

Assessing The Implementation of Computer Aided Facility Management (CAFM) In Malaysia Industry

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Abstract: As a developing country gradually implementing Facilities Management in various public and commercial sectors, Malaysia will recognize the importance of Computer Aided Facility Management (CAFM) in the company, which will benefit this industry. The goal of this research is to determine the full use of computer-aided technology facility management industry and analyse the CAFM in Malaysian companies for FM services. While the industry's top companies play their roles in developing Facilities Management to be more mature and established throughout it, the importance of CAFM should not be overlooked because it helps drive the process of Facilities Management services to be more manageable and secure. Therefore, to obtain information this study used a quantitative method approach to analyse the data. The information gathered from respondents will be analysed using SPSS, Microsoft Excel, and a Google Form. Accordingly, to the result obtained, the effectiveness of using CAFM in the organization has an average mean score total is between 3.35 to 3.43 respectively. To summarize the implementation of CAFM in organizations is moderate and the result can be used for future research to ensure study can focus Facilities Management organisations in Malaysia providing the best CAFM system in comparison to European countries that were pioneers in the Facilities Management industry hence this research to promote best practice on CAFM aspect in Facilities Management industry.

Keywords: Facilities Management, Computer Aided Facility Management (CAFM), Building Information Modelling (BIM), Maintenance, Knowledge

1. Introduction

Facility Management (FM) is the art and science of managing the people, facility resources, and services required to keep a business running smoothly [1]. FM industry emerged as one of the fastest-growing sectors in the final decade of the previous millennium [2]. The organization's core businesses benefit from the services provided by FM, which helps them achieve continuous improvement in their operations. Furthermore, FM is a management function that encompasses a variety of disciplines and

contributes to their core businesses by providing quality services and maintaining the support services of organizations [3]. At the national level, FM's strategic purpose is to improve corporate infrastructure and logistic support and a variety of public endeavours across all sectors. Thus, FM's fundamental role is resource management, both strategic and tactical levels and operational support levels [3]. The CAFM is a high-tech tool that combines a computerized network system with a centralized data gathering system to integrate graphic and non-graphic information in a consolidated manner. Facility professionals use these to track and manage nearly any facility-related asset. They enable managers and decision-makers to examine the effective use of space more efficiently than ever before [4]. CAFM systems are used to gather and archive information on buildings and facilities, so creating a comprehensive database of information about the state of the facility and reducing the likelihood of problems and emergency situations during its usage, reconstruction, or destruction. The significance of these software solutions is not limited to preventing possible injuries during the reconstruction phase of a crash [5].

1.1 Problem Statement

Based Kung et al., (2016) to having building design service lifetimes, a building's structure and other building control equipment are also expected to decay or break down at some point during the building's life span [6]. Despite this, facility management issues such as the postponement of important repairs, replacements, or renovations of the building structure or equipment are frequently noted due to the fact based on Mazlan & Mohammed, (2015) that systematic maintenance at the organizational level in Malaysia is still in its infancy [7].

During the early operational phase of their facilities, building owners and facility managers desperately need a method or tool that will allow them to predict the maintenance management systems for the life spans of their structures to allocate adequate maintenance to be maintained to prevent early degradation from causing major harm to it and preventing it from becoming non-functional.

These authors propose that the same capability might be applied to maintenance management systems prediction throughout the operating phase as well, by producing quantity take-off for the building elements that need to be maintained.

Throughout the building's operational phase, facility management systems or computerized maintenance management systems have been employed to plan and manage maintenance work. To accurately forecast building life cycle management systems during the early operational phase, using CAFM software must be based on a set of pre-planned maintenance tasks to be performed on various building subsystems and their components over a specified life span, which can be effectively assisted and scheduled by facility management systems.

1.2 Aim and Scope

The aim of this research was to discover facility management develop computers aided in the creation of information technology systems with the goal of enhancing FM performance in FM companies in Malaysia as well as digitization of operation management processes. The population for this study was derived from sample of participants from the integrated facility management company registered in Malaysia. The result of a final sample size of 74 company based on Facility Management listed company in www.digital.marketingddeal.com. The objectives of this study were as follows.

- i. To determine the full use of computer-aided technology facility management in industry.
- ii. To identify the effectiveness of computer-aided facility management in organizations.

2. Methodology

A flow chart is formed as an infographic for the sequence of processes or parts involved in a system or activity. In this study, to determine the pattern of the situation, quantitative approaches were used.

Therefore, the research methods and process of the study might be illustrated more clearly and understandably using this flow chart, as shown in Figure 1.

