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The Role of Sustainable Project Management in Facilities Management

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Abstract. Growth in facilities management (FM) and project management (PM) have been remarkable over the last decade. Simultaneously, the adoption of sustainability principles among organisations has also increased. The purpose of this study was to determine the connection between sustainability in PM and FM. Specifically, this research study aimed at understanding the common principles involved in both PM and FM that allowed sustainable development goals (SDGs) to be achieved by the United Nations in 2015 and to be an integral part of the European Green Deal in 2019. A systematic literature review of more than 200 different resource materials was performed, 55 of which were finally selected as falling under the scope of the study. The chosen literature was published between 2001 and 2020, except for the Brundtland Commission Report, which was published in 1987. Based on the collected material, a simplified facility lifecycle model was produced to illustrate the connection between sustainability in FM and PM. Developing this model will help practitioners and researchers incorporate PM as a function of FM, including the application of sustainable activities in different phases of a facility's lifecycle.

1. Introduction

The growth of the facility management (FM) industry has been noteworthy over the last three decades. This advancement has been steered by organisations pursuing rational solutions to everyday problems [1, 2], as well as lengthy and recurrent changes in the economy [3]. In the last two decades, the demand for FM services has increased due to expanded urbanisation and industrialisation [4]. As a result, the European FM market has encountered remarkable advancements over the past decade [5]. Despite its impact on reducing the market, the COVID-19 pandemic has also increased awareness of FM services. Thus, the FM market is expected to grow from \$1,260 billion in 2022 to \$1,856 billion by 2029 [4].

Concurrently, as the need for FM rose, the need for businesses to become sustainable also increased. Firms are now pursuing sustainability as its importance is growing [6, 7] and are modifying their core skills and business activities to embrace such targets [8, 9]. The integration of sustainability fundamentals and goals into policies and practices is coercing businesses to incorporate the sustainability principles [10]. This change applies to both FM and the related construction industry, wherein projects play a vital part. Sustainability has become a significant dimension of construction projects [11] and is a vital concern in the construction sector at large [12]. Decisions made in construction projects also have the potential to impact FM and its potential for sustainable operations. For this reason, we found it necessary to look deeper into the relationship between sustainability in FM and project management (PM).



Projects occupy a pivotal role in the sustainable development of corporations [13], and specifically in the construction industry [14]. In the last decade, both PM and sustainability initiatives have risen sharply, and there is still continuous growth in interest in their fields [15-21]. At its core, FM is all about being efficient and effective [22], and so is PM in terms of its core activities [23]. In FM, sustainability is related to the development phase of designing, planning, constructing, renovating, operating, demolishing, and optimising resources during the lifecycle of a building [24]. These processes are also linked to PM, which also includes the phases of initiating, planning, execution, monitoring and controlling, and closing [23]. In short, there are many mutual practices involved in both PM and FM.

Based on the common principles and activities that are shared between these respective disciplines, the purpose of this study was to determine the role of sustainability and how it could be incorporated into both FM and PM. Thus, we posed the following research question: “How do PM, FM, and sustainability relate to each other?” This question was formulated to identify the key activities that are common in both PM and FM and how these key activities correlate to sustainability, which is expected to help these two disciplines achieve their goals towards sustainable development.

2. Systematic literature review

A systematic literature review consists of a thorough, rigorous, and explicit process of reviewing the relevant literature [25, 26]. This paper is based on a systematic literature review that collected state-of-the-art insights about the relationship between sustainable FM and PM. To ensure the quality and reliability of the collected material, the university’s library search engine, Oria, which includes access to ScienceDirect and Google Scholar, was used to acquire the research articles.

2.1. Four-step process of identifying suitable literature

The literature review included research articles from 2001 to 2020 and followed a systematic approach inspired by [27]. In brief, the process followed four steps, as illustrated in Figure 1.

