Sustainability Commitment in Facilities Management: Perception of Facilities Manager for South Australian Universities

Mohamad Sufian Hasim[*]*, Faridah Muhamad Halil, Ellemy Iskandar Khalid*
Faculty of Architecture, Planning and Surveying,
Universiti Teknologi MARA, Shah Alam, 40450, Malaysia
**moham315@uitm.edu.my*

Mohd Fadzil Mat Yasin, Mohd Azian Zaidi
Faculty of Architecture, Planning and Surveying,
Universiti Teknologi MARA Cawangan Perak,
Seri Iskandar, 32610, Perak Darul Ridzuan, Malaysia

ABSTRACT

Sustainability practices are widely adopted by public and private organisations and have become a motivational factor in strategies for their businesses. Generally, the adoption of sustainability in individual or organisational practice will support the agenda of safeguarding both the current population and future generation's needs. In the facilities management (FM) field, the practice is concerned with developing processes that will lead businesses to have a sustainable orientation and create intelligent decisions that will reduce a negative organisational impact on the triple bottom line. The present investigation deals with the organisation's obligation to adopt sustainability into facilities management practices to investigate universities' commitment to sustainable facilities management practices. This study aims to determine the universities' commitment towards achieving the sustainability goal by identifying their activities that verified their efforts. The specific objective was to determine the initiatives concerning sustainability adopted within facilities management practices by observing three universities in Australia. Ten (10) interviews were conducted with facilities managers in the university facilities management offices. Overall, the results indicated that these universities are committed to adopting sustainability in facilities management practices. Environmental sustainability is mainly considered with more focus on energy efficiency, waste reduction, and carbon emission control programs. While for social, the key initiatives were in knowledge

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enhancement program and limited initiatives were mentioned for economic sustainability. Although this current study had observed the university organisation, the authors believed that the findings could be taken as a lesson learned by other organisations in advancing their sustainability efforts.

Keywords: *Sustainable Facilities Management; Facilities Manager; South Australian Universities; Semi-Structured Interviews; Sustainability Commitments*

Introduction

The concept of sustainability is not new and has been debated for a long time [1-3]. Globally, the emergence of this agenda has grown to decrease the impact of climate change and avoid the speeding exhaustion of resources [4-7]. Throughout this era, an awareness of overconsumption of resources and reliance on renewable energy rose globally and thus significantly influenced business practice [8, 9]. This movement is consistent with the United Nations Global Compact Accenture study. In 2010, the study found that above ninety percent of chief executive officers agreed that the sustainability practices would influence their upcoming business performance.

Generally, the sustainability agenda is connected with a triple bottom line aiming to increase environmental preservation, enhance economic feasibility, and boost social advancement [10, 11]. Furthermore, this agenda emphasises the connection between these three pillars. The movement minimises the current detrimental impact on the environment, delivering progressive economic progress and encouraging social aspects towards a better quality of life [12-14]. This opinion is consistent with Robinson [15], who argued that all three pillars must be efficiently integrated to achieve long-term sustainability goals.

Ideally, organisations can only be recognised as sustainable practitioners if they adopt all three pillars into practice [16]. This study, which focuses on university organisations, needs to be ethical leaders by aggressively adopting sustainability into their business operations. According to previous research [17, 18], universities are viewed as an essential setting to research due to their significant roles in sustainability. According to the Association of University Leaders for a Sustainable Future (AULSF), among vital areas for sustainability research are universities operation, campus transportation, community service, procurements, managing new and existing assets, management, and planning. Thus, the data gathered from these study areas can provide essential data for benchmarking and gauging the commitments of other organisations in adopting sustainability. Table 1 illustrates some of the

standard criteria for measuring the extent of the triple bottom line, called the sustainability pillars:

Table 1: Common criteria of the three sustainability pillars

The Criteria of Sustainability Pillars		
Environmental	Economic	Social
▪ Wildlife ▪ Biodiversity ▪ Water ▪ Energy ▪ Waste ▪ Materials	▪ Ongoing costs ▪ Capital costs ▪ Local economy ▪ Adaptability and flexibility ▪ Efficiency of use	▪ Health and safety ▪ Occupant comfort ▪ Access to facilities ▪ Participation and control ▪ Fairness in distribution and opportunity

Source: Adopted and adapted from previous researchers [19-24]

Various studies have been undertaken concerning sustainability and the built environment [25, 26]. Nevertheless, there are still significant obstacles in this field. There is a lot of detrimental impact on the environment due to traditional practices. According to previous researches [27-29], globally, the built environment consumes almost 35 per cent of total energy, 40 per cent of materials and generates around 50 per cent of greenhouse gas emissions [30]. Therefore, sustainability adoption in the built environment area is critical for this study context concerning sustainable facilities management.