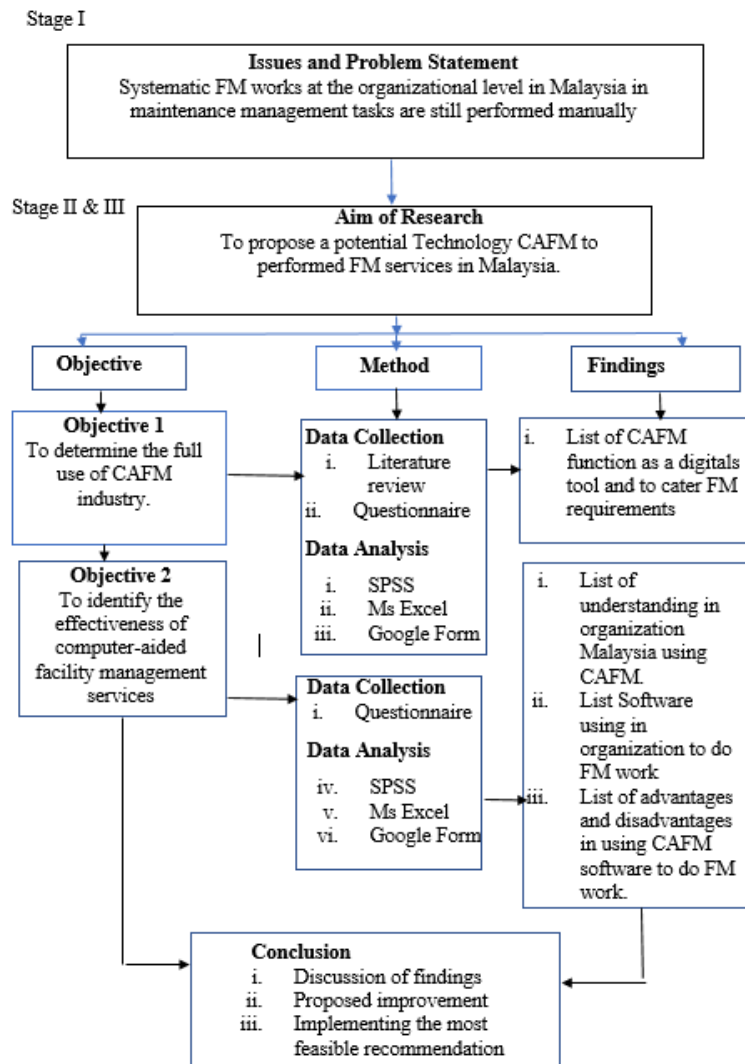


Figure 1: Flow chart for the sequence of this research

2.1 Questionnaires

For this study, the questionnaire design was based on the study's objectives. In order to meet the research objectives, the questionnaire must be competent. So, queries needed in the literature review must be connected to the topic. The questionnaire included four significant parts, Part A, Part B, and Part C, according to Table 1.

Table 1: Divided section of the question

Part	Title
A	Respondent's Demographic
B	Features used in CAFM
C	The Effectiveness of CAFM

2.2 Questionnaires Reliability

It is crucial to analyze the questionnaires to ensure every question is valid and understood by respondents when they answer the question. Therefore, a pilot study was conducted to verify the validity of the questionnaire survey utilized in this study. Twenty-three samples of respondents were performed reliability analysis using the Statistical Package for Social Sciences (SPSS). Cronbach's Alpha (α) value

for this sample question is 0.961, as shown in Table 2. Therefore, Cronbach's Alpha value criteria for interpreting alpha for Likert scale questions as shown in Table 3 [8]. Furthermore, that the validity of the questionnaire survey utilized in this study is in an "Excellent" state because $\alpha \geq 0.9$.

Table 2: Reliability Statistics

Cronbach's Alpha	N of Items
0.961	11

Table 3: Criteria Cronbach's Alpha value [8]

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

2.3 Data Interpretations

There are many interpretations for the questionnaire responses in this study. The question in Part B, is objective question which may be done by calculating percentage frequency respondent to the answer. Part C, a Likert-scale pattern is rated on a variable depending on the level of agreement shown by respondents who complete the surveys. It may be done by calculating the frequency and percentage and the mean and mean average of the responses to the questions. To determine the variables examined in this study, the guidelines of the mean score have been fixed, as shown in Table 4 [9].

Table 4: Mean Score and description

Mean score	Description
1.00-0.99	Strongly Disagree
1.99-1.00	Disagree
2.99-2.00	Agree
4.00-3.00	Strongly Agree

3. Results and Discussion

The results and discussion section presents data and analysis of the study. This section can be organized based on the stated objectives to achieve the objectives described in the previous chapter, each and every result uncovered during the course of the investigation will be expressed and developed.