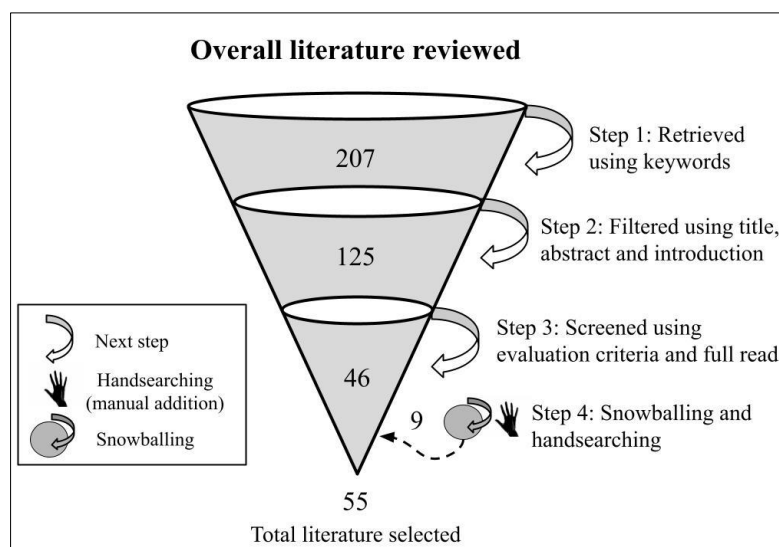


Figure 1. Tornado diagram illustrating the literature collection process.

2.1.1. Collecting literature. First, we searched the literature to obtain basic insights into PM, FM, and sustainability using simplified keywords such as “project management,” “facility management,” “sustainability,” and “sustainable development.” The search was then enhanced to determine the role of sustainability in the related fields. In total, more than 200 different research articles were identified.

2.1.2. Filtering the collected material. In the second step, the 207 articles were filtered by reviewing the titles, abstracts, and in some cases, the introductions to identify their relevance for this study. For example, the supply chain perspective was considered irrelevant and was excluded from further review.

2.1.3. Full read. The remaining literature, now consisting of 125 articles, was fully read and evaluated, and 46 articles that fell under the scope of this study were selected for inclusion.

2.1.4. Snowballing and hand searching. Finally, snowballing and hand searching were also conducted, which added nine research articles to the final selection. A total of 55 articles were considered suitable for the purpose of this article.

All information in Chapter 3 is based on the results of this literature review.

3. Sustainability connections between PM and FM

Based on the 55 articles selected, the following topics were identified as representing the importance of each discipline and their connections to sustainability:

3.1. Sustainability and its importance

Sustainability is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” by the Brundtland Commission Report [28]. Sustainability is thus a concept for thinking about the future in which environmental, societal, and economic considerations are balanced in the search for an improved quality of life [29]. This definition is often expressed as a triple bottom line, as it takes into account the environmental, economic, and social effects of development [13, 30, 31], occasionally with reference to people, the planet, and profits [7, 32].

Businesses are now realising the importance of sustainability and adopting such objectives into their mission statement [19]. Corporate social responsibility and sustainability are becoming important concepts worldwide in international debates around the concept of sustainability [16]. The construction industry is one of the main contributors to sustainable development, having significance for all three sustainability pillars [12, 14]. Sustainability is not only to be measured in terms of its effects on the environment, but also about its impact on global economies and societies [19]. Accomplishing sustainability goals is linked to all three pillars [14, 33, 34], and various countries have embraced such goals in a holistic manner [35]. Sustainability targets have thus resulted in profitability for organisations [36, 37], and a circular economy is seen as one potential model for achieving such an objective [27].

3.2. PM and sustainability

A project is defined as a “temporary endeavour undertaken to create a unique product, service, or result” while PM as a discipline is described as “the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements” [23]. According to Samset, “a project is a means to achieve a goal by applying a certain amount of resources” [38]. From a societal point of view, a project can be viewed as an element of a larger process, called the project purpose [38], and is considered as sustainable development in this paper.

