62% of respondents, making it one of the most established property management practices. However, subsequent questions show that 30% of respondents evaluate efficiency costs and 27% end-of-life costs, which are among the practices least implemented by respondents. Only 32% of them say they use the life-cycle cost method to assess the overall costs of managing their buildings.

The use of digital technologies to monitor the sustainable performance of buildings and to support decision-making are among the practices the least implemented by only 44% of survey participants. BIM is still little used, both in the design and in the monitoring of building performance. Only 6% of respondents use it.

The perception of positive impacts and benefits associated with the implementation of sustainable building management practices is one of the survey questions with the highest degree of agreement. Respondents are very positive about these practices.

The management of GHG emissions and energy management are unsurprisingly among the most widely deployed practices to manage the environmental impacts of buildings. However, the assessment of Scope 3 GHG emissions, i.e., the indirect emissions generated by the activities hosted by the building, is one of the last practices that the respondents declared to apply. The use of detailed analytical indicators of building performance and energy consumption is also one of the least used practices. In addition, fuel oil/diesel seems to remain the main source of energy to supply emergency or redundancy networks, whether for the electricity or heating network.

Waste and water management practices are also among the most widely used practices for the purposes of managing the environmental impacts of buildings. It should be noted that apart from raising employee awareness of waste management, which is one of the most widespread practices according to respondents, only 47% of them use waste characterization and 29% practice waste reduction at the waste source. In addition, only 33% of respondents use water leak detection, 24% have installed proximity sensors and 30% have installed water-efficient landscapes. Recycling or recovering rainwater are practices carried out by 10% of respondents and are among the practices least used. There also seems to be a lack of standardization and collaboration between the different levels of management of organizations to set and achieve targets for energy management, GHG emissions and consumption reduction of water.

Consideration of climate change in the environmental risk management process is carried out by 43% of respondents and 39% of them use circular economy practices. These practices are among the least operationalized by the respondents. The implementation of practices promoting biodiversity is carried out by 36% of respondents, such as the assessment of the level of pollution of building grounds, the inclusion of a minimum rate of plant cover on building grounds or the management of the impacts of buildings on the natural ecosystems of the land on which they are located. These practices are still uncommon.

The lack of budgetary resources was also mentioned such as the lack of staff which is cited by 72% of respondents, the lack of budget for optimizing the performance of buildings for 55% of respondents or the lack of budget for the upkeep and maintenance of buildings and their equipment, for 57% of respondents. Paradoxically, the latter would according to the respondent contribute to extending the life cycle of the buildings and their equipment and reducing investment needs if they must be replaced prematurely. Finally, 34% of respondents mentioned the lack of budget for training (particularly in terms of sustainable development, relations with stakeholders and development of skills in sustainable building management), which is also one of the practices the least prevalent.

Other obstacles to the operationalization of sustainable building management practices were also mentioned by respondents, such as the lack of budget, tools, knowledge, and training. The lack of organizational cohesion, management commitments and management staff awareness (Aghili et al., 2018) can also act as a brake on the social innovations required by the concept of sustainable building, to measure and compare the actions undertaken, and set goals. There may also be difficulty in undertaking management integrating the entire life cycle of the building due to the lack of exchange mechanisms between the operating and project implementation processes. Furthermore, it should be emphasized that assessment methods of construction costs, and more generally overly rigid accounting practices that do not consider the long-term benefits of a sustainable building are also obstacles to the transition to more sustainable buildings.

Ranking of the most operational sustainable building management practices according to the public sector property asset managers