The facilities management field covers various functions such as project management, maintenance management and space management [31]. However, most people recognised this field as works related to effectively managing buildings during the operational stage in the asset life cycle. Moreover, it involves minimising the impact of buildings on the built environment and supporting the organisational core business [32]. According to Pathirage [33], the facilities management scope in managing the built environment within an organisation is crucial due to their strategic role in delivering benefits from the investment in assets and facilities. Furthermore, sustainable practice in facilities management is the process that facilitates the organisation's ability to become more sustainable by improving environmental, financial and social pillars [34, 35]. For example, the practice may include energy minimisation, waste recycling, water harvesting recycling, and other initiatives that can minimise the detrimental impact on the environment [36].

Additionally, sustainable practices benefit the value of an investment, increasing health and safety, lowering the incidence of 'sick building syndrome' and increasing the comfort of occupants [37, 38]. For example, sustainable adoption may reduce organisational costs by increasing the comfort that influences productivity. According to Hodges [36], a slight

increase in the staff's productivity would significantly affect organisational costs and potentially have a substantial economic impact. Heschong et al. [39], in a study of a sustainable initiatives renovation project, found numerous benefits such as reducing the consumption of energy (59%), a decrease in employee absenteeism (47%) and employees higher productivity (5%). Another example is an increase of 40% sales by a retail store that initiated sustainability by installing natural lighting for skylights roof [40].

While sustainability adoption in facilities management is critical in managing new buildings, it is also required to manage current existing buildings. Many parties have expressed concerns about the impact of vast numbers of the existing building stock, exceeding the new buildings projects [41, 42]. These situations may significantly influence resource consumption, mainly energy, water, and waste [19, 43]. According to the chief operating officer in United State Green Building Councils, Rick Fedrizzi's [31], the existing buildings market size are sixteen times greater than the new building projects. It was estimated that around 80 to 90 percent of climate change impacts were generated during the operational phase in managing the existing buildings [44]. Indeed, the longer duration of the asset life-cycle is the operational and maintenance (O&M) phase. This phase is vital as it deals with both embodied energies, were mainly used during the manufacturing of the material, and operational energy, where energy consumption is during the operation of the building. Wood [45] argued that buildings consumed around 45 per cent of energy in this particular phase to produce power and heat.

Moreover, other researchers [44, 46] supported this and believed embodied energy needs to be efficiently managed as it consumes around 25% of the building life-cycle. Therefore, facilities managers should seriously consider the embodied energy of buildings when pursuing sustainability in managing existing buildings [47, 48]. Indeed, sustainability practices for this building category are vital as they can accelerate achieving sustainability goals. Therefore, this movement needs a champion: the facilities manager who highly understands sustainability and the built environments issues. The role of facilities managers is significant as they are responsible for dealing with both new and existing buildings over a long period. Indeed, their position is well placed to influence the change towards sustainable practice.

The above debate shows that sustainable practices in facilities management are vital to support sustainability goals. Undoubtedly, sustainability adoption will benefit an organisation and the facilities management team, especially the facilities manager who needs to enhance their role and capacity to practice sustainability to reach the highest achievement on sustainability pillars, environmental, economic, and social.

Method

This study engaged face-to-face semi-structured interviews with facilities managers. This position is aimed at the senior position as the heads of the department/unit/section and those at the managerial level in the office dealing with facilities management scope of works. Interview obtained in-depth information concerning the extent of initiatives undertaken. According to Warren-Myers [49], senior positions would provide truthful evidence regarding facilities management activities due to high knowledge.

In addressing the biases in the interview process and increasing data reliability, the study approach engaged with four different respondents in every university selected. For that reason, ten (10) interviews were conducted in three South Australian selection universities as a case study. The ten participation is considered appropriate in generating credible data and producing saturation. Furthermore, according to previous researchers [50, 51], in developing significant themes to achieve research objectives, a number of interviews between six (6) to 12 considered acceptable. Thus, this study conformed to the suggestion.