3.2.1. Activities involved in a PM lifecycle. PM is the field of planning, organising, and managing resources to complete the goals and objectives of a project [39]. The typical processes employed during the lifecycle of a project are initiating, planning, executing, monitoring, controlling, and closing [21, 23, 38, 40-42]. Project activities are normally categorised in the form of front-end phases (planning and design), implementation phases (detailed planning and execution), operational phases, and closing phases (termination) [38]. A higher possibility of highly influencing the project rests in the initiation process, as the cost of changes increases significantly over the lifecycle [38, 41]. Accordingly, Wondimu

et al. [43] discussed how early contractor involvement (ECI) can be beneficial in the early phases of a project.

PM illuminate knowledge areas such as risk management, stakeholder management, communications, human resources, procurement, quality, cost, time, scope and integration [17, 23]. Risk management helps with addressing uncertainties in advance, as projects are vulnerable to unexpected events [44]. Similarly, stakeholder management has been considered the chief activity for project success [17, 45]. *Table 1* highlights the various activities that are considered to be key to the lifecycle of a project.

Table 1. Key PM activities/functions identified in the literature. X denotes present, while O indicates absent.

Key PM activities/functions identified		Source of literature				
		Samset (2010)	Collins (2011)	De Marco (2011)	PMI (2017)	Hussein (2018)
Initiation	Business case	X	O	O	X	X
	Project charter	O	O	O	X	X
	Concept development/feasibility study	X	X	X	X	X
Planning and design	Decision making	X	X	X	X	X
	Communications management	X	X	X	X	X
	Scope management	X	X	X	X	X
	Schedule management	X	X	X	X	X
	Costs management	X	X	X	X	X
	Quality management	X	X	X	X	X
	Change management	O	O	O	X	X
	Defining responsibility and accountability	X	X	X	X	X
	Policies and strategies	X	X	X	X	X
	Rules and regulations/procedures	X	X	X	X	X
	Procurement management including resource planning and contracts	X	X	X	X	X
	Commissioning	X	O	X	X	O
	Human resource planning and management	O	O	X	X	X
	Risk management/uncertainty	X	O	X	X	X
	Stakeholder management	X	X	X	X	X
	Design methods/architectural/engineering design	X	X	X	X	X
Goal and objectives	X	X	X	X	X	
Prototype	O	O	O	X	X	
Sustainability criteria	X	X	O	O	O	
Detailed planning and engineering	X	O	X	X	X	
Implementation	Construction/execution	X	X	X	X	X
	Managing constraints (quality, cost, time schedule, budget, scope, resources)	X	X	X	X	X
	Sustainability criteria	X	X	O	O	O
	Uncertainty handling/risk management	X	X	X	X	X
	Manage communications	X	O	X	X	X
	Direct and manage project work/tasks/processes	O	X	X	X	X
	Manage stakeholder engagement	X	X	X	X	X
	Conduct procurement	O	X	X	X	X
Evaluation	X	X	X	O	X	
Operations/monitoring and control	Track, review and regulate the project progress and performance	X	X	X	X	X
	Monitor risk	X	X	X	X	X
	Control costs, schedule, scope, quality, resources	X	X	X	X	X
	Monitor communications	O	O	X	X	X
	Monitor stakeholder engagement	X	X	X	X	X
	Sustainability performance measures	X	X	O	O	O
	Training	X	X	X	X	X
	Maintenance/testing	X	X	X	X	X
Evaluation	X	X	X	X	X	
Closing	Approval	X	O	X	X	O
	Accounting	X	O	O	X	O
	Documentation	X	X	X	X	X
	Evaluation	X	X	O	X	X
	Lessons learned/Knowledge transfer	X	X	X	X	X
	Re-use the building/resources	O	X	X	O	X
	Disposal/closing contract	X	X	X	X	X

