

Critical Success Factors for Low Cost Housing Building Maintenance Organization

Shubashini Ganisen*, A. Hakim Mohammed, L. Jawahr Nesan, Gunavathy Kanniyapan

Faculty of Geoinformation and Real Estate, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia

*Corresponding author: ashini_shuba@yahoo.com

Article history

Received :1 November 2014

Received in revised form :

31 March 2015

Accepted :30 April 2015

Abstract

Building services are the elements within a building which supports the fundamental operation of a building. Efficient performance of building services able to facilitate and avoid an unnecessary aggravations to the end users. Thus, the role of building services maintenance (BSM) organization is vital during the building operation phase in order to be responsible for overall performance of the building and its services. However, in recent years the maintenance performance provided by BSM organization is lack on many aspects. In Malaysia, the performance provided by BSM organization especially in low cost flats are considered to be poor. Hence, this paper focuses on identifying the BSM problems, the cause and consequently identify critical success factors (CSFs) to be applied by the BSM organization to overcome those problems. Reviews on literatures, questionnaire survey and interview were conducted to collect the valuable data for the study. The data obtained was analyzed using frequency, mean, standard deviation and content analysis. The findings indicate that the common BSM problems occur in low cost flats are refuse disposal, rain water disposal and fire fighting system. While, lack of expertise, long duration taken and limited numbers of staffs are among the factors identified as the causes of those problems. 10 CSF namely clear goals and objectives, workforce development and training, effective monitoring and feedback, project team competence, dedicated resources, management planning, taking account past experience, good interdepartmental communication, education on new technologies and clients expectations are identified to solve the challenges facing by the maintenance organization which causes various BSM problems. The 10CSF identified based on the opinion given by 24 interviewees from various Local Authorities. A low cost flat managed by Kuala Lumpur City Hall located at Cheras was used as case study. This study expected to help respective parties to overcome the BSM problems in the low cost flats.

Keywords: Building services; building services maintenance; low cost flats; Critical Success Factors (CSF)

Abstrak

Perkhidmatan bangunan adalah elemen dalam bangunan yang menyokong operasi asas bangunan. Perkhidmatan bangunan yang cekap dapat memberikan pengguna suasana yang selesa. Oleh itu, peranan organisasi perkhidmatan penyelenggaraan bangunan (PPB) adalah penting semasa fasa bangunan beroperasi untuk menjaga prestasi keseluruhan bangunan dan perkhidmatannya. Sejak kebelakangan ini prestasi penyelenggaraan yang disediakan oleh organisasi PPB mempunyai kekurangan dalam pelbagai aspek. Di Malaysia, prestasi yang disediakan oleh organisasi PPB terutama di rumah pangsa kos rendah dianggap tidak memuaskan. Oleh itu, kertas ini fokus dalam mengenal pasti masalah and punca masalah PBB serta mengenal pasti faktor-faktor kejayaan kritikal (CSF) bagi organisasi PPB untuk mengatasi masalah tersebut. Ulasan pelbagai kajian literatur, kajian soal selidik dan temubual dijalankan untuk mengumpul data-data penting untuk kajian ini. Data yang diperolehi telah dianalisis menggunakan kekerapan, min, sisihan piawai dan analisis kandungan. Penemuan-penemuan menunjukkan bahawa masalah umum PPB di rumah pangsa kos rendah adalah seperti masalah pelupusan najis, air hujan dan sistem pemadam api. Selain itu, kekurangan kepakaran, tempoh lama untuk penyelenggaraan dan bilangan kakitangan terhad adalah faktor utama yang menjadi punca kepada masalah tersebut. 10 CSF untuk menyelesaikan masalah PPB juga dikenal pasti berdasarkan pandangan yang ddiberikan oleh 24 orang dari pihak berkuasa tempatan yang ditemu bual. Rumah pangsa kos rendah di Cheras, di bawah pengurusan Dewan Bandaraya Kuala Lumpur telah digunakan sebagai kajian kes. Kajian ini dijangka dapat membantu pihak-pihak berkenaan yang terlibat untuk mengatasi masalah-masalah PPB di rumah pangsa kos rendah.

Kata kunci: Perkhidmatan penyelenggaraan bangunan; rumah pangsa kos rendah; faktor kejayaan kritikal

© 2015 Penerbit UTM Press. All rights reserved.

■1.0 INTRODUCTION

Building services maintenance (BSM) is a term that covers a wide range of activities comprised in the effective maintenance of a building. It involves the complete maintenance of all services that support fundamental operation of a building (Wood, 2009). Building requires maintenance to keep up its structure, finishes, fittings and the entire specific features in a proper and acceptable state of repair including both internally and externally (Cripps, Armstrong and Bampton, 1984). Further, the buildings services of a building also require proper maintenance to ensure the building services kept under proper control and provide required function. This will ensure the users in the building are well facilitated to move in and out, to enjoy the facilities and services in the building. Building services are complex duty which needs to be warrant with continuous attention. Thus, it is the role of the building management organization to coordinate and oversee safe, secure, and environmentally-sound operations in a cost effective manner aimed for long-term preservation. According to Cripps *et al.* (1984) the prime role of a building maintenance manager is to satisfy his client's requirements by ensuring the building is properly maintained at acceptable standard and workmanship. A point that should be remembered is that, if building services are not maintained properly, it can have a very detrimental effect on components of the building and results in unnecessary aggravations to the users.

Low cost house is also known as affordable house where funding for the house is provided by, or subsidized through government and administered by the local housing agencies (Simm, 2010). A low cost house can be define as provision of housing which caters to the minimum requirement of masses within their income capabilities, without sacrificing the quality of construction (Lal, 2003). In Malaysia, low cost house is a housing program introduced by the government to ensure continuous supply of adequate number of low cost houses for the low income community. The low cost housing programs developing by the Malaysian government predominately comprises stratified properties such as low rise flats or high rise affordable flats. Other than developing low cost flats for the benefit of the low income community, state government is also responsible to provide reasonable and proficient building services in order for the low income group to receive excellent services and benefits. Thus, it has becomes the government's responsibility to provide excellent BSM for these community to enjoy a better quality of life. This is because excellent function and operation of building services will ensure the residents utilized with safety and uninterrupted services. Hence, providing better quality of BSM for the low income groups turns out to be a main agenda for the local authority.