The interviews were audio-recorded with permission using a digital recorder and lasted between 40 and 70 minutes. They were mainly asked about their awareness and knowledge concerning sustainability adoption in universities facilities management practices. There is a limitation of these interviews where the researcher did not observe body language or other associated signals and positioned himself as an objective observer.

A content analysis was used to analyse oral and textual materials. For this study, the data were collected in digital audio format and verbatim transcribed to deliver textual data, then followed by content analysis before converting into a meaningful format. During the analysis, a coding system was used to establish themes. A coding process that involves data organisation and reduction is an essential step in the content analysis as it enables the researcher to become familiar with the data [52]. Lastly, statements were clustered to generate more substantial groups guided by the themes of the overall content. The content analysis technique provides clear procedures and is highly accepted concerning reliability and validity issues [53]. Therefore, this technique was applicable. Figure 1 shows the procedures for the interview process.

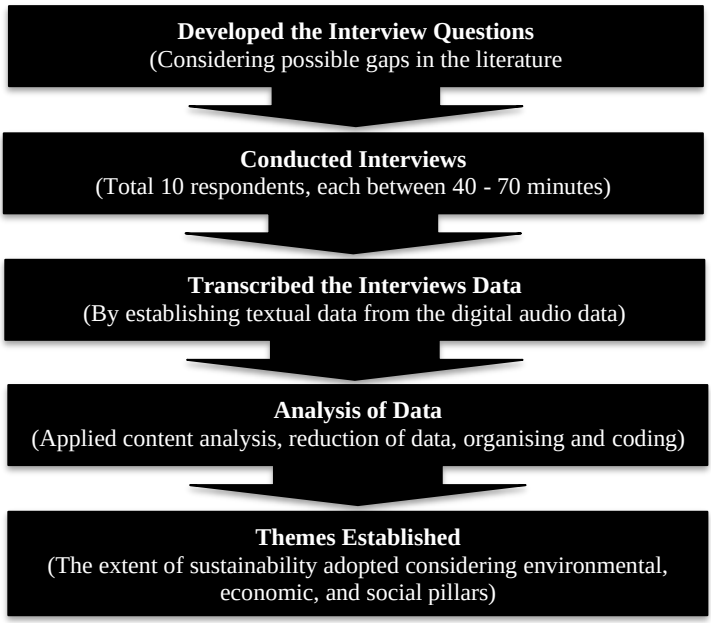

Figure 1: The procedures for the interview.

Result and Discussion

This section presents the findings, which revealed the extent of initiatives undertaken by three universities in South Australia that reflect their commitment toward sustainability in facilities management. In addition, it discusses three key results representing each sustainability pillar. Firstly, the results of environmental initiatives, secondly, the economic initiatives and finally, the extent of social initiatives. The comprehensive reporting is as follows.

Analysis of environmental sustainability initiatives

Generally, the study identified eight (8) initiatives for the environmental pillar and Table 2 shows the list of initiatives, percentages, and ranks.

Table 2: List of environmental initiatives, percentage and ranked

Environmental Initiatives	Description	(%)	Ranked
Energy	Energy efficiency implemented such as zoning system, fitting with energy-efficient technology appliances (LED lights, timer, sensors)	28	1
Waste	Recycling and reduction and programs	19	2
Emission control	Measuring carbon to reduce carbon footprint	16	3
Water	Recycling, conservation, such as water greywater adoption, and rainwater harvesting)	12.5	4
Policy	Embedding sustainable policy, plan or guidelines in new projects or existing buildings (i.e. environmental plan)	12.5	5
Green building	Rating system adopted for the Green Building (i.e. 5-star Green Star)	6	6
Reporting	Reporting on environmental criteria such as energy, water and waste (i.e. provides to internal or external stakeholders)	3	7
Building Management System	Develop a system to control and monitor environmental criteria (i.e., energy for the air-conditioning system)	3	8

In referring to the above table, there are three (3) critical environmental initiatives implemented by these universities that are energy efficiency (28%), waste reduction and recycling (19%) and carbon emission control (16%) programs. Respondents specified that:

> *'... as we fitted energy meters in every building ... previously we only had one to three meters per campus ... So, now we have got metered energy in every building across the university, and we started to analyse that data ... and we have reduced the carbon emissions by 6.4% since 2007' (participant 3).*

'... environmentally, we have been looking at some of our carbon emissions, waste management ... an example for waste initiatives, we now have ... a waste bin under every desk. We have a central collection point ... that is for recycling and putting less waste to landfill ... we are looking at ... our emissions ... and our consumption of utilities ...' (participant 10).