3.2.2. *Sustainable PM.* Sustainable project management (SPM) has been described in many different ways, whether it be in terms of shifts [7, 46], angles [13, 47], dimensions [13, 46], strategies [10], or

key factors [48]. Sustainability primarily impacts all the processes and practices of PM [46]. Furthermore, the integration of sustainability in PM has called for three shifts [7, 46]: (1) a shift of scope in the management of projects, (2) a shift of the paradigm of the PM, and (3) a shift of mind for the project manager. Sustainability can be implemented in many ways in projects. For instance, Aarseth et al. [10] identified eight sustainability strategies in PM related to goals, supplier practices, project design, policies, project practices, sustainability-promoting actors, competencies, and project portfolio management. According to Kivilä et al. [47] and Silvius and de Graaf [13], PM sustainability can be measured in two ways: (1) the sustainability of the project delivery (the process), and (2) the sustainability of the project deliverable (the product).

Along with the design and planning phases of projects, the project execution stage is of paramount importance for the sustainable delivery of the projects [47]. In this vein, Silvius and de Graaf [13] identified various dimensions of sustainability that are integrated into the PM, such as (1) the specifications and design of the project's deliverable, (2) the materials used, (3) the benefits to be achieved, (4) quality and success criteria, (5) the identification and engagement of stakeholders, (6) the process of procurement in the project, (7) the development of the business case, (8) the monitoring of the project, (9) the identification and management of project risks, (10) the communication in and by the project, and (11) the selection and organisation of the project team. All these dimensions are significant for the integration of sustainability in PM.

Project managers have powerful impact on the sustainability of a project and its PM [13]. PM professionals are crucial to carrying out sustainable project activities through the distinct phases of a project [39]. The responsibility for sustainability in a project is mostly distributed between the project manager and the project sponsor [7]. Likewise, the following four key factors of sustainability in PM from a project manager's lens have been identified [48]: (1) stakeholder management, (2) a sustainable innovation business model, (3) economic and competitive advantage, and (4) environmental policies and resource savings. Stakeholder management has been positioned in the context of sustainable development in some of the literature [45]. Additionally, strict standards in design, procurement, and construction contracts should be applied by policy makers to underline the importance of sustainability [12]. In short, sustainability in PM requires a holistic approach [46, 47]. Green PM practices can deliver sustainable construction projects within allowable cost limits and add significant value [11, 49]. The phase-end, stage-gate framework of a project lifecycle is used as the basis for measuring sustainable PM in different industries [9].

3.3. *FM and sustainability*

The ISO defines FM as an “organizational function which integrates people, place, and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business” [50]. Similarly, according to the IFMA, FM is “a profession that encompasses multiple disciplines to ensure functionality, comfort, safety, and efficiency of the built environment by integrating people, place, process and technology” [51].

3.3.1. Activities involved in an FM lifecycle. FM is an essential, strategic business function [51, 52]. The common functions of FM include management of the organisation, facility planning and forecasting, lease administration, space planning, allocation and management, architectural/engineering, planning and design, workplace planning, budgeting, accounting and economic justification, real estate acquisition and disposal, construction PM, operations, maintenance and repair, technology management, facility emergency management, security and life-safety management, and general administrative services [52]. According to Atkin and Brooks [22], core competencies in FM cover areas such as real estate management, financial management, organisational management, innovation and change management, and human resources management. According to the IFMA [42], these functions are organized into competencies such as occupancy and human factors, operations and maintenance, sustainability, facility information and technology management, risk management, communication, performance and quality, leadership and strategy, finance and business, real estate, and PM.

FM covers a wide range of services, which usually range from strategic planning for workspace requirements to real estate affairs [3, 53, 54]. The phases involved in a FM lifecycle are by some described to be planning, acquisition, operations, maintenance, and disposition [22, 31, 52]. In addition to this, the facility lifecycle include main phases as design, construction, testing and commission, start-up [22], and also capital asset management [31]. *Table 2* shows the different key activities encountered during the FM lifecycle.

