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REVIEW OF FACILITIES MANAGEMENT FUNCTIONS IN VALUE MANAGEMENT PRACTICES

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ABSTRACT

This paper identifies the functions of facilities management (FM) in value management (VM) studies in Malaysia. Most previous research in this area has discussed the history, evolution, knowledge, challenges, and contributions of FM in both the private and the public sectors, yet it is also essential to explore the benefits of FM involvement and the drawbacks of FM non-involvement in VM studies during the pre-construction stage in Malaysia. This paper provides an overview the FM manager's roles in a VM workshop based on a review of literature collected and compiled from various publications. The study contributes to current knowledge by addressing the five elements of FM functions and their impacts on VM studies. The findings will enhance project, product, and service value by illustrating the importance of FM functions in a VM study.

Keywords: Facilities management; Malaysia; Pre-construction; Value management

1. INTRODUCTION

Facilities management (FM) and value management (VM) are relevant in Malaysia because buildings are used every day, and the country cannot afford to deliver mediocrity. Architects, engineers, designers, and tenants play major roles in determining the value of a building, as well as any potential to save time, money, or effort. According to Kamaruzzaman and Zawawi (2010), the term facilities management covers a wide range of services, including real estate management, contract management, change management, human resource management, financial management, and health and safety management. The term also covers building maintenance, utility supplies, and domestic services (e.g. cleaning and security).

Tladi (2012) remarked that "Buildings can last a very long time and it is better to design for efficiency and cost-effective operations and maintenance from the beginning" (p. 6). It is likely that the functions of FM offer certain advantages. Therefore, when a facility uses FM functions that relate to the elements of a VM study, the overall value of the facility will decline proportionately to the cost of building maintenance (Enoma, 2005). In addition, Xianhai (2013) stated that a lack of early FM engagement during the pre-construction stage may cause

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problems relating to the improper use of building materials and equipment.

Furthermore, such an oversight may result in every aspect of the building being more complex and expensive to repair when the building is completed. Without early FM involvement, there can be no feedback on proposed design elements. As a result, problems may be less defined and, thus, less likely to be solved during the early stages.

Problems can make facilities difficult and costly to control and maintain. However, rather than carrying out an analysis to identify design flaws, companies often blame the FM team. Therefore, in recent years, there has been an increasing amount of literature on the importance of FM involvement during the pre-construction phase of projects (Erdener, 2003; Tladi, 2012; Jawdeh, 2013; Wang et al., 2013). This literature has identified the important role of FM managers during the pre-construction phase, which involves the following aspects: (i) client satisfaction; (ii) energy efficiency; (iii) operation and maintenance; (iv) space management; and (v) sustainability.

Both FM and VM should be applied during the early phases of a project and throughout the whole life cycle of a building (Jensen, 2009). Therefore, the present paper aims to review the knowledge gaps concerning the importance of FM for design reviews (e.g. during the inception and conception stages prior to the approval stage). FM involvement in design reviews is important because maintenance costs increase relative to the improper maintainability of maintenance equipment. The literature review shows that both FM and VM should be integrated to allow designers to consider the various aspects of FM in their designs, as well as to enhance design support functions. However, few studies have addressed the topic of FM involvement in VM, especially in the Malaysian context. Therefore, this paper seeks to identify the importance of FM functions in VM studies in Malaysia.

2. METHODS

The aim of this study is to provide useful information pertinent to the functions of FM in a VM study on the pre-construction stage in Malaysia. The research seeks to establish a deeper understanding of FM functions relating to client satisfaction, energy efficiency, operation and maintenance, space management, and sustainability in the study of VM in Malaysia. The paper discusses the findings of a literature search as they relate to the functions of FM in VM practices.

3. LITERATURE REVIEW

A literature search was conducted to identify studies related to FM functions and VM studies. The review process involved searching for published studies from the ScienceDirect, Emerald, and Scopus databases using the keywords facilities management, Malaysia, pre-construction and value management. Related theses, conference proceedings, and review articles were also reviewed. The study excluded literature that was considered redundant. The study focused on studies on FM functions published between 1999 and 2016. The search identified seven constructs with 50 items important for identifying the functions of FM in VM practice. Descriptions of each of the constructs related to FM are presented in the next subchapter to illustrated the relationships between these constructions and the involvement of FM in VM studies during the pre-construction stage, as depicted in the literature.