3.1 Questionnaire Analysis

The questionnaire of this study was distributed to the organization involved, and researchers managed to collect data from 29 respondents in Malaysia organizations. Some of the questionnaire data were obtained and analyzed using Ms Excel. The method of analysis used is by descriptive tests using frequency, percentage, mean, and standard deviation scores to achieve all objectives of this study.

3.1.1 Part A: Demographic Factors

This part is used to verify the respondents' demographic information, including variables such as highest academic, designation, years of working, industry employed and name of the CAFM system/software were used the questioned are to establish the respondents' credibility and elicit convenient responses.

Table 5: Summary of respondent demographics

No	Item	Category	Sample Size (n=30)
1	Highest academic	SPM	2
		Certificate	4
		Diploma	9
		Degree	15
		Master	0
		PhD	0
2	Position in the company	Facility Manager	1
		Engineer	5
		Technician	9
		Other	14
3	Years of working experience	Less than 5 years	18
		From 5 to 10 years	8
		From 11 to 15 years	2
		More than 15 years	1
4	Which industry are you employed	Manufacturing	1
		Commercial	12
		Healthcare	4
		Education	5
		Other	8
5	Able to access Computer-Aided Facilities Management (CAFM) system in organisation	Yes	26
		No	3
6	Select the name of Computer-Aided Facilities Management (CAFM) used in the organisation	ARCHIBUS	0
		CAMSIS	2
		CWORK	0
		GEMS	1
		NIAGARA	0
		CMMS	22
		Other	5

Table 5 shows that the majority of the respondents are from degree holder and for designation majority from other categories are Internship student, Information Technology (IT) Analyst Executive, IT administrator, Hr executives, Tender Specialist and Administrative Assistants. The reason that other received the highest percentage is the questionnaire are given online randomly by the in charge staff.

Moreover, most respondents are from the commercial industry which does hospitality, utility, warehouses, and other manufacturing. Table 5 demonstrates the findings regarding the name of Computer Aided Facilities Management (CAFM) utilised by the organisation. In the pie chart, CMMS has the highest percentage compared to others. It can be concluded that the result is influenced by the sample size of the various population groups.

3.1.2 Part B: Features of CAFM

The respondent is questioned about operational work in Facilities Management. This is to acknowledge to the researcher the characteristics incorporated in the organization's implementation of Information Technology for Facilities Management. The respondent feedback in the Part B question is shown in Table 6.

Table 6: Respondent feedback in Part B question

Item	Features	Category Code	Category Details	Frequency	%
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B1	Asset Management		B1-A	Asset Registration	23	18
			B1-B	Asset Statutory & License	22	17
			B1-C	Asset Status & Placement	23	18
			B1-D	Asset Maintenance	23	18
			B1-E	Asset Disposal (Beyond Economic Repair)	19	14
			B1-F	Inventory & Store Management	19	15
B2	Space Management		B2-A	Drawing Plan	22	26
			B2-B	Location Code	26	31
			B2-C	Space Usage Status	19	22
			B2-D	Occupancy Number Status	18	21
B3	Helpdesk/Administration		B3-A	Work Order Management	27	29
			B3-B	Customer Complaint	23	25
			B3-C	Operation Data Information Update	22	23
			B3-D	Information Update On Building & Organization	22	23
B4	Operational Report	Process	B4-A	Customer Complaint Report	22	16
			B4-B	Work Order Report	26	18
			B4-C	Inventory Report	21	15
			B4-D	Planned Preventive Maintenance Report	26	19
			B4-E	Asset Management Report	23	16
			B4-F		22	16

The table 6 shows the system's scope and features. This section examines whether the organization's system follows the recommendations of the British Institute of Facilities Management (BIFM) and the International Facility Management Association (IFMA).

The information that the respondents had access to while using the system was the basis for the obtained results and are shown in table 6. This result is also impacted by the roles that respondents played within the organisations they were a part of when they provided their responses. Because there is a system designed with access restrictions based on the position of the organisation's employee, this frequently occurs. For instance, if the respondent is a technician, the highest level of the system to which he is permitted access is the level of operation. On the other hand, if the person responding works as an engineer for the company, the engineer has access to additional features like the feature in the operations and reports section.

Furthermore, the question about reasonable majority yes because the project has a certain target and is implementing the CAFM software application in their day to day business operations, the project is worth certain target. Some organisations who cast their vote for Maybe were of the opinion that the businesses might have become too comfortable with their systems and work processes, leading them to believe that the existing work process does not require CAFM software because it is already efficient enough.

3.1.3 Part C: Effectiveness of CAFM in organization

The purpose of this section is to investigate the efficiency of Computer Aided Facility Management in the Facilities Management sector. Quantitative information was collected, and the results of the survey were analysed with the Ms Excel. Distributing survey forms to the company has been chosen as potential respondents were the method that was utilised to acquire the data. The findings that were obtained from the first objective are used as a support tool in order to get answers that are more specific for the second objective. The respondent feedback in the Part C question is shown in Table 7.