However, in recent years, the buildings service provided are at unsatisfactory level. Low cost flats, especially in Malaysia facing a lot of maintenance problems. This had been highlighted by the Kuala Lumpur City Hall (KLCH). KLCH stated in 2000, its Operations Room in the Housing Management Department, has received a total of 5377 complaints from the low cost flat residents. It is shown that an average of 450 complaints per month was recorded. The highest complaints were 4,431 cases in respect of the lift repair, followed by 689 electrical, 161 civil, 61 mechanical and 35 other maintenance. This statistics show most of the complaints reported are related with the building services which consequently affect as well as interrupt the performance of the building (Our News Home, 2001). Other than that, in the Star Online News, on 7th June 2009, delegate of The National House Buyers Association agrees that most of the low cost housing in the country is of low quality, not properly equipped with amenities and badly located. Low cost flats should be given

special attention to provide better quality of BSM resulting in improved building services.

In order for the building services in low cost flats function as required, it is necessary for the BSM personnel to improve and provide excellent maintenance services. Therefore, it is imperative to identify the factors that contribute to the maintenance organization success. Hence, it is strongly assumed that the CSFs for BSM organization will provide a clear direction for the building maintenance organization for a successful implementation of maintenance in low cost flats building services in future. Additionally, there has been lack comprehensive and dedicated study on the CSFs for building maintenance organization carried out by previous researchers. Therefore, this research is designed to be the first step in developing the knowledge base, focusing on the CSFs for building maintenance organization success particular by focusing problems arises in low cost flats managed by the government. Thus, this research focuses on answering the following research questions; what are the BSM problems that frequently occur and the causes of the problems in low cost flats? And what is the Critical Success Factors (CSF) that can be used to solve the BSM problems? Based on the research questions derived, the following objectives are formulated; 1) To identify building services maintenance problems and the causes of the problems in low cost flat. 2) To identify the Critical Success Factor's (CSF) to solve the building services maintenance problems in low cost flat. Therefore the author has selected a low cost flat managed by KLCH located at Taman Ikan Emas, Cheras as a case study for this research.

■2.0 BUILDING SERVICES AND BUILDING SERVICES MAINTENANCE PROBLEMS

Building services play an important role in buildings. The Chartered Institution of Building Services Engineers (CIBSE) defines building services as all the services and facilities inside a building which makes the building safe and comfortable to live in. Building services are the systems and components which provide plumbing, sewerage, ventilation, power, fire fighting protection and other special services such as public address system to a building (Miles and Syagga, 1987). BSM is a type of activity carried out in order that all electrical, mechanical and technical services within a building provide adequate function. Thus, BSM has a significant influence on the efficient performance of the building services systems and the overall building (Lam, 2000). According to Beddington (1984), BSM representing an escalating proportion of the building contract, convenience, comfort and cost-in-use of the building and depend more on planned and adequate servicing.

Buildings are subject to various building services problems although there are numerous standards, procedures and guidelines produced to maintain a building in an efficient manner. BSM problems may cause unsafe or incapable operations of building services and affect the productivity of a building. Several studies have been carried out to identify building services problems to reduce its occurrence. For an example, the National Building Agency (1969) together with the Building Research Establishment had carried out 3 years study on traditional housing to identify common problems that occur in buildings. The study showed that similar problems were identified as common problems occur due to poor building maintenance. Reference from various literatures, lead to identify numerous BSM related problems. Among other include the followings;

i) Defective Electrical Circuit

Electricity is a very dangerous system in a building which can kill people by electrocution. Therefore regular inspection, testing and maintenance should be carried out in order to avoid any electrical defects. Building regulations require electrical installations, modifications or maintenance to be carried out by competent individuals. Electrical insulation breakdowns, loose wire, faulty appliances are among electrical defects. Cleaning light fittings, replacing bulbs and regular checking on the whole system or sub system should be carried out in order to avoid frequent electrical defects.

ii) Water Quality and Defective Water Supply System

Water main distribution ring is in the form of grid. From the main system water is supplied to each building through its storage tanks. This water extraction and distribution flow from the street main pipes to supplies building and finally to the building storage tank before entering each units of households. Thus, proper maintenance of storage tank is important to avoid alga grow which can affect the water quality. In addition, maintenance personnel need to make sure each water pipes and valve maintained as scheduled to avoid rusty pipe system and defective water supply system to ensure good flow of water supply (Hall and Greeno, 2009).

iii) Defective Fire Fighting System

Defective fire fighting system normally happened when the firefighting equipment are not maintained or inspected properly as scheduled. Thus, routine checking and inspection is needed since it can endanger the residents when the equipment doesn't perform its function in emergency situations. All components that function to resist and contain the spread of fire such as automatic fire sprinklers, smoke vents, smoke detectors, fire extinguishers, alarms, and emergency door should be regularly inspected (Wood, 2009).

iv) Defective Sanitary Sewerage System

One of the common defects in sanitary sewerage systems is blocked waste pipes. According to the National Building Agency (1969), blocked waste pipes means the waste water does not flow away. The main cause of waste pipes block is due to the waste that bowed or distorted in the pipes. On the other hand, leakage is also one of the general defects in sanitary systems. Leakage on waste pipes occurs when chemical waters used to clean floor, paint strippers was poured away and attacked the inside of the trap. These chemicals will remain for long period in the trap and may slowly cause leakages. Thus, routine checking and inspection is needed.

v) Ineffectual Drainage System

Sanitary problems can be seen from an inspection chamber or manhole. Drains become blocked as a result of deliberate or accidental misuse of sanitary appliances. However the main problems of blocked drainages are due to rubbish or wastages blocks in the middle of the pipes. Thus, all the access points in the drainage system should be inspected and cleaned regularly. In addition, it is necessary to pump out and remove sludge at regular intervals and daily checking of septic tanks. Manhole cover should also be inspected regularly to identify any damages and replace the broken covers which may cause danger to the residents (Miles and Syagga, 1987).

vi) Blocked or Leaking Gutter or Pipes

Gutter blocks normally occur when the gutter is old and become perforated or when the joints are no longer effective. Pipe leakages happen when fungus or small plants grow on the joint and damage the interval sections of pipes. Pipe clog occurs when pipes are blocked by general rubbish or when the small plants growth entering through the joints. These problems may continue to appear and make a worse situation when less maintenance have been conducted to the piping systems (National Building Agency, 1969).