The previous study [36, 49, 54] found that energy, water, and waste criteria are significant issues in environmental sustainability practices. Furthermore, this condition seems similar to many facilities management researchers that found sustainable energy [45, 55, 56] and sustainable waste practices [57, 58] are critical in the sustainability pillar of environmental practice.

Analysis of economic sustainability initiatives

For an economic sustainability implementation, this study revealed limited evidence from these universities. Only a few initiatives were declared concerning the life cycle cost and cost reduction initiatives in some of their projects. For example, investing in the latest technology by procuring appliances to cut the long-term cost (i.e. shifting to LED lighting), developing energy-saving programs, and hiring local contractors for project implementations. Among pieces of evidence are as follows:

'Well, probably the total life cycle cost is the primary one ... not just the upfront capital cost but the overall life cycle cost but then it is included in that it is the environmental cost ... so we would price carbon for example as part of the considerations, so our life cycle costing analysis will reflect every possible thing that we can think of' (participant 3).

'Well ... really, the cost of energy drives the improvement. So, for example, these lights I have [a new system] are significantly more energy-efficient ... use less power, hence less carbon. They cost less, so that is a good incentive to do that ... energy is a big driver ... so the economic work, in terms of energy consumption and any time you do something, you just go for the more energy-efficient results. That is how you get your economic return by pushing the amount of energy down, hence saving the cost of our energy' (participant 1).

In terms of hiring the local contractors and applying local materials and products, a participant stated that:

'... we are always looking for local contractors who can maintain and operate our equipment and who can back up the plant and equipment selection that we have. There is no point in me installing a half-a-million-dollar base plant that needs a technician to fly from Japan every three months to service and maintain it ... we always work out where we can use local products. However, we do not have a specific policy on that...' (participant 8).

Analysis of social sustainability initiatives

Overall, six (6) initiative themes emerged concerning social sustainability. The results showed that universities committed to adopting social sustainability into facilities management practices as with other themes. Table 3 provides a list of social initiatives, percentages, and ranks.

Table 3: List of social initiatives, percentage and ranked

Social Initiatives	Description	(%)	Ranked
Enhancing human capital	Implementing knowledge enhancement programs by developing unique websites, publicity campaigns (i.e. posters on various themes), training, academic program and site experiences.	44	1
Participation and involvement	Encouraging participation from various stakeholders (i.e. internal campus community and external local public).	24	2
Health and safety	Health and safety considerations to occupants, visitors. Safety monitoring and productivity benefit.	16	3
Public access	Provision of disabled access path, flexible operational schedules, and easy access to facilities.	8	4
Collaboration	Collaboration with NGOs such as permission of public transport right to campus vicinity	4	5
Occupiers' satisfaction	A satisfaction surveys to stakeholders such as students and staff.	4	6

Universities embarked on initiatives to enhance human capital (44%) and knowledge development by providing information and promotions using posters and websites. Respondents mentioned:

> *'... we implemented some publicity campaigns and permanent posters on the various themes ... asked people to turn off their lights, save water, turn off the taps ...' (participant 7).*

> *'... I think what we are doing is very real and transparent. We try to give out as much information as we can. We try on our websites to keep on about waste landfill' (participant 5).*

Furthermore, it initiated community participation and involvement (24%) by encouraging stakeholders for opinions and suggestions throughout planning a new asset. The following initiatives are the health and safety of occupants programs (16%). For instance, some respondents approved those various stakeholders (i.e. campus and local communities) have been requested to give opinions in the earliest planning asset cycle stage of asset creation. Among evidence such as:

> *'... certainly, when we look at developing a new building, we look at the social impact on our campus community ... we bring in various groups around the university and sometimes the broader Adelaide community to be involved in what we are doing ... For example, on a recent project, we had several groups. One was an environmental sustainability group that brought in representatives from the faculties of Architecture, Economics, Computer Science, and various engineering faculties. We gave our ideas about that topic ... we used more and more reference groups to inform what we learned about our project. So now, we have enormous student engagement and student involvement to inform the planning decisions ...' (participant 8).*

> *'We would go through the usual consultation process and then make an informed decision based upon that ... or partly based upon that ... it is the way we deal with our stakeholders and the way we look to achieve a better outcome ...' (participant 10).*

This evidence observed some commitment of universities concerning involvement with communities on the sustainability issues. Hasim et al. [56] supplied similar evidence to support. For example, the University of Technology Sydney (UTS) arranged a dialogue focusing on corporate social responsibility on the 'Sustainable Business Forum' to encourage sustainability in business. Additionally, the University of New South Wales (UWSW) has developed a unique website on 'Teach Sustainability' to assist a group of school teachers in stimulating sustainability agenda to the young generation.

