BUILDING USER MANUAL: A VITAL COMPONENT OF THE MALAYSIAN GREEN BUILDING INDEX

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Abstract: - The provision of decent and well-maintained buildings is one of the visions of developers and contractors in Malaysia. Most modern buildings and infrastructure contain new and innovative features that have been introduced into our built asset. Compared with national economic projections, this shows unexpected improvement, especially regarding issues of development and infrastructure. However, the high demand for new construction, including residential and multi-purpose buildings such as office buildings and government buildings, requires the government and the private sector to provide guidelines and procedures to ensure that the buildings will be economical in terms of life cycle costs. For this reason, a comprehensive approach is necessary for the management of the assets and facilities. The introduction of a Green Building Index, which implements an inclusive and holistic approach to building management, is a good idea and a concept that will be beneficial to Malaysian people. The development of the Building User Manual as one of the criteria that must be completed by developers, as in line with the requirement of Malaysian Green Building Index. This paper provides a systematic discussion of the various documents involved in developing the Building User Manual.

Key-Words: - asset management, building maintenance, building user manual, facility management, green building, handing over management, Malaysia, sustainable asset

1 Introduction

Buildings and infrastructure today are not as simple as they once were. There are many new innovative features that have been introduced into our built asset, from the building and structure design; until its building services (Che-Ani et al., 2010). With the Green Building Index (GBI) in place and carbon credit initiatives available, stakeholders will have more control in designing and managing their assets (Che-Ani et al., 2010). However, the most important thing in reaching high levels of achievement during the design and construction stage is the process of handing over management. The process will include full documentation of the building itself, which will be handed over to the client. As a part of the GBI requirements, in order to receive credit on the GBI score sheet, the Building User Manual is very important document and must be handed over to the client in a way to achieve the maximum performance and use of the building (GBI, 2010). The Building User Manual (BUM) is the formal documentation of a building itself and its components, including operation and maintenance of the building. This document comprises the Building Technical Specification, Building Maintenance and Management, the Building Manual for the occupants and all of the procedures related to the building. As important tools in the future, the Building User Manual represents an improvement in documentation process that is handed over to the client or future occupants. This paper discusses the proposed building user manual documentation in a Malaysian context in relation to the other document such as Total Asset Management and how it will benefit development, especially in Malaysia. At the end of this paper, is matrix shows the relationships between the Building User Manual and various sustainability practices in construction and maintenance stage.

2 The Importance of the Building User Manual

The Building User Manual is the most important aspect that of the development process by the consultant to ensure that the building will be operated efficiently, without any breakdowns due to technical problems that may arise during the occupancy period. The Building User Manual is like the *'birth certificate'* of the building. The reasons for having the Building User Manual are the following:

a) To achieve sustainable asset management:

Achieving sustainable asset management is one of the fundamentals that must be focused on. Sustainable asset management basically deals with the business process and the interaction between people and the system (information technology mechanism) (Che-Ani et al., 2010). In order to ensure that the business process is well implemented, having team members who do work at various levels is a necessity. It is not a one-man show, and we have to realize that one person cannot be responsible for everything (Baharuddin and Che-Ani, 2010; Che-Ani et al., 2010). As we are now living in the new millennium, information technology (IT) is a necessity in the business process (Kibert, 2008; Atkin and Brooks, 2009). Data need to be converted into information, and IT makes this process possible. Having the Building User Manual, along with the technical specifications of the building, will assist the client and future occupants in dealing with special characteristic that need to be considered. With regard to item EE 9 of the GBI Assessment criteria for Non Residential New Construction (NRNC), sustainable maintenance ensures that the building's energy system will continue to perform as intended beyond the 12 month Defects & Liability Period. This assessment criteria also enhances the post construction period, during which any project or development must have at least 50% of the permanent building maintenance team on board one (1) and three (3) months before practical completion, prepared to fully participate in the testing and commissioning sessions of all building energy services. In addition, it will be compulsory to provide a building maintenance office that is fully equipped with tools, instrumentation and inventory storage. The maintenance team should provide a documented plan for at least 3 years of facility maintenance and preventive maintenance, with a budget that includes staffing and outsourced contractors (GBI, 2010).

b) To ensure the comprehensive and strategic use of facilities and asset management for the organization:

The Building User Manual includes the procedure for compliance by responsible bodies and technical specifications from pre-construction until the completion of the project. In this way, all of the facilities and asset management documents are registered and kept as records, and all related documents, including operations and manuals for the mechanical, electrical, civil and structural aspects of the project will be detailed in this manual and available in both soft and hard copies. Regarding item SM 13 of GBI Assessment Criteria, the document offers the building user strategies for sustaining performance during occupancy period. The documents offer the building user strategies for sustaining performance during the occupancy period (GBI, 2010).

c) To enhance the process of handing over management:

There is presently no formal protocol for the preparation and handover of a building and its documentation. As a result, many buildings are not being properly handed over on practical completion. When this happens, 'it is likely that the building will be used inefficiently, leading to the dissatisfaction of its users and clients and wasted energy sources' (Wood, 2009). The Building User Manual encourages the handover to be seen as a process, with emphasis on information exchange, training, demonstration and fine tuning (Wood, 2009). With regards to the Building Research Establishment, Digest 474, Handover of Office Building Operations (HOBO), handing over management practices is the new instrument of the construction industry, and should be practiced and implemented between the contractor and consultant. This

practice includes documentation of all stages of construction (pre- construction, construction and post-construction) and is to be handed over to the future building user. Furthermore, training and consultation sessions will be given to the user to ensure the continuity of effective maintenance management (BRE, 2007; Graves and Jaggs, 2007).

d) To enhance the procedures for sustainable maintenance of the building:

By establishing the Maintenance Department for the first 3 years and providing a comprehensive maintenance plan, the Building User Manual aims to enhance the sustainable maintenance approach. In this way, the competent parties or maintenance professional are involved in a way that ensures that the building will operate according to its function with maximum performance. For GBI compliance, the maintenance team needs to be on board for at least 3 months before the issuance of the CCC/CFO (GBI, 2010).

3 Key Points and References for the Building User Manual

The main reference point for asset management in Malaysian industry is the Total Asset Management Manual (TAM), published by the Public Works Department (PWD). The Building Research Establishment Handover Protocol (HOBO) policy and other related documents are also available for this purpose. These documents were used as references in the development of the Building User Manual.

3.1 Dasar Penguruan Aset Kerajaan (DPAK)

The reference point for asset management in Malaysian industry is the TAM Manual. This manual is part of the DPAK (Dasar Pengurusan Aset Kerajaan) (DPAK, 2009). Recently released in April 2009 by the former Prime Minister Y.A.B. Dato' Seri Abdullah Hj. Ahmad Badawi (now Tun Abdullah Hj. Ahmad Badawi), this document provides key ideas and directions for the whole life cycle of our assets. The definition of assets does not refer merely to buildings. According to the manual, asset refers to movable assets (asset alih), fixed assets (asset tidak alih), live assets (asset hidup) and intellectual property (harta intelek) (DPAK, 2009). With such wide coverage of assets, the asset management team is no longer focused solely on buildings. It must be integrated to achieve the aspirations of the TAM Manual. The TAM model for infrastructure, building and special movable assets is given in Figure 1.

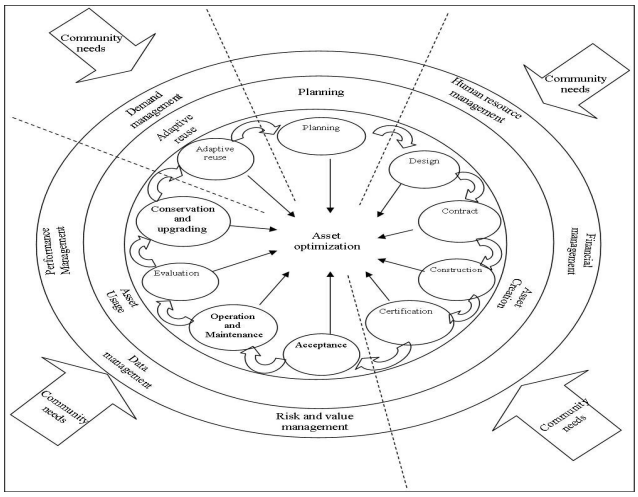

Figure 1: The TAM model for infrastructure, buildings and special movable assets (MPAM, 2009)

This DPAK document clearly shows that the government realizes the importance of properly managing and maintaining assets in each category. The document is organized in four sections: the policy document, the manual, the procedure and a document related to enhancing a sustainable approach to any development. A competent asset manager must ensure the asset will be registered by keeping records and data for future maintenance and development (MPAM, 2009). In relation to the building user manual, the compilation of all the data from the construction stage to the post construction stage will contribute to the systematic approach that has been introduced. By using this DPAK document in combination with the building user manual, all of the building information will be available to aid the building user in achieving an acceptable standard of building maintenance.