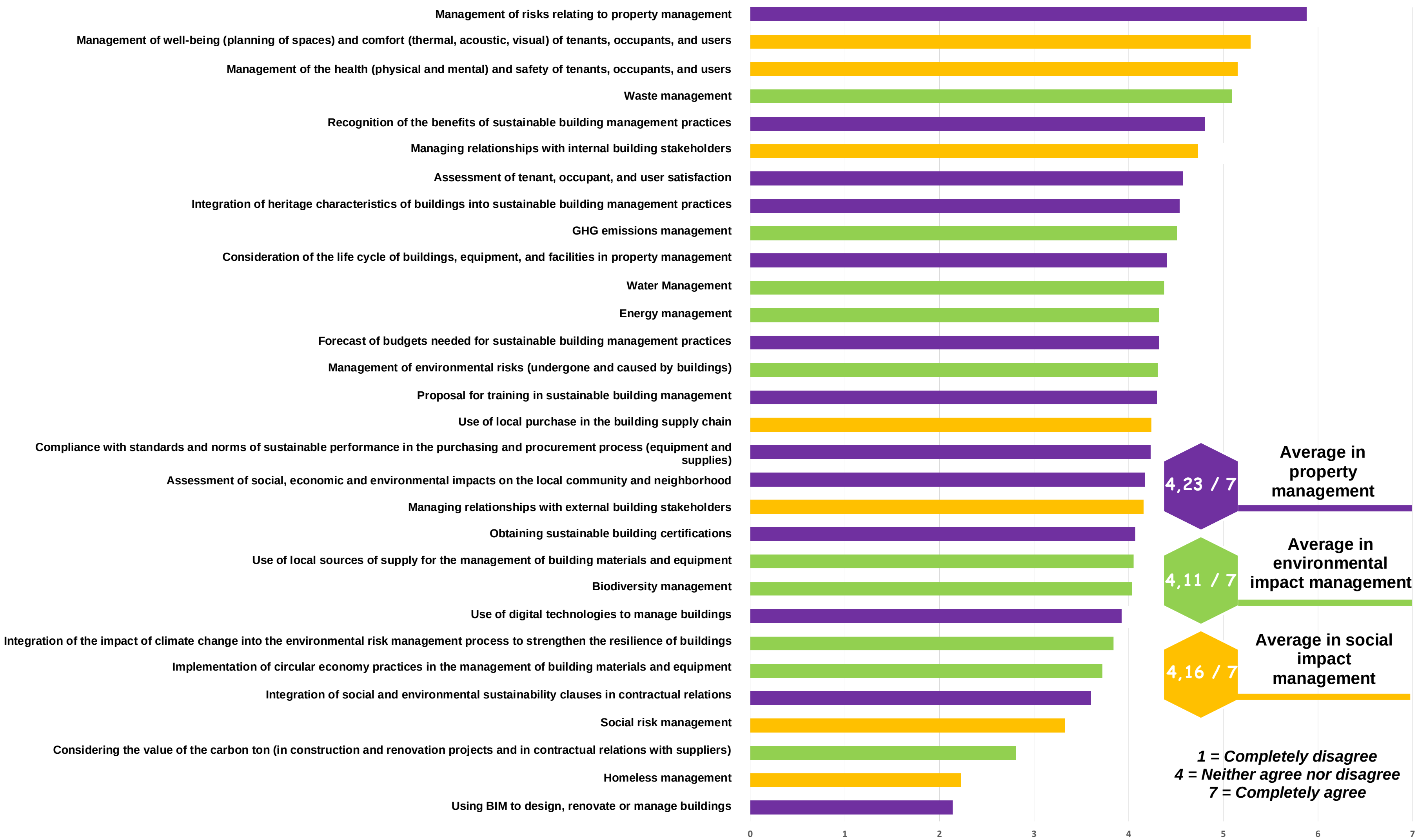

Figure 1: Ranking of the most operational sustainable building management practices according to the public sector property asset managers