3.1. Client Satisfaction

According to Jawdeh (2013), FM managers must coordinate with clients to acknowledge the requirements of users and proprietor businesses. The association between FM and society can influence the sharing of expertise pertinent to the various aspects of FM with both clients and designers. Jawdeh (2013) also maintained that the participation of FM managers is important in

a VM study, particularly with respect to answering questions posed by designers. Previous studies have primarily dismissed the notion of significant designer interest in building performance at the occupancy stage (Way, 2006; Jawdeh, 2013).

In another study, Talib (2013) found that FM managers assist in the preparation of project specifications. Information extracted from prior projects and buildings should be assessed to develop design considerations for new facilities. To relate Post-Occupancy Evaluations (POEs) to workplace design, Preiser (2003) stated that POEs operate in accordance with facility design, which encompasses: (i) the high-quality influence of workplace design on an organization's desired outcomes; (ii) the contribution of workplace designs to cutting non-relevant costs and increasing revenues; and (iii) the impacts of workplace designs on improving human resource development.

FM managers can also use POEs to optimize building performance (Tladi, 2012). According to Yasin (2013), consumer needs are constantly demonstrated through service level agreement (SLAs). An in-house FM service provision dominates FM decision-making, which includes the development of FM, expenditures, and human resources (Yasin, 2013). Meanwhile, an outsourced FM is restricted to client SLAs. There is a difference between the "weightages" of the facilities performance evaluations supported by outsourced and in-house FM service provisions. Hence, it is important to acknowledge service inputs in the SLA at the earliest design stage (Koleoso et al., 2013; Yasin, 2013; Ikediashi, 2014).

3.2. Energy Efficiency

The world is currently facing a deterioration of natural resources, increasing utility costs, and global warming. Thus, stakeholders in the built environment are responsible for committing to sustainability efforts by developing facilities that require minimal resources to build, operate, and maintain (Tladi, 2012). By raising concerns at the design stage, FM managers can contribute to facility efficiency, or cost-effectiveness. In so doing, they can competently achieve their objectives and implement cost-effective design solutions that benefit buildings' entire life cycles (Enoma, 2005). Thus, there is a need for FM managers to check the appropriateness of utility services during the building design.

Tladi (2012) specified that FM managers must provide significant contributions to sustainability strategies that require few resources. They can accomplish this by assisting in the design of cost-effective facilities. Cloete (2002) and Tladi (2012) have made several attempts to show that water services must be easily accessible for regular service purposes and to avoid unpredictable incidents. Similarly, Lehrer (2001) suggested that the design of any water systems should focusing on ease and costs of operation and constant maintenance. For instance, to conserve water, an FM may recommend changing high-pressure flush toilets to low-pressure flush toilets.

Hartungi and Jiang (2012) discuss lighting efficiency, which can be considered to conserve energy and reduce costs. FM managers should also consider the energy efficiency of thermal factors. According to Atkin and Björk (2007) and Wan-Hamdan et al. (2011), the majority of organizations wish to provide comfortable working environments to enhance the productivity of employees and management, and thermal efficiency is one of the components of productiveness affected by environmental factors. Finally, Mcauley et al. (2015) created a client's brief that promotes better thermal efficiency, enhanced artificial lighting, improved acoustics, and the addition of a shop unit.

3.3. Operations and Maintenance

FM managers also play an important role in lowering maintenance costs (Enoma, 2005, Che'Mat & Shah, 2006). Their research on the advantages of FM, particularly in hospitals and hotels, suggests that a large proportion of any given building supports facilities and the

management of core activities. Likewise, Mustapa (2013) acknowledged that FM managers' authority relates to conceptual design. Kelly et al. (2005) and Mustapa (2013) recognized the three distinct levels of FM: (i) strategic FM, which is concerned with the direction of the FM function and includes setting objectives in response to the purpose of the FM function, carrying out long-term planning, and considering external requirements; (ii) tactical FM, which is concerned with making an FM organization function as a whole; and (iii) operational FM, which is concerned with day-to-day decisions in operating facilities.

Tladi (2012) suggested that FM managers should estimate the impacts on the cost of FM during the pre-construction stage. Since the delivery of a facility at the lowest possible cost is no longer paramount in the construction industry, it is vital to be aware of and to consider a facility's whole life cycle cost. Furthermore, in order to inspect permanently fixed elements, FM managers must focus on areas requiring constant maintenance (Enoma, 2005). The project team should develop resolutions to meet business needs throughout the lifetime of a facility and outline requirements for future facility maintenance. During the design stage, FM managers should propose an effective, yet cost-efficient facility and accomplish daily tasks concerning other ad hoc roles within the facility (Enoma, 2005).