Conclusion

For a case study, the three South Australian universities, this study has identified the extent of commitment to sustainability practices in facilities management. Generally, the results showed that these universities are committed to adopting sustainability in facilities management practices. In all three pillars of sustainability, environmental is mainly considered, followed by the social pillar and finally, economic pillar.

In particular, environmental sustainability priorities among university organisations in South Australia were providing an extra focus on programs for energy efficiency, waste reduction, and carbon emission control. While for

social, the significant initiatives were in programs that increased human capital, such as knowledge enhancement by delivering information and campaign using websites and posters. However, for economic sustainability, limited information was detected. As a result, only a few initiatives were declared, especially on cost reduction and life cycle cost for new projects implementation. For example, they adopted the latest technology to minimise the long-term cost by shifting to LED lights, executing energy-saving programs, and hiring local contractors for project implementation.

Generally, these organisations showed a sound commitment to various sustainable initiatives undertaken in facilities management practice. These findings offered some light and understanding of the whole picture of the study's aim and objectives. Although this study is applied to university organisations, it can be adapted by other organisations such as government departments and the private sector to achieve sustainability goals.

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References

[1] Ten Have, H. and Gordijn, B., "Sustainability", Medicine, Health Care and Philosophy, vol. 23, no. 2, pp. 153-154, 2020.
[2] Purvis, B., Y. Mao, and Robinson, D., "Three pillars of sustainability: in search of conceptual origins", Sustainability Science, vol. 14, no. 3, pp. 681-695, 2019.
[3] Diaz-Balteiro, L., González-Pachón, J. and Romero, C., "Sustainability as a multi-criteria concept: New developments and applications", Sustainability, vol. 12, no. 18, 7527, 2020.
[4] Fedele, G., et al., "Transformative adaptation to climate change for sustainable social-ecological systems", Environmental Science & Policy, vol. 101, pp. 116-125, 2019.
[5] Kouloukoui, D., et al., "Factors influencing the level of environmental disclosures in sustainability reports: Case of climate risk disclosure by Brazilian companies", Corporate Social Responsibility and Environmental Management, vol. 26, no. 4, pp. 791-804, 2019.
[6] Sarà, G., et al., "Predicting shifting sustainability trade-offs in marine finfish aquaculture under climate change", Global Change Biology, vol. 24, no. 8, pp. 3654-3665, 2018.

[7] Lokonon, B.O.K. and Mbaye, A.A., "Climate change and adoption of sustainable land management practices in the Niger basin of Benin", Natural Resources Forum, vol. 42, no. 1, pp. 42-53, 2018.
[8] Yong, J.Y., et al., "Pathways towards sustainability in manufacturing organizations: Empirical evidence on the role of green human resource management", Business Strategy and the Environment, vol. 29, no. 1, pp. 212-228, 2020.
[9] Miska, C., Szőcs, I., and Schiffinger, M., "Culture's effects on corporate sustainability practices: A multi-domain and multi-level view", Journal of World Business, vol. 53, no. 2, pp. 263-279, 2018.
[10] Petrini, M. and Pozzebon, M., "Integrating Sustainability into Business Practices: Learning from Brazilian Firms." Brazilian Administration Review, vol. 7, pp. 362-378, 2010.
[11] ul Haq, S. and Boz, I., "Measuring environmental, economic, and social sustainability index of tea farms in Rize Province,Turkey", Environment, Development and Sustainability, vol. 22, no. 3, pp. 2545-2567, 2020.
[12] Rydin, Y. and Holman, N., "Re-evaluating the contribution of social capital in achieving sustainable development", Local Environment, vol. 9, no. 2, pp. 117-133, 2004.
[13] Dempsey, N., et al., "The social dimension of sustainable development: Defining urban social sustainability", Sustainable Development, vol. 19, no. 5, pp. 289-300, 2011.
[14] Hitchcock, D.E. and Willard, M.L., "The business guide to sustainability: practical strategies and tools for organizations," 3rd ed., London, UK: Routledge, 2015.
[15] Robinson, J., "Squaring the circle? Some thoughts on the idea of sustainable development", Ecological Economics, vol. 48, no. 4, pp. 369-384, 2004.
[16] Boyle, C., "Sustainability assessment: Assessing the sustainability of business activities," in 10th International Conference of the Greening of Industry Network, Göteborg, Sweden, pp. 23-26, 2003.
[17] Gamage, P. and Sciulli, N., "Sustainability Reporting by Australian Universities", Australian Journal of Public Administration, vol. 76, no. 2, pp. 187-203, 2017.
[18] Sepasi, S., Rahdari, A., and Rexhepi, G., "Developing a sustainability reporting assessment tool for higher education institutions: The University of Californi", Sustainable Development,. vol. 26, no. 6, pp. 672-682, 2018.
[19] Jafari, A., Valentin, V., and Bogus, S.M., "Identification of Social Sustainability Criteria in Building Energy Retrofit Projects", Journal of Construction Engineering and Management, vol. 145, no. 2, pp. 0401-8136, 2019.