Analysis

Environmental impact management

It is in the management of environmental impacts that the most advanced practices in sustainable building management are identified in the scientific literature and in research findings (Dridi & De Serres, 2017; Nilashi et al., 2015; Zhao, 2019) but they are not, however, among the practices most implemented by the respondents. Energy performance management is one of the most developed practices in environmental impact management, but the performance indicators used by managers do not allow detailed analysis and monitoring. However, the energy performance of a building is based on many elements and cannot be determined by a single indicator (Forsström et al., 2011). The analysis, monitoring and reduction of GHG emissions are also becoming a priority for respondents, but the analysis of scope 2 GHG emissions is not yet generalized in the public sector, whereas the government of Quebec has made a commitment to reduce GHG emissions by 37.5% below 1990 levels by 2030 (Ministry of Energy and Natural Resources, 2022. a, c). Accounting for scope 3 GHG emissions, which is becoming necessary as the regulatory framework tightens in this regard, is not yet operational (IFRS, 2022; Voir vert, 2022). Moreover, whether the targets relate to the management of energy, GHG emissions or water, lack standardization to be achieved according to the responses to the survey, revealing a lack of collaboration between the different management levels of organizations (Bititci et al., 2016). Waste management practices are the most advanced among environmental impact management practices, ahead of water and materials management practices, which are also becoming important issues for respondents (Giwa & Dindi, 2017; Kamali & Hewage, 2016; Kridlova Burdova & Vilcekova, 2014). The management of the social, economic, and environmental impacts generated by buildings on natural ecosystems and biodiversity is still not widespread but is nevertheless becoming a major concern (Lagnika & De Serres, 2009) since the loss of biodiversity and the disruption of ecosystem services, which are essential to the environmental but also social and economic balance of societies, maintain close links with climate change (Staudinger et al., 2012).

Social impact management

The management of the health, safety, comfort, and well-being of internal stakeholders in buildings seems to have been catalyzed by the COVID-19 crisis (Semsari & De Serres, 2021), such that these practices are among the most developed of all sustainable building management practices in the survey (Clements-Croome, 2014a). Internal building impacts are managed by most survey respondents. This is not the case for impacts external to buildings. However, the management of a sustainable building should consider all the external stakeholders of the building, including the local community, the neighborhood, and the natural territory in which it is located (De Serres et al., 2018a). Social and environmental risks management practices are the least developed practices. However, it is crucial to manage them to prevent potential impacts because they can affect all practices and risks in property management, particularly legal (in the event of an accident), political, reputational, and financial risks (St Lawrence, 2004). It is a question of anticipating and adapting to the climatic (Dubois, 2011; Heinzlef et al., 2020; UMQ, 2022; Yau & Hasbi, 2013), and ecological emergency but also to changes in the regulatory framework as well as to changes in the expectations and needs of tenants, occupants, users, and changes in the use of buildings and their spaces (Kincaid, 2003).

Property management

The requirement to respect standards and norms of sustainable performance in the process of purchasing and supplying buildings (Mueller et al. 2009; Seuring, 2008; Zhu & Sarkis, 2007; Zou & Couani, 2012), along with training offer in sustainable building management (De Paula et al., 2017) and forecasting the necessary budgets are essential practices for the operationalization of sustainable building management practices. This is a challenge that still needs to be addressed based on the responses obtained in this study. Green building certifications can also provide useful guidelines for green building managers (Gui & Gou, 2020; Newsham, Veitch & Hu, 2018) while new technologies related to the concept of smart building can bring innovative tools to facilitate the monitoring of the environmental, social, and economic performance of the building and its management (Dong & Andrews, 2009; Suryadevara et al., 2015). However, they are among the least deployed in the entire public sector according to the respondents. Managing the upkeep and maintenance of buildings is also essential to the implementation and sustainability of good management practices in sustainable buildings (Mydin, 2015). It can affect all environmental and social impact management practices and thus impact the disposal value of existing buildings (Hauashdh, 2022). However, the respondents seem to lack the budget for the upkeep and maintenance of buildings in the public sector. It also involves considering the entire life cycle of the building and its equipment in the decision-making process of managers to make efficient and sustainable decisions (Kylili et al., 2017; Marsh, 2017 Ortiz et al., 2009). However, even if most respondents seem to have integrated consideration of the life cycle of their buildings into their decision-making process, this dimension is not considered in the assessment of the value of the buildings.

Potential explanations for variability in results

Some survey results can be explained by the business model of building owners, i.e. whether the building is managed by the owner or whether the latter delegates the management of his building to specialized companies. In this case, the inclusion in the contracts of objectives, targets, requirements, and incentives are decisive in the performance of sustainable building management practices (Pitt et al., 2009). In addition, the strategy deployed in the management of real estate portfolios can also introduce variability in the results. For example, a greater number of buildings induces a greater number of employees dedicated to the management of buildings and thus greater complementarities of specialization of skills, while a smaller management team presents less specialization and diversification of tasks. The use of buildings is also a variable to consider since the increase in the number of tenants, occupants, or users as well as the densification of spaces requires more maintenance and upkeep, particularly during changes in the use of spaces (Kincaid, 2003). The management of existing buildings also induces additional constraints in terms of the implementation of sustainable building management practices (Lim et al., 2021; Ruparathna et al., 2016; Yudelson, 2010).