vii) Defective Rainwater Goods

According to Ghafar (2004), the problems associated with defective rainwater goods include sagging or missing eaves, gutters, corroded or broken downpipes and leaking rainwater heads. Undersized gutters or downpipes causes an overflow of water during heavy rain. Further, inappropriate disposals of water at ground level are also one of the causes included under defective rainwater goods. This problem may due to inadequate or lack of proper wall fixings, displaced of pipes through impact by vehicle or heavy articles causing instability to the downpipes, leaks at its joints and neglected routine maintenance.

viii) Refuse Disposal Services

Refuse disposal services, are services which includes the collection, treatment, and disposal of the solid wastes of a community. A garbage disposal, food waste disposal, waste disposal unit, and etc are examples of refuse disposal services. Unscheduled or ineffective refuse disposal services are common problem faced by community. Inadequate waste disposal can cause environmental pollution, health problems and diseases to the community. Thus, proper and well managed refused disposal services are required to prevent all the problems (DACEL, 1999).

ix) Cleaning Services

Cleaning services should cover all common areas of a building such as car parks, guard house, sewerage plant, corridors, staircases, refuse areas and so on. The scope of work is to ensure provide excellent quality of cleaning services. Examples are sweeping and mopping common areas, clean drainages each day to ensure free flow of water, cleaning windows, public halls and clean rubbish bins are also require. The main complaints receive from residents is that, cleaning service is not provided in higher floors. Thus, maintenance personnel need ensure cleaning services are provided as scheduled covering all the areas of a building (McKenna *et al.*, 2000).

■3.0 CHALLENGES FACED BY MAINTENANCE ORGANIZATION THAT CAUSES BUILDING SERVICES MAINTENANCE PROBLEMS

Although several professional bodies, acts and procedures have been established, yet buildings are still subject to various BSM problems. Studies conducted by previous researches lead to identify the causes of BSM problems. They are namely; poor management of maintenance organization (Kondo, Hatakeyama and Isobata, 1990; Chew, 1994), design deficiencies (Chew and De Silva, 2003; Chew *et al.*, 2004; and Silva and Ranasinghe, 2010), poor construction quality (Mills *et al.*, 2009; Dunston and Williamson, 1999), improper materials selection (Chew, Wong and Kang, 1999 and Chew, 2000), external factors such as age of

the building, climate conditions, vandalism and etc (Richardson, 1991; Olubodun, 1996). Although there are several factors which can cause buildings to develop defects, yet through proper maintenance, management planning and services it is believed that the building services problems could be avoided (Pierce and Dunham, 2010; Wood, 2003; Al-khatam, 2003 and Porteous, 1992).

Atkinson (2003) found that managerial errors accounted for more than 82% of overall errors committed on BSM problems. In addition, Atkinson (2003) also stressed that managerial errors have hidden or latent characteristics, suggesting that these errors are not visible at the construction stage and might have huge impact on the building services defects. Josephson and Hammarlund (1999) exhibited the chain effects of building defect, highlighting the importance of process control, management, knowledge, and the integration of existing knowledge to stop the chain reactions that would result in building services related defects. Further, Andi and Minato (2003) identified that inadequate information, unawareness, wrong assumptions, and lack of knowledge, along with other organizational and motivational factors, as the factors contributes to the defects of the building services. Therefore, it is clear that, inadequate maintenance performance by the BSM organization is one of the significant factors that contribute to ever increasing BSM problems.

Thus, for the purpose of this study, the following section highlights and discusses the causes of BSM problems due to various challenges faced by the BSM organization. Among the challenges faced by maintenance organization are such as unclear goal and objective of the organization, untrained maintenance staffs, limited number of staffs, lack of expertise, improper maintenance planning, inappropriate communication between building professionals and users, limited resources applied for building maintenance, insufficient of BSM period, lack monitoring, avoiding implementation of new technology and difficulties in implementing quality and standard required. The challenges were discussed in detail in the subsections below. These challenges are the factors which cause poor performance of building maintenance organization and consequently lead to various BSM problems facing by the building industries.

1) Unclear Goals and Objective

According to Brown (1996), an organization that failed to identify their organizations goals and objectives will fail to perform well and satisfy their clients. Thus, if the building maintenance organizations have a stake in seeing their effort continue to bear fruit, they have to decide the organization goals and objectives. The goals should aims directly to enhancing the building services function and improving the management components of the maintenance organization. Management components refer to all the sufficient staff training, proper scheduling, effective budget and proper recoding.

2) Lack of Trained Maintenance personnel

According to Cripps, Armstrong and Bampton (1984), among the causes of BSM failures are, due to lack of trained maintenance personnel. Most of the time, incorrect usage of materials, wrong jointing of material, lack of proper site supervision and poor craftsmanship are among the BSM problems occurs due to lack of training as well as maintenance task provided by the untrained maintenance personnel. Cripps *et al.* (1984) explain that, building maintenance personnel should be well trained, has experience and suitably qualified to ensure the building and its services are kept in a reasonable standard and quality. Further, Telang (2010)

stressed that maintenance personnel usually trained to deal with common and routine maintenance task. They do not given proper training to conduct special maintenance especially to deal with high technological equipment or services installed in the building. When there is a problem encountered by the special building services or equipment, this untrained maintenance personnel could not diagnose the problem on time (Telang, 2010). Eventually this situation will delay the maintenance process and increase the criticality of the problems and even some time it could result in building services failure. Therefore, trained and expertise staff in handling special kind building equipment is necessary.

3) Limited Number of Employees or Staffs

According to Cripps *et al.* (1984), inadequate number of employees or staffs in an organization or operation may decrease the productivity of an organization and lead to failure. Thus adequate number of employees, staffs or workforces is important for an organization for continually provide effective performance. Inadequate number of maintenance personnel or technicians in an organization can delay the work or operations that should complete on time. Consequently it will cause an increase in the criticality of the problems or defects and finally lead to increase in the cost of maintenance.

4) Improper Planning or Scheduling

An organization that failed to plan is always plan to fail. According to Pierce and Dunham (1990), an organization mission should be combined with the strategic planning of the organization in order to provide effective services. The effort of top manger to design the organization to position it with external environment is known as strategic planning. Thus, organizational strategic plans always outline an organization's long-term vision, objectives and operational strategies. As most of the vision and objective of building maintenance organization is to provide effective services, a proper planning and scheduling of an organization able to minimize the building services defects and lead to efficient performance of building.