[20]Montalbán-Domingo, L., et al., "Social Sustainability in Delivery and Procurement of Public Construction Contracts", Journal of Management in Engineering, vol. 35, no. 2, pp. 1-11, 2019.
[21]Stender, M. and Walter, A., "The role of social sustainability in building assessment", Building Research & Information, vol. 47, no. 5, pp. 598-610, 2019.
[22]Kaklauskas, A., et al., "Multiple criteria analysis of environmental sustainability and quality of life in post-Soviet states", Ecological Indicators,. vol. 89, pp. 781-807, 2018.
[23]Ajibike, W.A., et al., "The impacts of social responsibility on the environmental sustainability performance of the Malaysian construction industry". International Journal of Construction Management, pp. 1-10, 2021.
[24]Hong, J., et al., "Towards environmental sustainability in the local community: Future insights for managing the hazardous pollutants at construction sites", Journal of Hazardous Materials, vol. 403, 123804, 2021.
[25]Manzone, F., Rebaudengo, M., and Zaccaro, V.L., "The Italian Response To Sustainability In Built Environment: The Match Between Law And Technical Assessment", Singapore: Springer Singapore, 2019.
[26]Shirazi, M.R. and Keivani, R., "Critical reflections on the theory and practice of social sustainability in the built environment – a meta-analysis", Local Environment, vol. 22, no. 12, pp. 1526-1545, 2017.
[27]Azari, R., "Chapter 5 - Life Cycle Energy Consumption of Buildings; Embodied + Operational, in Sustainable Construction Technologies", V.W.Y. Tam and K.N. Le, Editors. Butterworth-Heinemann, pp. 123-144, 2019.
[28]Chel, A. and Kaushik, G., "Renewable energy technologies for sustainable development of energy efficient building", Alexandria Engineering Journal, vol. 57, no. 2, pp. 655-669, 2018.
[29]Lu, M. and Lai, J.H.K., "Building energy: a review on consumptions, policies, rating schemes and standards", Energy Procedia, vol. 158, pp. 3633-3638, 2019.
[30]Khasreen, M., Banfill, P.F., and Menzies, G., "Life-cycle assessment and the environmental impact of buildings: A review", Sustainability, vol. 1, no. 3, pp. 674-701, 2009.
[31]Reineck, M., et al., "Measuring corporate sustainable development in facilities management with key performance indicators", OIDA International Journal of Sustainable Development, vol. 2, no. 20, pp. 69-76, 2011.
[32]Moller, S. and McCartney, D., "Facilities management and maintenance and sustainable commercial buildings", Sydney, NSW: Your Building,

Property Council of Australia, 2007, http://www.yourbuilding.org. [Accessed January 20, 2010]

[33]Pathirage, C., et al., "Knowledge management practices in facilities organisations: a case study", Journal of Facilities Management, vol. 6, no. 1, pp. 5-22, 2008.

[34]Elmualim, A., "CSR and sustainability in FM: Evolving practices and an Integrated Index", Procedia Engineering, vol. 180, pp. 1577-1584, 2017.

[35]Nazeer, F.S., Gunatilake, S., and Ramachandra, T., "Significant Sustainable Facilities Management (SFM) practices in the Health Care (HC) Sector", IOP Conference Series: Earth and Environmental Science, vol. 290, 012055, 2019.