Table 7: Respondent Feedback in Part C Question

No	Item	Likert Scale Score Frequency (f) and Percentage (%)										
		Strongly Disagree		Disagree		Agree		Strongly Agree		Total %	Mean	STD Deviation
		f	%	f	%	f	%	f	%			
1	Does the system/application accessible through computer?	3	10.3	0	0	7	24	19	65.5	1.17	0.388	
2	Does the system/application accessible through phone?	3	10.3	2	6.9	8	25.6	16	55	3.52	0.898	
3	Does the system/application has an intuitive interface (user friendly)?	3	10.3	2	6.9	7	24	17	58.6	3.43	0.945	
4	Do you need high speed internet to use this system/application?	1	3.4	5	17.2	10	34.5	13	44.8	3.52	0.898	
5	Does the system/application able to provide latest information and report?	4	13	9	31	0	0	16	55	3.39	0.839	
6	Does retrieval of data is available whenever the system/application is updated into new version?	3	10.3	1	3.4	10	34.5	15	51.7	3.35	1.027	
7	Have you experienced any problem while using the system/application such as missing data and outdated data?	2	6.9	4	10.3	8	25.6	15	51.7	3.43	0.896	
8	Do you agree that training courses (user training) on how to use this system should be conducted periodically to ensure that employees can use the system/application comprehensively and practically?	3	10.3	0	0	6	20.7	20	69	3.52	0.790	

9	Do you agree that user satisfaction with FM and a buildings facilities is achieved and contributes to the organizations productivity	3	10.3	2	6.9	7	24	17	58.6	3.65	0.714
10	The strategies for implementing facility management service concepts into operation are realistic and achievable	4	13	0	0	8	25.6	17	58.6	3.57	0.78
11	Do you agree using scientific data for FM service concepts and cost estimates to selection the best value for money option	4	13	0	0	8	25.6	17	58.6	3.52	0.898

To investigate the efficiency of Computer Aided Facility Management in the Facilities Management sector., the survey found that the respondents' average was aware (4.00 – 3.00, Strongly Agree) of the effectiveness of CAFM in the organization. Most of the respondents have aware of the effectiveness of the CAFM. The organization were concerned about the importance of the CAFM usually becomes an important element taken into the organization's operational work.

According to the analysis, respondents strongly disagreed that CAFM system is complex to access using a computer, the majority of respondents felt that it was simple with 26 data of person. Furthermore, A question regarding the system's ability to provide the latest information and reports was also asked, and the respondents provided their responses. 3.39 is the mean and std deviation 0.839 score with belief from the findings that the system is constantly being updated.

The last part of Section c is feedback respondent regarding to the effectiveness of the CAFM are mostly the respondent give a comment to make the system running in offline mode, due to limitation of internet coverage, make a technology that need to use in modern era for make all work are easy to update the progress on time and easy to monitor from far. From this the computer aided system have implement with IoT (Internet of things), integrating with CAFM systems, Building Management Systems (BMS) and Smart Sensors (IoT). Moreover, the feedback is to make the system to be more use friendly especially involve the facility location and the work order time response.

Therefore, when a building operator assumes responsibility for new equipment or a new building, the asset registration will do a list of the to be maintained plant and equipment, with each item identified by a unique coding system including location code thus it easier for the recipient of this record information will require some form of management system to store it securely, retrieve it on demand, and update it when necessary. The records will either be stored on hard copy media or, increasingly, as electronic data. Carrying out all of this can be accomplished with a smaller number of personnel than would be required without the usage of a CAFM system.

4. Conclusion

In conclusion, the two objectives that have been proposed at the beginning of the research were achieved through quantitative approaches were used, which are questionnaires. In addition, the feedback of respondent for the first objective, to determine the full use of computer-aided technology facility management industry, indicate that the majority of respondents are aware (agree) of the features

in CAFM uses this means that respondents and organization have been practically using the system for operational or services work.

Next for the second objective, to identify the effectiveness of computer-aided facility management in organizations. indicate that the majority of respondents are agree that the current CAFM application system that is being used by the organisation is quite effective. However, based on the previous study, it is recommended that both employees and business owners increase their knowledge on the topic of computer-aided application in facilities management so that they will have an insight into the importance of the effectiveness of the information technology application in the facilities management industry in Malaysia.

Finally, the researchers hope that this research can benefit all organization implement the CAFM for operational and services purpose. The results obtained from the survey questionnaire, observations, and perceptions of the respondents should be taken seriously by the management, as well as any parties involved, to provide a better and safer environment for residents, especially integrated facility management company in Malaysia.

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