5) Lack Communication

Cripps *et al.* (1984) has stated that, BSM can contribute to failure when there are lack of communication between the client, contractors and management. A building services manager should have proper communication and teamwork within the organization and with the residents. By having proper communication between clients a building maintenance manager can identify the problems faced by the residents and solves the problems on time. In addition, maintenance manager also should have good relationship and communication with his staffs, technicians and contractors to ensure they produce excellent services to the residents.

6) Limited Resources to Applied in Building Services Maintenance

According to Brown (1996), financial fund is the nuts and bolts of a maintenance program. Most maintenance program failure due to lack of maintenance funding. Lack of fund in an organization will prevent maintenance task to be conducted on time and as required. Consequently, it will result in malfunction of the services within the building and interrupt the regular activity of building users.

7) Insufficient Building Services Maintenance Period

According to Wood (2003) BSM problems arises, when the building management team fails to diagnosis the defect or breakdowns on time. Failure could almost certainly be avoided if all components replaced immediately after its defect or fault identified. This is because delay in diagnosing the failure of components can eventually result in breakdown of the overall system of building services. According to Riggs (1987), practicing work on time can reduce costs by stressing the elimination of waste, without rejects, delays, queues, idleness and useless motion.

8) Less Monitoring Works Conducted by The Parties Involved in The Management

The performance and satisfaction of individuals or team members needs to be measured and implemented so that the plan will help enhance the work environment of the workers. Less monitoring by the management will decrease the productivity level, the performance and quality of works provided by the employees. Thus, monitoring staffs performance known as an assessment which could help employees to get motivated and performed well with satisfied quality and standard (Fisher, 2009).

9) Lack of Implementation of New Technologies or Processes

The need of implementing new technologies in a management organization also seemed to be very important. Thus, management organization must continually educate, apply and deliver upgraded maintenance process to ensure they meet the demands of clients immediately in latest technology environment. Lack of implementations of new technologies will decrease the performance level of maintenance process.

10) Difficulties in Implementing Quality and Standard Required

BSM problems also occur when building management organization find difficulties in implementing quality and standard required by a building. Standard could be used in relation to a repetitive way of doing things. It is also can be defined as a minimum level of performance to be achieved. Standards are developed for an organization to follow all the relations and guidelines in order to achieve best performance (Wood, 2009). Thus, if an organization fails to implement quality services and standards as required, than the building is more prone to incur defects.

4.0 THE CRITICAL SUCCESS FACTORS (CSF)

According to Morrison (2009), CSF is the factors required for ensuring the success of a business. This term was initially used in the world of data analysis, and business analysis. Rockart (1979) define CSF as the limited number of areas, if they are satisfactory, they will ensure successful competitive performance for the organization. In order to identify CSF for building services maintenance organization, a vast numbers of literatures that contained CSF have been reviewed. The frequency of each of the CSF used by the organization was also reviewed. These CSF were then compared with the causes of building services maintenance problems due to poor performance provided by the BSM organization in order to identify the CSF for BSM organization.

System organization and services organization CSF only obtained in order to identify and analyze the CSF for BSM. This is because, according to the Business Dictionary, system organization involve in as set of detailed method, procedure or routine specific activity to solve a problem, whereas management organization is an organization that deal with or controlling people or things. Subsequent to analyses made on the CSF, the author has identified 14 main CSF for BSM organization. This CSF is identified to solve BSM problems in low cost flats. As the CSF were identified using different sources, it is necessary to verify the CSF through established methodology such as interviews or questionnaire survey. Many researches (Ab Wahid, 2010; Naim, 2012; Finney and Corbett, 2007; Chin, Chan, & Lam, 2008; Chin & Choi, 2003) has use this approach to identify and verify their CSF findings. Thus, the CSF for BSM organization are identified through literature review are discussed in detailed in the following section.

1) Clear Goals and Objectives

Determining clear goals and objectives of an organization is imperative in order to win support of all the organization members and perform the best to the clients (Turner, 2004; White and Fortune, 2002; Somers and Nelson, 2001).

2) Top Management Support

Cancellations or failure in a system or operation occur when senior management delegates progress monitoring and decisions at critical junctures of the systems. Thus it the success of an organization often been linked to the presence of top management, who performs the functions of leadership, facilitation, and marketing the projects (Turner, 2004; Turner, 1999; Somers and Nelson, 2001; White and Fortune, 2002).

3) Management Planning

Management planning is important for an organization performed in an organized and scheduled way. It is known that, organization that failed to plan always plan to fail. This quotation shows how important is planning for an organization success (Yeo, 2002).

4) Dedicated Resources

It is a critical mass of resources necessary for an organization to perform at an optimal level. When resources fall below critical mass level, performance of the organization will declines and quality will decreases as well. The level of resources can be thought of as an indicator of the health of an organization (Turner, 2004; Somers and Nelson, 2001; Turner, 1999).

5) Workforce Development Training and Education

The role of training and education to facilitate an organizational success seems to be a very crucial factor. Thus, workforces have to be educated and trained on a continuous basis to meet the changing needs of technologies, operations and management (White and Fortune, 2002; Somers and Nelson, 2001).

6) Education on New/ Proven Technologies or Processes

The need of implementing new technologies in management organization is very important. Thus, management organization must continually educate, apply and deliver upgraded maintenance process to ensure they meet the demands of clients immediately (Yeo, 2002).

7) Effective Monitoring and Feedback

Effective monitoring and feedback from the team leader is important which may lead to the success of a project. Other than that it will also ensure the staff used correct tools and implementation to complete a task. Monitoring is seen as an obligation imposed for staff mechanically to complete their tasks (White and Fortune, 2002; Turner, 2004).

8) Project Team Competence

Project team competence related to the knowledge, skills, abilities, and experience of the project manager as well as selection of the right team members. Success of a management team also depends on project team competence (Turner, 2004).

9) Good interdepartmental communication

It is imperative for interdepartmental to communicate their goals and long-term perspectives in order to win support of all members of the organization and ensure all the works to be done as required (Somers and Nelson, 2001; Turner, 1999).