Table 2. Key FM activities/functions identified in the literature. X denotes present, while O indicates absent.

Key FM activities/functions identified		Source of literature					
		Chotipanich (2004)	Hodges (2005)	Levitt (2013)	Roper and Payant (2014)	Atkin and Brooks (2015)	IFMA (2018)
Planning	Organizational management	X	O	X	X	X	X
	Innovation/change management	X	O	X	X	X	X
	Planning and programming/decision making	X	X	X	X	X	X
	Goals and objectives including cost, quality and scope aspects/best value	X	X	X	X	X	X
	Risk and opportunity management/catastrophy planning and management	X	X	X	X	X	X
	Stakeholder management/engagement	X	O	X	X	X	X
	Human resource planning and management	X	O	X	X	X	X
	Space planning, allocation and management	X	X	X		X	X
	Financial management/lease administration/capital budgeting/legal aspects	X	X	X	X	X	X
	Roles and responsibilities	X	X	X	X	X	X
	Procurement and contract management/outsourcing/purchasing	X	X	X	X	X	X
	Real estate and property management/acquisition	X	O	X	X	X	X
	Sustainability/environment criteria/corporate social responsibility	X	X	X	X	X	X
	Policies, strategies, procedures and standards	X	X	X	X	X	X
	Cross-cultural management	X	O	O	X	X	O
	Communication management	X	O	X	X	X	X
Design	Architectural/engineering/workplace design	X	X	X	X	X	X
	Flexibility	O	O	O	X	X	O
	Sustainability/environmental aspect	O	X	X	X	X	X
	Evaluating design solutions	O	X	O	X	X	O
Construction	Building/PM/construction management/facility	X	X	X	X	X	X
	Performance and quality management	O	X	X	X	X	X
	Cross-cultural management	O	O	O	X	X	O
	Communication management	O	O	O	X	X	X
	Sustainability/environmental aspect	O	X	X	X	O	X
	Testing, commissioning and handover	O	O	O	X	X	O
Operations and maintenance	Operations and maintenance processes/repairs	X	X	X	X	X	X
	Facility information management/technology management/BIM	X	O	X	X	X	X
	Performance management including benchmarking	X	X	X	X	X	X
	Communication management	O	O	X	X	X	X
	General administrative services/office services	X	O	X	X	X	X
	Cleaning/housekeeping/catering/vending	X	O	X	O	X	O
	Energy/waste/water/materials and consumables management	X	X	X	X	X	X
	Sustainability/environmental aspect	X	X	X	X	X	X
	Monitoring and control including costs, quality, scope, time schedules, carbon footprint, etc.	X	X	X	X	X	X
	Building systems services and operations	X	X	X	X	X	X
	Risk management/minimizing risk and liabilities	X	O	X	X	O	X
	Human resource management/occupancy and human factors/employment support services and	X	X	X	X	X	X
	Personnel development and trainings	O	O	O	X	X	O
	Health, safety and security/facility emergency management	X	X	X	X	X	X
	Stakeholder engagement/management	O	O	X	X	X	X
	Work management systems/work environment	X	X	X	X	X	X
	Documentation/records management	X	X	X	X	X	X
Evaluation	X	X	X	X	X	X	
Refurbishment/renewals and renovations	X	X	X	X	X	X	
Disposition	Documentation	O	X	O	O	O	X
	Disposal of facilities/real estate assets	X	X	X	X	X	X

3.3.2. Sustainable FM. Sustainable affairs are salient in FM [37], as FM has a chief position in enacting sustainability goals and development [24, 55]. Tackling climate change is the main objective of sustainable FM [6], and the application of FM is quickly evolving in relation to sustainability [56]. FM can contribute to sustainable development through the primary and supportive processes of an organisation [57]. According to Nielsen et al. [58], sustainable FM is based on a strategic perspective of the building, processes (operation and use), and management practices. In this vein, Min et al. [59] investigated the proactive operations and maintenance strategies of FM, focusing on sustainability. Sustainable FM has also been discussed in terms of maintenance management, performance management, risk management, supply services management and development [60].