A building's current conditions and ease of access both influence its maintenance costs. For example, a building that is poorly maintained and offers poor access for maintenance and cleaning purposes will have higher maintenance and cleaning costs. Moreover, buildings that are difficult to access may require special equipment to clean or maintain. By contrast, a well-arranged operation and maintenance plan may attract more occupants and ensure the successful pursuit and accomplishment of plans. Many researchers have argued that facility designers fail to utilize conservation devices that decrease the use of chemical cleaning products, thus cutting down on maintenance costs (Lehrer, 2001; Tladi, 2012). Therefore, the role of the FM manager should include crucial aspects of building management, such as checking for ease of cleaning and maintenance of building surroundings.

3.4. Space Management

Che'Mat and Shah (2006) defined the role of FM managers as guaranteeing a high rate of utilization during the design stage. In their review of organizations, Hodge et al. (2002) and Yu (2006) surmised that organizations should be flexible and focused on change. The current industrial situation has been portrayed as steady and simple, since the capacity to change and react to new environmental conditions is considered crucial for long-term survival. According to Che'Mat and Shah (2006), therefore, the role of the FM manager is to allow for the efficient flow of movement. For example, the FM manager should notify designers of any information regarding space, including information on room use, functional categories, shared use, room capacities, and room dimensions. They explain that the FM manager must ensure a high rate of utilization during the design stage (Che'Mat & Shah, 2006).

Furthermore, Wan Hamdan et al. (2011) propose that information on space should be provided during the early stages of the design process to trigger a positive effect on FM and ensure pride in the facility in the context of higher education institutions. The FM process adheres to the National Higher Education Strategic Plan (NHESP), which requires investigation and early supervision in the development of infrastructure and resources to achieve optimum utilization. A high level of efficiency minimizes wastage in terms of building space, space capacity, tasks, actions, and occupancy. Space planning management can also support simultaneous demands on a workspace to expand business exercises and availability in the context of timing.

Fraser (2014) proposed that online fault detection and persistent observation on continuous monitoring condition (CM) frameworks are becoming increasingly essential. This growing importance is largely due to the potential advantages of identifying component failures during

their initial stages and preventing performance declines by ensuring adequate time to rectify faulty parts. In the long term, solid and stable CM frameworks can substitute for regular unit services through cost-cutting measures. CM is also a conscientious investment that supports the installation of hardware and software checking systems, as opposed to conventional checking systems (which are charged at cost for each observation). Thus, FM managers are required to provide information on integrated workplace management systems.

3.5. Sustainability

It has been conclusively shown that various roles are needed to engage and integrate sustainability into a VM study (Abidin & Pasquire, 2007; Nawawi et. al, 2015). Abidin and Pasquire (2007) stated that FM managers should give input on sustainable development issues. However, concentrating too heavily on sustainable development may overshadow issues at the macro-scale level during the operational stage, since any design must have the capacity to minimize maintenance costs and ensure safety (Enoma, 2005). Including FM managers in the full scope of the design process may minimize costs in procurement accounts and reduce work modifications and unnecessary alterations (Enoma, 2005).

Nawawi et al. (2015) reported that the active participation of FM managers during pre-construction phases could ensure that sustainable strategies are not affected following the delivery of a facilities and that plans and policies for facilities are kept up-to-date. The FM manager's role in addressing sustainability includes checking for the appropriateness of various sustainability design aspects and offering input concerning waste disposal systems. Abidin and Pasquire (2005) found that respondents generally believe that sustainability issues are important and should be given attention in VM studies.

The use of new materials and technological advancements could help control energy wastage in the context of adding value to existing structures (Chan, 2014). New items can be expected to discharge low or no unpredictable organic compounds and formaldehydes, both of which can have negative ecological impacts and negative effects on building occupants. Poly Vinyl Chloride (PVC) utilization should be minimized through upgrades because of its negative effects relative to its life expectancy.

3.6. Advantages of FM Involvement in a VM Study

Utilizing FM as a rigorous approach for obtaining optimum values in a VM study has several benefits, including increased accessibility to various equipment for maintenance and replacements (Jawdeh, 2013), a better selection of equipment and materials (Jawdeh, 2013), a method of addressing sophistication and reducing complexity in modern buildings (Enoma, 2005; Tladi, 2012), and improved design output and increased design efficiency (Enoma, 2005, Tladi, 2012). Tladi (2012) believed that architects and/or civil engineers are responsible for deciding on materials and equipment based on availability. The materials selected must conform to certain criteria (e.g. non-hazardous, sustainable, and non-expensive), and these criteria should be standardized across the whole building (Jawdeh, 2013). Such measures may help boost the efficiency of FM. Furthermore, Jawdeh (2013) and Enema (2005) found that FM participation in the design stage may enable FM managers to achieve cost savings throughout a facility's life cycle. To avoid costly maintenance, service fees, and cleaning fees in the future, FM managers must engage in early preparation. In other words, FM participation in VM studies at an early stage could minimize the risks pertaining to workload and expenditure (Jawdeh, 2013).