10) Interdepartmental Cooperation

Interdepartmental cooperation is a culture that emphasizes the value of sharing common goals over individual pursuits and the value of trust between staffs, organizations, employees, managers and corporations (Somers and Nelson, 2001).

11) Effective Management of Risk

An organization should have knowledge on how to avoid risk by having effective management of risk. This will afford the organization to overcome any problems that may face during conducting a task either before or after the particular problem exist (White and Fortune, 2002).

12) Taking Account of External Influences

An organization should take into account external influences such as environmental and social influences to successes of a process (White and Fortune, 2002).

13) Taking Account of Past Experience

An organization should take into account their past experience, discuss with their organization regarding the negative and positive impact of project experiences that they had faced before. This will increase knowledge for the new team members. Past experience can educate and teach on how to conduct new project with successful. All the experience gained can be used to avoid similar problems in future projects (White and Fortune, 2002).

14) Clients Expectations

An organization management or system will be unsuccessful if failed to meet a clients, customers or residents expectations. Careful deliberation of success measurement as well as management of expectations by the implementation manager of maintenance services are important factors (Marion, 1999).

5.0 SCOPE OF THE RESEARCH

Like in other studies, this particular study has its own limitations. First of all, this study will be carried out particularly to provide the building maintenance organization a way to successfully provide BSM service through focusing on the critical success factors. Thus, the result might only be generalizable to the building maintenance organization. Further, the research selects a low cost flat which is Flat Seri Johor, Cheras as the case study. It is located in DBKL housing area at Taman Ikan Emas, Cheras, Kuala Lumpur and managed by KLCH under the divisions of Maintenance in department of property management. A low cost flat managed by government was selected as case study as many BSM problems were reported in governmental low cost flats. In addition, it is easy to obtain data on BSM problems in low cost flats and the challenges facing by the government maintenance organization compared to the private organization. Thus, due to time constraints and flexibility on collecting the required data, the researcher has selected the governmental low cost flat.

6.0 METHODOLOGY

Proper planning and development of research methodology is important to achieve objectives of the research. The research methodologies used for this research are designed to achieve the objectives of the research. There are two objective of the research; 1) To identify building services maintenance problems and the causes of the problems in low cost flat. 2) To identify the Critical Success Factor's (CSF) to solve the building services maintenance problems in low cost flat. To achieve the stated objectives, this research will be carried out using the following methodologies:-

6.1 Literature Review

The purpose of reviewing related literature was to identify gaps in CSF researches for the building maintenance organization. In this research study, the challenges faced by the building maintenance organization to provide excellent BSM were reviewed and a list of challenges was compiled. Before compiled the challenges facing by the maintenance organization, the BSM problems were identified. The BSM problems are the needle that will lead to identify the challenges faced by the maintenance organization. Additionally, a vast amount of articles related to success factors regardless of the types of industry and level of implementation was carefully reviewed. The analysis of all the articles results in the identification of the significant gap and the methods used by the researchers in identifying the CSF. The gap was the absence of the CSF study for the maintenance organization. Since, there was lack of articles directly related to CSF for maintenance organization; literature search was done again to identify articles that contain the elements of success factors of organization. The final list of CSF at this phase was the careful integration between the challenges faced by the maintenance organization of the selected case study.

6.2 Questionnaire Survey

Questionnaire survey was conducted to validate the building services maintenance problems and the challenges facing by the maintenance organization. The questionnaire comprise of 3 session namely section 1 regarding background of the respondents, section 2 on BSM problems and section 3 about the maintenance organization challenges that causes BSM problems. Section B and C contains likert scale question for the

respondents to circle the agreeing rank for all BSM problems and challenges cause the problems listed. The ranking scales used to give their answer are as shown in Table 1 and Table 2. The source of data collection for questionnaire survey distribution is the residents of Flat Seri Johor.

Table 1 Ranking Scale used for Section B

1	Most Frequent
2	Frequent
3	Neutral
4	Less Frequent
5	Least Frequent

Table 2 Ranking Scale used for Section C

1	Strongly Agree
2	Agree
3	Neutral
4	Disagree
5	Strongly Disagree

In rational of this study, random sampling was used to select samples for data collection process through qualitative method. According to Alias (1999) a reasonable sample used for research are in between 30. Thus, for the questionnaire survey distribution 90 respondents were choose randomly in order to achieve the research objective. In order to analyses the data using quantitative method, the Statistical Package for the Social Science (SPSS) was used. Frequency, descriptive and qualitative the analysis used in order to analyze data collected through questionnaire distribution.

6.3 Interviews

The interview sessions were conducted to validate the CSF of maintenance organization identified through literature review. In addition the interviewee was also asked to rank the CSF in order to find and list the significant CSF. The interview questions are consists of three sections namely Section A regarding the background of the interviewee, Section B on BSM problems and the challenges cause BSM problems and Section C about CSF for BSM. Interview sessions were conducted among the BSM managers and staffs of four different Local Authorities. Purposive sampling was used to select samples for data collection through interview. Purposive sampling is a group of sample selected specifically because they have the knowledge or experience in the related issue discussed. According to De Paulo (2000), number of sampling for qualitative research are not important as long it is big enough to hear most of the perception that might be important for the research. Hence, 24 interviewees from four different Local Authorities choose as respondents for interview session. To analyze the result obtain through interview sessions, contents analysis and descriptive analysis were used.

7.0 RESULTS AND DISCUSSION

The results and discussion are divided into two parts, which are questionnaire survey and interview sessions. First of all, the results obtained through questionnaire survey will be discussed. It analyses the respondents response on the BSM problems occur in Flat Seri Johor, in order to achieve the first objective of this research. The respondents are requested to give their opinion based on the rank given. The data obtained was analyzed using

the frequency analysis and descriptive analysis. The charts below shows results on the ranking of BSM problems and the causes of the problems obtained from the residents of Flat Seri Johor.

Figure 1 illustrates on ranking of BSM problems as listed by the respondents of the research. According to the respondents, refuse disposal services problem was the most frequent occur BSM problems in Flat Seri Johor, followed by rain water disposal system problems, fire protection system problems, drainage system problems, sanitary sewerage system problems, plumbing system problems, cleaning services problems, street lighting problems and also water supply system and water quality problems. Finally the least frequent problem faced by the respondents is the problems related to electrical defects.