The analysis of the FM lifecycle is vital for reflecting on the sustainability of facilities and services [61]. Sustainability can be effectively realised through the planning, design, and construction phases of the facility lifecycle and management of the built environment [31, 62]. Sustainable FM is related to the development phase of designing, planning, and constructing, as well as renovating, operations, and demolitions, through which resources are optimised during the lifecycle [24]. Cautiously evaluating green design and construction in the context of sustainable FM leads to a greater return for any organisation [54]. Sustainable FM is a wide area integrating site development to elevate flexible design and renovations to improve building longevity, energy efficiency, waste management, water reuse, ecologically suitable materials use, recycling activity use during construction, demolition, renovation, and occupancy [37].

Energy management, waste management and recycling, and health and safety are the top three responsibilities of a sustainable organization [56]. Energy management is identified as the most important sustainable FM process, in relation to environmental sustainability [55]. The operational phase of a building is critical for identifying energy consumption and sustainability problems, including the issue of addressing non-renewable resources use [58]. Also, sustainability can be performed highly efficiently through commencing human resource policies, such as training of employees, to support sustainable development [63]. Legislation is a key driver for realising sustainability activities, as it pressures organisations to abide by regulations [64]. Collins and Junghans [8] discussed the green lease approach in building operations, which allowed landlords and tenants to mutually invest in a sustainable FM infrastructure. FM professionals can thus generate long-running, positive value for an organisation through the efficient application of sustainability activities [31, 56].

4. Results and discussion

According to the literature reviewed, the development, construction, and renovation of a facility can itself be considered a project. Based on this reflection, a simplified facility lifecycle phase model incorporating PM as a function of FM has been produced, interlinking sustainability, PM, and FM, as shown in Figure 2.

4.1. FM lifecycle as incorporating PM and sustainability

The business case is normally used to list the reasons and objectives for project initiation [23, 38, 41]. The main theme of the business case should be sustainable development and its benefits to an organisation for implementing sustainability in the FM lifecycle. This was determined in accordance with the literature reviewed earlier from Silvius and Schipper [46], Mavi and Standing [12] and Silvius and de Graaf [13]. Otherwise, a lack of business case would hinder firms from applying sustainability [36]. In the following subsections, different phases of the FM lifecycle model are discussed.

4.1.1. Planning and design (front-end phase). The front-end phase of the project includes the planning and designing stages of the facility lifecycle. This phase consists of the initiation and pre-engineering phase gates involving the project definition and concept development to underscore the problems and requirements. This is performed to highlight the goals, objectives, and main features of the project [23, 38-41]. During this stage, sustainability criteria should also be included. Defining roles, responsibilities, and accountability is an important activity in this phase. Other key activities involved in this phase, such

as stakeholder management, procurement, and so on, are shown earlier in Table 1 and Table 2. During pre-engineering, the sustainability-promoting design of facilities should also be considered [3, 22, 31, 39, 42, 52]. Flexibility should also be included in this phase [22, 52], as in having excess space, area, or additional technological tools pre-installed so that, in the future, switching to green energy would be easier for a facility. All of this would result in reduced energy consumption, which has been highlighted as significant by numerous authors. The front-end phase is finally completed after the project finances are secured, thus moving the project to the implementation phase.