[36]Hodges, C., "A facility manager's approach to sustainability", Journal of Facilities Management, vol. 3, no 4, pp. 312-324, 2005.

[37]Lee, S.Y. and Kang, M., "Innovation characteristics and intention to adopt sustainable facilities management practices". Ergonomics, vol. 56, no. 3, pp. 480-491, 2013.

[38]Williams, D. and Sutrisna, M., "An evaluation of the role of facilities managers in managing sustainability and remedial actions in reducing CO2 emissions in the built environment", in RICS COBRA Conference, RICS: Dauphine University, Paris, 2010.

[39]United States Green Building Council, "Building momentum: National trends and prospects for high-performance green buildings", Washington, DC: US Green Building Council, 2003.

[40]Heschong, L., et al., "Skylighting and retail sales: an investigation into the relationship between daylighting and human performance", Research Report for Pacific Gas and Electric Company, San Francisco, California, 1999.

[41]Elle, M., et al., "Sustainability in the existing building stock: the role of sustainable facilities management", in The 2005 World Sustainable Building Conference: Action for Sustainability, Tokyo, pp. 3152-3159, 2005.

[42]Sharif, S.A. and Hammad, A., "Simulation-Based Multi-Objective Optimization of institutional building renovation considering energy consumption, life-cycle cost and life-cycle assessment", Journal of Building Engineering, vol. 21, pp. 429-445, 2019.

[43]Mahmoud, S., Zayed, T., and Fahmy, M., "Development of sustainability assessment tool for existing buildings", Sustainable Cities and Society, vol. 44, pp. 99-119, 2019.

[44]Aaltonen, A., et al., "Facilities Management Driving Green Building Certification–a Case from Finland", Facilities, vol. 31, no. 7/8, pp. 328-342, 2013.

[45]Wood, B., "The role of existing buildings in the sustainability agenda", Facilities, vol. 24, no. 1/2, pp. 61-67, 2006.

[46]Pullen, S.F., "Consideration of environmental issues when renewing facilities and infrastructure", in Durability of Building Materials and Components 8, M.A. Lacase and D.J. Vanier, Editors, Institute for Research in Construction: Ottawa, Canada, pp. 1778-1786, 1999.
[47]Pullen, S.F., "Circulating resources, embodied energy and buildings", in Creating Sustainable Communities in a Changing World, P.E.J. Roetman and C.B. Daniels, Editors. Crawford House Publishing: Australia, 2011.
[48]Pullen, S.F., "Energy used in the construction and operation of houses", Architectural Science Review, vol. 43, no. 2, pp. 87-94, 2000.
[49]Warren-Myers, G., "Sustainable management of real estate: is it really sustainability?", Journal of sustainable real estate, vol. 4, no. 1, pp. 177-197, 2013.
[50]Vasileiou, K., et al., "Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period", BMC medical research methodology, vol. 18, no. 1, pp. 130-148, 2018.
[51]Guest, G., Namey, E., and Chen, M., "A simple method to assess and report thematic saturation in qualitative research", Plos One, vol. 15, no. 5, e0232076, 2020.
[52]Wiersma, W., "Research methods in education", Boston : Pearson, 2009.
[53]Collis, J. and Hussey, R., "Business Research. A practical guide for undergraduate and postgraduate students", 3rd edition. London: Palgrave Macmillan, 2009.
[54]Brown, A.W. and Pitt, M.R., "Measuring the facilities management influence in delivering sustainable airport development and expansion", Facilities, vol. 19, pp. 222-232, 2001.
[55]Dahle, M. and Neumayer, E., "Overcoming barriers to campus greening: A survey among higher educational institutions in London, UK. International Journal of Sustainability in Higher Education, vol. 2, no. 2, pp. 139-160, 2001.
[56]Hasim, M.S., et al., "Commitment to sustainability: A content analysis of website for university organisations", IOP Conference Series: Earth and Environmental Science, vol. 117, 012046, 2018.
[57]Pitt, M., "Trends in shopping centre waste management", Facilities, vol. 23, no. 11/12, pp. 522-533, 2005.
[58]Zhang, N., et al., "Greening academia: Developing sustainable waste management at Higher Education Institutions", Waste Management, vol. 31, no. 7, pp. 1606-1616, 2011.