Figure 2 depicts the ranking on challenges faced by the maintenance organization which cause various BSM problems. From the respondent's opinion, limited number of staffs in an organization is the main cause of BSM problems followed by lack of trained maintenance personnel, insufficient BSM period, poor monitoring, improper planning and scheduling, lack communication, unclear goals and objectives and finally the difficulties in implementing qualities and standard required. In conclusion, limited numbers of staffs and lack trained maintenance personnel are the most significant challenges faced by maintenance organization. Whereas, the difficulties in implementing qualities and standard required is identified as the least significant cause of maintenance problems faced by the residents of Flat Seri Johor.

7.1 Results and Discussion of the Interview Sessions

In this section, the results obtained through interview sessions will be discussed. Interview session is conducted in order to achieve the first objective as well as second objective of this research. In order to analyze the qualitative data gained through interview session, content analysis is applied. In addition, descriptive analysis was also used to analyze and rank the CSF. The tables below shows the ranking results of BSM problems, the challenges faced by maintenance organization which cause BSM problems and the top 10 CSF.

The results obtained through questionnaire survey were illustrated in Table 3. It analyses on the significant BSM problems in low cost flats. This is as refers to the response given by the residents of the low cost flats. The respondents are requested to give their opinion based on the rank given. The data obtained was analyzed using frequency analysis. Based on Table 3, it can be concluded that plumbing system is the most occurred complaints regarding BSM problems in the low cost flats managed by the four Local Authorities, followed by sanitary sewerage system problems, cleaning services problems, drainage system problems and water supply system problems. The least complaints were registered on electrical defect related problems.

Table 3 Ranking of building services maintenance problems

Building Services Maintenance Problems	Frequency	Rank
Plumbing System	79%	1
Sanitary Sewerage System	54%	2
Cleaning Services	46%	3
Drainage System	42%	4
Water Supply	33%	5
Electrical Defects	29%	6

As refer to the Table 4, the limited number of staffs is the major challenge lead to BSM problems. Lack of trained maintenance personnel, insufficient BSM period, poor monitoring, improper planning and scheduling, lack communication, and unclear goals and objectives are followed respectively in the rank. Finally, difficulties in implementing required standard and qualities are considered to be the last factor in the rank.

The critical success factors (CSF) obtained through various view on literature were also ranked by the interviewee. Table 5.0 demonstrates top 10 CSF which obtained through experience and opinion given by the interviewee. Workforce development training and education is identified as most crucial CSF followed by clear goals and objective, effective monitoring and feedback, project team competence, dedicated resources, management planning, taking account past experience, interdepartmental communication, education of new technologies and client expectations respectively.

Table 4 Ranking of the challenges faced by maintenance organization which cause building services maintenance problems

Challenges faced by Maintenance organization which Cause BSM Problems	Frequency	Rank
Limited Numbers of Staffs	54%	1
Lack of Trained Maintenance Personnel	42%	2
Insufficient BSM period	33%	3
Poor Monitoring	29%	4
Improper Planning or Scheduling	25%	5
Lack Communication	21%	6
Unclear Goals and Objectives	21%	6
Difficulties in Implmenting Quality & Standars required	18%	7

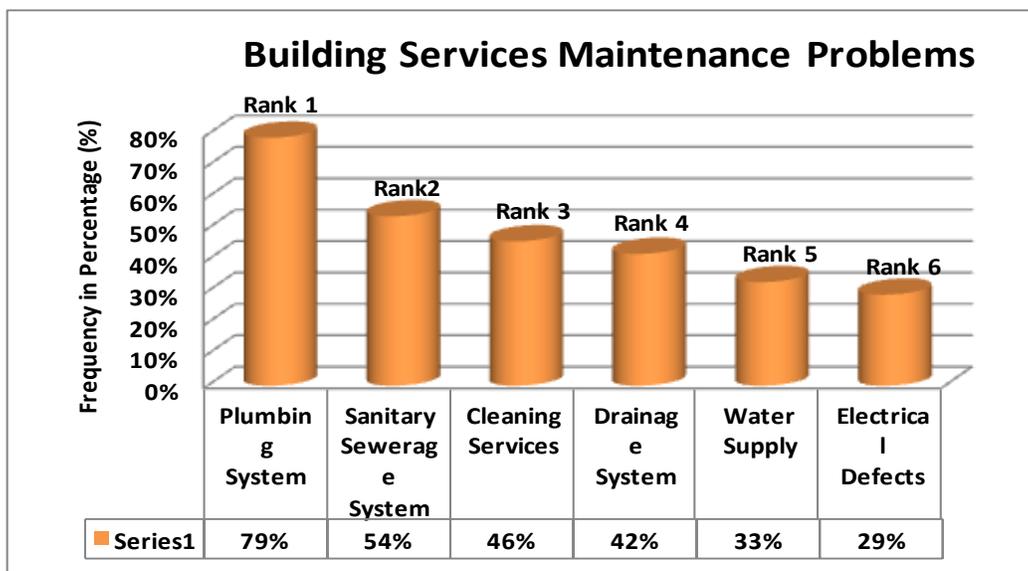


Figure 1 The ranking on building services maintenance

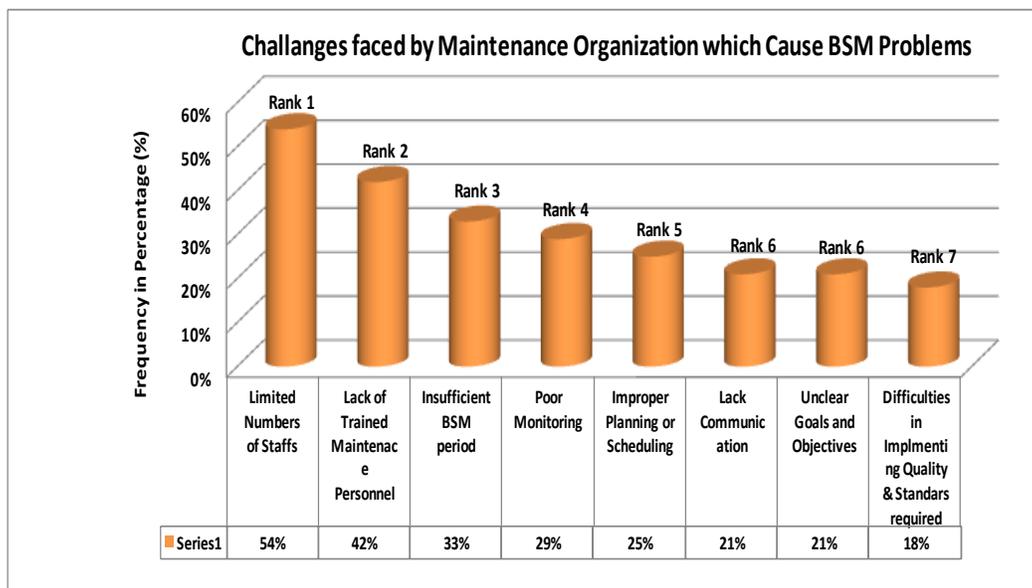


Figure 2 The ranking on challenges faced by maintenance organization which causes BSM problems