3.7. Disadvantages of FM Non-Involvement in a VM Study

It is common knowledge that FM has drawn the attention of several organizations. Both the public and private sectors are highly satisfied with the implementation of FM practices in VM studies. However, FM non-involvement in the VM process has several disadvantages, including

difficulties accessing equipment for maintenance purposes (Jawdeh, 2013), problems with electrical services and equipment (Jaunzens et al., 2001), problems with fixtures and fittings (Jaunzens et al., 2001), problems with the building fabric (Jaunzens et al., 2001), and problems with deliveries and waste management (Jaunzens et al., 2001). It is also possible to calculate a client's loss of profit due to the absence of FM in a VM study (Jawdeh, 2013). The abandonment of FM expertise within various business sectors may reduce designers' capability to fulfill clients' needs and produce more FM-efficient designs (Jawdeh, 2013). Furthermore, organizations may fail to consider life cycle costing analyses (Jaunzens et al., 2001). In other words, it may become meaningless to consider the total cost of life cycle accounting for all possible costs related to building construction and operation, particularly at their present values (Enoma, 2005).

3.8. Latent Constructs of FM Functions in VM Study

Throughout the literature review presented in this study, themes that support the continuation of this research to the next stage have been identified. The findings from the literature review demonstrate that there is a need to integrate FM into the role of FM managers in VM studies. Table 1 summarizes the indicators for seven latent constructs and 50 items gathered from the literature review, along with their sources.

Table 1 Indicators for latent construct

Latent Construct	Indicators	Item Description	Source(s)
Client Satisfaction (ClientS)	ClientS1	Coordinate with client to ensure that all user and owner requirements are included in the brief	(Coenen & Schäfer-Cui, 2013; Jawdeh, 2013; Hungu, 2013)
	ClientS2	Assist in the preparation of the project specifications	(Elmualim et al., 2010; Jensen et al., 2014)
	ClientS3	Answer questions posed by designers	(Jawdeh, 2013)
	ClientS4	Ensure building design was carried out to the expectations of facility users	(Tladi, 2012)
	ClientS5	Finalize the brief for client signoff	(Enoma, 2005; Jawdeh et al., 2010; Tladi, 2012; Jawdeh, 2013)
	ClientS6	Provide POE outcomes to optimize building performance	(Tladi, 2012)
	ClientS7	Provide inputs on SLAs	(Koleoso et al., 2013; Yasin, 2013; Ikediashi, 2014)
Energy Efficiency (EnerE)	EnerE1	Check for energy and resource consumption (e.g. electricity, heating, cooling, water)	(Tladi, 2012; Hungu, 2013; Tahir et al., 2016)
	EnerE2	Check for appropriateness of energy saving	(Sheau et al., 2010)
	EnerE3	Check for appropriateness of utility services	(Enoma, 2005; Tladi, 2012)
	EnerE4	Check for appropriateness of power and water consumption	(Tladi, 2012; Tahir et al., 2016)
	EnerE5	Check for lighting aspects	(Jawdeh et al., 2010; Tahir et al., 2016)
Operation and Maintenance (OpeM)	OpeM1	Provide technical information to help designers produce the best design	(Enoma, 2005; Che'Mat & Shah, 2006)
	OpeM2	Ensure that the FM requirements stated in the brief are actually reflected in the concept design	(Mustapa, 2013)