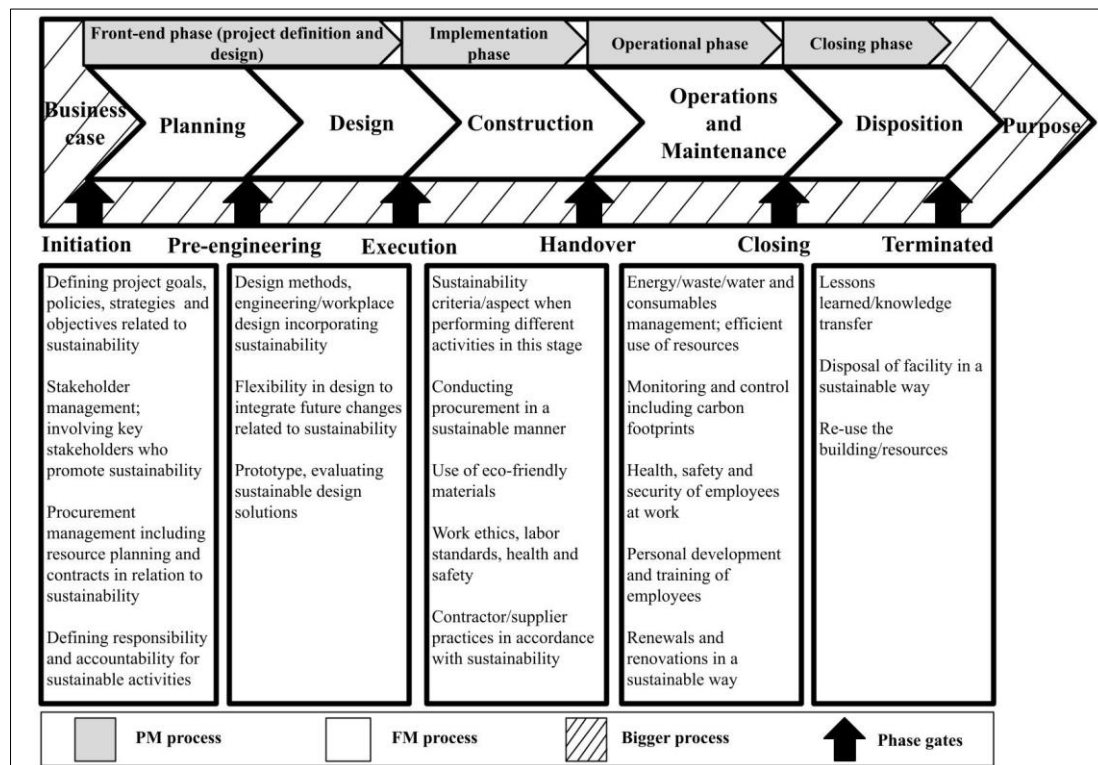


Figure 2. The relation between PM, FM, and the bigger process of the project purpose.

FM lifecycle model incorporating PM as a function towards achieving sustainable development. A large arrow with a pattern filling surrounding the grey and white process arrows illustrates that PM is an element of a bigger process [38]. This bigger process is considered sustainable development in this paper. The white process arrows inside this big arrow illustrate the FM phases. The phases of the FM lifecycle, from planning to disposition, were created using the resourced material from the Table 2. The PM phases at the top of this figure, shown with process arrows in grey, were adapted using the Table 1. The black arrows, which illustrates the phase gates, are based on [23] and [43]. Each of the boxes below the process arrows corresponds to the FM process. This framework shows some of the sustainability-promoting processes in each of the phases using both Tables 1 and 2, which can be integrated during the lifecycle of an FM. These are shown in the columns.