Table 5 Overall ranking of the CSF for building maintenance organization

Critical Success Factor	Rank
Workforce Development Training & Education	1
Clear Goals and Objectives	2
Effective Monitoring and Feedback	3
Project Team Competence	4
Dedicated Resources	5
Management Planning	6
Taking account of past experience	7
Good Interdepartmental Communication	8
Education of New Technologies	9
Clients Expectations	10

8.0 CONCLUSION

Generally, it can be concluded that respondents from Flat Seri Johor mostly agreed that refuse disposal system is the most frequently occurred problem. However, in interview session between the managers and staffs, plumbing system problem had been categorized as the frequently occurred problem. However, both of the respondents had agreed that electrical defects are the least occurred building services maintenance problem. There are different opinion obtained from residents and the building services maintenance staffs regarding the building services maintenance problems. It can be concluded that some problems faced by the resident did not reach the management view properly or is not aware by the management. Hence, the building service maintenance organizations have to undertake their routine maintenance and inspection in order to identify the problems faced by the residents in low cost flats.

For the analysis on causes of the problems, the first respondents whom are the residents of Flat Seri Johor choose lack of expertise as the main cause, whereas the interviewees chose limited number of staffs as the main cause of the problems. The maintenance organization would know better regarding the causes of the problems compare to the residents. However the opinion of the resident could not be neglected as well because they might personally experience the causes. Thus, building services maintenance organization has to consider the opinion of the residents as well and upgrade their services in future.

It is agreeable that building services maintenance problems did not occur only because of human error but it also caused by the system error as well. However, the system error in building services maintenance could be minimized if the maintenance staffs do their routine inspection and maintenance. Thus, it is crucial for the building services maintenance organization to implement the top 10 CSF's identified through the research in order to achieve their organization goals and to provide best services for the residents of low cost flats. In addition, building services maintenance organization that maintaining services of other types of building also could implement the CSF's identified through the research.

Acknowledgements

The authors would like to express their sincere appreciation to Universiti Teknologi Malaysia.

References

- [1] Ab Wahid, R. 2010. *Beyond Certification: The Maintenance of Iso 9000 in Malaysian Service Organisations*.
- [2] Alias, B. 1999. *Statistik Penyelidikan dalam Pendidikan dan Sains Sosial*. Bangi: Penerbit Universiti Kebangsaan Malaysia.
- [3] Al-Khatam, J. A. 2003. *Buildings Maintenance Cost. Master of Engineering Report (CEM-600)*. College of Environmental Design, Construction Engineering and Management, King Fahd University of Petroleum & Minerals.
- [3] Andi, and Minato, T. 2003. Representing Casual Mechanism of Defective Designs: A System Approach Considering Human Errors. *Constr. Manage. Econom.* 213: 297–305.
- [5] Atkinson, A. R. 2003. The Pathology of Building Defects; A Human Error Approach. *Eng. Constr., Archit. Manage.* 91: 53–61.
- [6] Beddington, N. 1984. *Managing Building Maintenance-The Present Position and Look Ahead*. The Chartered Institute of Building Englemere.
- [7] Bingi, Sharma, and Godla. 1999. Critical Issues Affecting An ERP Implementation. *Information Systems Management*.
- [8] Brown, D. W. 1996. *Facility Maintenance-The Manager's Practical Guide and Hanbook*. Published by American Management Association (AMACOM).
- [9] Carole Simm. 2010. *Definition of Low-Cost Housing*. eHow Contributor.
- [10] Cripps, D. J., Armstrong, R. W., and Bampton, E. 1984. *Managing Building Maintenance*. The Chartered Institute of Building, Englemere, Kings Ride, Ascot Berkshire.
- [11] Chew, M. Y. L., Tan, S. S. and Kang, K. H. 2004. Building Maintainability—Review of State of the Art. *Journal of Architectural Engineering*. 10(3): 80–87.
- [12] Chew, M. Y. L. and De Silva, N. 2003. Benchmarks to Minimize Water Leakages in Basements. *Structural Survey*. 21(4): 131–45.
- [13] Chew, M. Y. L. 2000. Joint sealant for Wall Cladding. *Polymer Testing*. 19(6): 643–653.
- [14] Chew, M. Y. L., Wong, C. W. and Kang, L. H. 1999. *Building Facades—A Guide to Common Defects in Tropical Climates*. Singapore: World Scientific Publishing.
- [15] Chew, M. Y. L. 1994. *Efficient Maintenance: Overcoming Building Defects and Ensuring Durability*. Conference on Building Safety. The Asia Business Forum, Kuala Lumpur.
- [16] Chin, K. S., & Choi, T. W. 2003. Construction in Hong Kong: Success Factors for ISO 9000 Implementation. *Journal of Construction Engineering and Management*. 129: 599–599.
- [17] Chin, K. S., Chan, B. L., & Lam, P. K. 2008. Identifying and Prioritizing Critical Success Factors for Cooperation Strategy. *Industrial Management & Data Systems*. 108(4): 437–454.
- [18] DACEL. 1999. Study to Investigate the Need for Additional Hazardous Waste Facilities for Gauteng Province.
- [19] De Paulo, P. 2000. *Sample Size for Qualitative Research*, Article ID: 20001202. Copyright 1986-2007 Quirk Enterprises, Inc.
- [20] Dunston, P. S. and Williamson, C. E. 1999. Incorporating Maintainability in Constructability Review Process. *Journal of Management in Engineering*. 15(5): 56–60.
- [21] Finney, S., & Corbett, M. 2007. Erp Implementation: A Compilation and Analysis of Critical Success Factors. *Business Process Management Journal*. 13(3): 329–347.
- [22] Fisher, A. 2009. *Performance, Motivation and Satisfaction*. University of Phoenix—April 27, 2009.
- [23] Ghafar. 2004. *Understanding Common Building Defects-The Dilapidation Survey Report*. Article Published In "Majalah Akitek". Universiti Sains Malaysia, Penang. 16 (1).
- [24] Foster, J. 2010. *Benefits of Critical Success Factor (CSF)*. Available from [http://www.suite101.com/profile.cfm/jinnenefoster]. Accessed: 30 September 2013.
- [25] Hall, F. and Greeno, R. 2009. *Building Services Handbook—Incorporating Current Building and Construction Regulations*. Published by Elsevier Limited.
- [26] Josephson, P. E., and Hammarlund, Y. 1999. The Causes and Costs of Defects in Construction: A Study of Seven Building Projects. *Autom. Constr.* 8: 681–687.