Statistical study limitations

In terms of statistical limitations to this study, it should be noted that for each of the multiple-choice questions in the survey, the result is expressed in terms of the percentage of respondents who chose to select the answer. People who did not answer the question are omitted from the result. Thus, the percentage expressed is calculated only on the people who answered the question. In addition, given that several respondents did not complete the survey until the end, there is probably less representativeness of the results on the management of social impacts, the last part of the survey.

Conclusion

The purpose of this research was to paint the current portrait of sustainable building management practices in institutional buildings in Quebec and Canada to analyze and compare their performance by transferring and using scientific knowledge and research results. On the scientific level, this research has contributed to a better understanding of the progress of the deployment of sustainable building management practices in the public sector compared to the findings of the existing literature which focuses more on commercial buildings.

The results show that all the managers recognize that sustainable building management practices can increase the resilience of buildings, enhance the quality of services offered to tenants, occupants and users and improve the quality of life at work in the buildings. However, the lack of budgetary resources, particularly for the upkeep and maintenance of buildings but also for the optimization of their performance, as well as the lack of training in sustainable building management constitute obstacles to the transition to more sustainable institutional buildings.

To successfully implement sustainable building management practices, it is necessary to adapt property management practices based on a more strategic reflection of building management than technical one. The challenge is to implement sustainable building management practices to manage the internal but also external impacts of the building, in the context of the fight against climate change, the protection of biodiversity and consequently changes in the regulatory framework. The objectives set and the will to achieve them must then be reflected in the contractual clauses of the relations with the organization's partners (Hydro-Québec, 2019; Setiadi & Abduh, 2019). This notably involves the integration of social and environmental sustainability clauses (Palmujoki, et al. 2010). These clauses may include requirements, bonuses for achieving set objectives or penalties to create incentives for achieving targets, in contractual relations with suppliers and partners, throughout the entire life cycle of the building and its supply chain (Aghili et al., 2018; Sarkis et al., 2011; Simpson & Samson, 2008).

The development and use of sustainable building management practices follow the findings identified in the scientific literature review to the effect that, if the internal impacts of buildings are to be managed by the respondents of the survey, it is not the case for external impacts to buildings. However, it is crucial to extend sustainable building management to all the external stakeholders of the buildings, including the local community, the neighborhood but also the natural territory in which the building is located. Therefore, if the management of social impacts, which has been exacerbated and catalyzed by the COVID-19 crisis, seems to be among the most developed practices in the public sector according to the respondents of the survey, particularly concerning the health and safety of tenants, occupants and users as well as the management of their well-being and comfort, this is not the case for the management of external stakeholders and the various and heavy impacts that the building can have on them. In the same way, we note that this trend extends to all aspects of sustainable building management, including the environmental impacts of buildings.

This research thus highlights the many interrelationships between property management, and environmental, social, and economic impact management. To be sustainable, the management of a building must direct its practices towards a balance between these three pillars of sustainable development. More broadly, sustainable building should no longer be thought of as a closed system minimizing its negative impacts by only considering the repercussions on the internal activities of the organization. We must move to an ecosystem approach by emphasizing the interdependence of the building with its neighborhood and its natural territory since the close relationships that these systems maintain can also generate major risks and disasters that can affect the sustainability of the building and its management. This whole building, neighborhood and natural territory must therefore be considered as a whole, as an ecosystem rich in interactions between the elements that compose it. It is a question of increasing the scope of attention and management of building managers for sustainable buildings, which will bring new practices adapted to current and future reality.

The avenues to explore to continue this research would be to make a geographical comparison with the management practices operationalized by the public sector property asset managers in the rest of North America, in Europe and in Asia. It would also be relevant to conduct longitudinal studies to better understand the pace of change and the evolution of the implementation of sustainable building management practices in the public sector. This research could also be repeated in the future with managers of commercial real estate properties to compare the existing differences between those practices with the ones in the public sector.

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