4.1.2. Construction (implementation phase). The implementation phase is also known as project execution. During execution, sustainability criteria should be included when performing different practices. For example, procurement in a sustainable way, the use of eco-friendly raw materials, work ethics, labour standards, the assurance of the health and safety of the workers, and the use of no child labour or illegal employment during the construction process should be abided by in accordance with established sustainability principles. These activities are also correlated with the identified sustainable

PM angles, including the materials used, the procurement process, supplier practices, the monitoring of the project, project policies, and project activities. This would also satisfy the demand of stakeholders to deliver the sustainable project [47], as managing stakeholders' interests is crucial for project success [45] and sustainability [46]. Furthermore, based on what was identified in Chapter 3, these activities can be part of both PM and FM in terms of project managers' and facility managers' responsibilities, showing the overlap between these fields. This signifies the crucial role of both PM and FM professionals in implementing sustainability procedures, as identified in the reviewed literature [7, 39, 42, 56]. The implementation phase ends when the facility is finally built and handed over and the outputs are delivered. This is where the operation phase of buildings starts.

4.1.3. Operations and maintenance. The operational and maintenance phase of a facility is normally the longest. In this phase, the goals of the projects are achieved in terms of first-order effects from the user's perspective [38]. The efficient use of resources, as well as recycling activities and the monitoring and control of the carbon footprint, are examples of activities that improve sustainability. These activities correspond to achieving both the economic and environmental aspects of sustainability. In addition, the last pillar of sustainability, the social feature, could easily be realised by assuring the health, safety, and security of employees at work, the personal development and training of employees, employment support services, and other related rules, regulations, and policies that have a positive impact on the society, like preserving and protecting the built environment [42]. Return on investment is also attained at this stage, commonly known as the payback period [38]. This payback period is quite important, as the sustainability agenda most likely fails if it does not contribute to positive returns on investment over time, regardless of having an obligation or business case for the long term [36].

4.1.4. Disposition. Finally, the disposition phase of facility starts with a closing process, where the goals and purpose of a facility are clearly realised [38]. This phase involves various key processes, such as documentation, evaluation, the identification of lessons learned, knowledge transfer, and so on, as shown in Tables 1 and 2. For example, in lessons learned, knowledge transfer is a key activity, so that future projects or other ongoing related projects can be run more efficiently based on the findings, and learnings from the terminated project. Furthermore, reusing a building is another critical activity, so that the built facility is not left abandoned, resulting in taking up the land space and impacting the surroundings and society in a negative way. Reusing resources would positively impact all three aspects of sustainability. For instance, reusing resources would help in cost savings, which is an economic factor. Similarly, less landfill waste contributes to the environmental component, and, finally, a positive image among society and improved quality of life would be exemplary of the social aspect.

In short, the FM lifecycle model shown in Figure 2 highlights the key activities involved in how both PM and FM integrate sustainability, thus answering the research question posed earlier. The result shows that PM, FM, and sustainability are closely related. However, the outcomes acquired were based on purely qualitative means. Accordingly, further research is needed to support the results of this study by conducting surveys or interviews with PM, FM, and sustainability professionals. This, in turn, would allow for a comparison between the theoretical results and the professionals' experiences, thus justifying the research.

5. Conclusion

This research was designed to investigate how PM, FM, and sustainability relate to each other. The rise in FM and PM has been significant in the last decade, and organisations are now actively embracing the sustainability concept. This led to the formation of this research study with the purpose of determining the role of sustainability and how it can be incorporated into both FM and PM. Based on the literature reviewed, a simplified facility lifecycle model was produced, integrating PM as a function of FM. Additionally, sustainability activities have been highlighted in all phases of the FM lifecycle, starting from the initiation process until the termination of a facility. As a result, all three pillars of

sustainability—economic, environmental, and social—have been taken into account. This facility lifecycle model answers the main research question about the interlinks between PM and FM in the pathway towards realising sustainable development, thus fulfilling the objective of this study. An especially important finding is the need for goal setting and a clear business case for sustainability. Following this recommendation, one should ensure that there are sustainability criteria to heed through the lifecycle, which would enable the opportunity to contribute to social, environmental, and economic sustainability, including positive return on investments.

Finally, it should be noted that this study excluded the supply chain perspective from the scope of the research. Therefore, the supply chain perspective should also be explored in future work to determine its interlinkage with sustainable FM and PM, further enhancing the scope of the study.

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