- [27] Kondo, T., Hatakeyama, S., Isobata, O. 1990. *Simplified Inspection Method for Long Term Maintenance of Existing Buildings*. Building Maintenance & Modernisation Worldwide. 2: 650–8.
- [28] Lal, A. K. 2003. *Hand Book of Low Cost Housing*. New age International (P) limited Publisher.
- [29] Lam, K. C. 2000. *Management of Building Services Procurement for Highly Serviced Healthcare Facilities*. Department of Building Services Engineering, Faculty of Construction and Land Use, The Hong Kong Polytechnic University.
- [30] Lancaster & Associates. 2007. *Critical Success Factors, For the North Carolina Community College System*, Eighteenth Annual Report. Published by North Carolina Community College.
- [31] Marion, L. 1999. *Snap, Crackle, Pop—and Crash—Go the Income Statements*. Datamation. Available from: [www.datamation.com/entap/02exp1.html, 1/5/2000]. Accessed: 15 September 2013.
- [32] McKenna, S., Jabri, S., Duric, Z., Rosenfeld, A. and Wechsler, H. 2000. Tracking Groups of People, Comp. *Vis and Image Understanding*. 80: 42–56.
- [33] Miles, D. & Syagga, P. 1987. *Building Maintenance, A Management Manual*. Published by Intermediate Technology Publications Ltd.
- [34] Mills, A., Love P. E. D. and Williams, P. 2009. Defect Costs in Residential Construction. *Journal of Construction Engineering and Management*. 135(1): 12–16.
- [35] Morrison, M. 2009. *The BIR—The Diamonds and the Term* (RapidBI).
- [36] Naim, A. 2012. A Structured Critical Success Factors Model for Implementing Project Quality Management System in Construction. A Thesis Submitted in partial fulfillment of the Requirements of University Technology of Malaysia for the degree of Doctor of Philosophy. University Technology Malaysia (UTM), Malaysia.
- [37] National Building Agency (NBA). 1969. *Metric House Shells*. NBA, London. Read More: [http://ascelibrary.org/doi/full/10.1061/\(ASCE\)AE.1943-5568.0000077](http://ascelibrary.org/doi/full/10.1061/(ASCE)AE.1943-5568.0000077).
- [38] Olubodun, O. F. 1996. *An Empirical Approach to the Evaluation of Factors in Local Authority Housing Maintenance Requirements*. A Thesis Submitted in partial fulfillment of the Requirements of University of Salford for the degree of Doctor of Philosophy. University of Salford, City of Manchester, Salford, U.K.
- [39] Our News Home (Berita Rumah Kita). 2001. March-April. Operations Room of Housing Management Department, Kuala Lumpur City Hall, (Bilik Gerakan Jabatan Pengurusan Perumahan, DBKL).
- [40] Pierce, J. L., and Dunham, R. B. 1990. *Managing*. Published by Glenview III: Scott Foresman.
- [41] Pinto, J. and Slevin, D. 1987. Critical Factors in Successful Project Implementation. IEEE Transactionson Engineering Management. *Project Management Journal*.
- [42] Porteous, W. A. 1992. *Classifying Building Failure by Cause*. Unpublished PhD thesis, Victoria University of Wellington.
- [43] Riggs. 1987. *Production Systems*. 4th edition. Published by Wiley, New York.
- [44] Richardson, B. A. 1991. *Defects and Deterioration in Buildings*. E&FN Spon, London.
- [45] Rockart, J. F. 1979. Chief Executive defines their Own Data Needs. *Harvard Business Review*. March–April.
- [46] Silva, N. and Ranasinghe, M. 2010. Maintainability Risks of Condominiums in Sri Lanka. *Journal of Financial Management of Property and Construction*. 15(1): 41–60.
- [47] Simm, C. 2010. Definition of Low Cost Housing. Available from: [http://www.ehow.com/facts_7383111_definition-low_cost-housing.html]. Accessed: 27 July 2013.
- [48] Somers, T. M., and Nelson, K. 2001. The Impact of Critical Success Factors across the Stages of Enterprise. Resource Planning Implementations. Proceedings of the 34th Hawaii International Conference on System Sciences.
- [49] Star Online News, on 7th June. 2009.
- [50] Telang, A. 2010. Comprehensive Maintenance Management. PHI Learning Private Limited, New Delhi.
- [51] Turner, J. R. 1999. Editorial: Project Management: A Profession based Knowledge or Faith. *International Journal of Project Management*. 17(6): 329–220.
- [52] Turner, J. R. 2004. Five Necessary Conditions for Project Success. *International Journal of Project Management*. 22(5): 349–350.
- [53] White, D. and J. Fortune. 2002. Current Practice in Project Management—An Empirical Study. *International Journal of Project Management*. 20: 1–11.
- [54] Wood, B. 2009. *Building Maintenance*. Wiley-Blackwell, A John Wiley & Sons Ltd Publications.
- [54] Wood, B. 2003. *Building Care*. Wiley-Blackwell, A John Wiley & Sons Ltd Publications.
- [56] Yeo, K. T. 2002. Critical Failure Factors in Information System Projects. *International Journal of Project Management*. 20(3): 241–6. Available from: [http://dx.doi.org/10.1016/S0263-7863(01)00075-8]. Accessed: 4 December 2013.