Latent Construct	Indicators	Item Description	Source(s)
	OpeM3	Apply life cycle costing in the selection of materials and equipment	(Tladi, 2012; Hassanain et al., 2013; Olanrewaju, 2013)
	OpeM4	Ensure access to all areas inside the building for maintenance work	(Mat et al., 2011)
	OpeM5	Raise Operation and Maintenance (O&M) issues to avoid defects during occupancy	(Tladi, 2012)
	OpeM6	Assist in managing the selection of materials and equipment to avoid operational issues	(Jawdeh et al., 2010)
	OpeM7	Ensure permanently elements designs should be avoided in areas requiring continuous maintenance work	(Enoma, 2005)
	OpeM8	Check for ease of cleaning and maintaining the building and surrounding areas	(Tladi, 2012)
Space Management (SpaceM)	SpaceM1	Ensure a design emphasis on efficient and effective use of space	(Che'Mat & Shah; 2006; Yu, 2006; Ibrahim et al., 2012)
	SpaceM2	Ensure a high rate of utilization	(Che'Mat & Shah 2006)
	SpaceM3	Provide info on integrated workplace management systems (CMMS)	(Fraser, 2014)
	SpaceM4	Give information on space needs	(Wan-Hamdan et al., 2011)
	SpaceM5	Assist with general layout and circulation	(Tladi, 2012)
Sustainability (Sust)	Sust1	Check for appropriateness of sustainability aspects	(Nawawi et al., 2015)
	Sust2	Give input on waste disposal system	(Price, 2012)
	Sust3	Ensure the design considers sustainability factors	(Enoma, 2005; Nawi et al., 2014)
	Sust4	Avoid the design of non-environmentally friendly systems	(Mcauley et al., 2015)
	Sust5	Express preferences concerning options for new products and discuss their suitability	(Jensen et al., 2012)
Advantages (Adv)	Adv1	Properly address client and FM requirements to achieve satisfaction	(Jensen, 2009; Jawdeh, 2013)
	Adv2	Address sophistication and complexity reduction in modern buildings	(Enoma, 2005; Tladi, 2012)
	Adv3	Improve design output and efficiency	(Enoma, 2005; Tladi, 2012)
	Adv4	Minimize abortive work during construction and operation	(Enoma, 2005; Tladi, 2012)
	Adv5	Achieve cost savings throughout the facilities life cycle	(Enoma, 2005; Jawdeh, 2013)
	Adv6	Ensure a smooth takeover of facilities	(Jensen, 2009)
Advantages (Adv)	Adv7	Increase accessibility to various equipment for maintenance and replacements	(Jawdeh, 2013)
	Adv8	Provide FM with knowledge about systems early on	(Tladi, 2012)
	Adv9	Improve the selection of equipment	(Arditi &

		and materials	Nawakorawit 1999; Tladi 2012)
	Adv10	Reduce future operational expenditures	(Jensen, 2009)
Disadvantages (DisAdv)	DisAdv1	Wrong interpretations of FM requirements by designers	(Jawdeh, 2013; Xianhai, 2013)
	DisAdv2	System inefficiencies	(Jawdeh, 2013; Xianhai, 2013)
	DisAdv3	Clients' loss of profit	(Jawdeh, 2013)
	DisAdv4	Access difficulties for maintenance purposes	(Hassanain et al., 2013)
	DisAdv5	Cleaning difficulties (especially on the external facade)	(Jawdeh, 2013; Xianhai, 2013)
	DisAdv6	Failure to consider lifecycle costing analysis	(Jaunzens et al., 2001)
	DisAdv7	Problems with electrical services and equipment	(Jaunzens et al., 2001; Xianhai, 2013)
	DisAdv8	Problems with fixtures and fittings	(Jaunzens et al., 2001; Xianhai, 2013)
	DisAdv9	Problems with the building fabric	(Jaunzens et al., 2001)
	DisAdv10	Problems with deliveries and waste management	(Jaunzens et al., 2001)

4. CONCLUSION

It can be assumed that studies on VM in Malaysia are as extensive as those conducted elsewhere. Generally, the use of VM in Malaysia yields the same improvements as implementations of VM frameworks globally, and such improvements have been incorporated into the concept of sustainability within construction projects. This integration should be adopted into the building management culture at an early stage in order to guarantee that project needs are achieved within the relevant project scopes.

In Malaysia, FM and VM have been evolved within several organizations for decades. Thus, it is possible to understand the practices of FM functions in the context of VM practices in Malaysia. To ensure better solutions and outputs and avoid future problems, both FM and VM should be applied throughout a building's whole life cycle, starting with the early design stages. The present study has endeavored to enhance our understanding of the importance of FM functions in a VM study. The authors hope that the combination of FM and VM will be helpful in increasing buildings' value and saving time, effort, and money.

More data and information on FM functions in VM studies would help us establish a greater degree of accuracy concerning our findings. If the debate is to move forward, better understandings of client satisfaction, energy efficiency, ergonomics, operation and maintenance, space management, and sustainability must be developed. These research gaps require further investigation on the benefits of FM involvement and the drawbacks of FM non-involvement in VM studies.

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