3.2 Manual Pengurusan Aset Menyeluruh (MPAM)

Total Asset Management (TAM) is an approach that has been used by the Superintendent Officer (S.O.) in applying the outline procedures in TAM to government and private agencies. Assets Management uses various disciplines and processes in order to ensure that the asset will achieve high performance, cost effectiveness, and risk control. Based on TAM principals, the *Inspection, Recording, Evaluate and Report* process is an efficient approach that ensures that the building stays in good condition, at an 'acceptable standard'. Total Asset Management requires optimum service in terms of maintenance to

the assets to ensure that the assets will be long lasting. In relation to the building user manual, the sustainable approach is important to the future occupants to ensure that the assets will be in good condition. The building user manual encourages the consultant and contractor to develop a maintenance plan and to compile all related information, including a list of equipments and emergency contact numbers.

3.3 Green Building Index (GBI)

The Green Building Index is an environmental rating system for buildings developed by PAM (Pertubuhan Arkitek Malaysia / Malaysian Institute of Architects) and ACEM (the Association of Consulting Engineers Malaysia). The Green Building Index is Malaysia's first comprehensive rating system for evaluating the environmental design and performance of Malaysian buildings. It is based on six (6) main criteria: Energy Efficiency, Indoor Environment Quality, Sustainable Site Planning & Management, Materials & Resources, Water Efficiency, and Innovation (GBI, 2010). The Green Building Index was developed specifically for the Malaysian tropical climate, environmental and developmental context, and cultural and social needs. The GBI initiative aims to assist the building industry in its progress towards sustainable development. The GBI environmental rating system is created to:

- 'Define green buildings by establishing a common language and standard of measurement;
- Promote integrated, whole-building design;
- Recognize and reward environmental leadership;
- Transform the built environment to reduce its environmental impact; and
- Ensure that new buildings remain relevant in the future and existing buildings are refurbished and upgraded properly to remain relevant'.

(GBI, 2010)

Green Building Index Pte. Ltd. (GSB) encourages all project team members, building owners, developers and other interested parties such as including contractors and government to use the Green Building Index to validate environmental initiatives during the design phase of new construction, at the beginning of building refurbishment projects or during the construction and procurement phases of building projects. Use of the Green Building Index is encouraged on all projects to assess and improve their environmental attributes.

3.4 Building Research Establishment-Handing Over Management (HOBO)

BRE's handover protocol, Handover of Office Building Operation (HOBO), is innovative because it encourages the handover to be seen as a process of many activities with emphasis on information exchange, training, demonstration and fine-tuning. The HOBO protocol encourages the appointment of a HOBO manager who understands the needs of the building's user and who has contractual responsibilities to collate, check and hand over documentation regarding building operations and coordinate training and demonstration sessions for the users. The HOBO manager will set up a rational, consistent and streamlined document management system from the outset of the project and will work alongside the planning supervisor, who will be responsible for ensuring that the health and safety file is produced. The HOBO manager can also coordinate a period of continuous commissioning in the first year of occupancy to allow the building to be fine-tuned.

It may not be economical to employ a specific HOBO manager for small projects, but it is still advisable to use the protocol to ensure control of documentation during the project. In this case, it is important that the tasks in the protocol that would be carried out by the HOBO manager are specifically assigned to others with an agreed timetable. All steps in the checklist should have a 'person(s) responsible' and a 'date due' assigned to them.

In relation to the Building User Manual, the handover protocol emphasizes a systematic approach to be implemented for any development. The building user manual is a part of the building document that should be handed over to the building user. The building user manual contains the data that will aid the building maintenance department managing and efficiently maintaining the building. Previously, in most of the buildings where this procedure was not practiced, the result was an inefficient approach that was not economic in terms of achieving a good life cycle cost (BRE, 2007). The implementation of HOBO practice will encourage better management in building maintenance and will also act as a record and database, especially regarding the specific characteristics of building components and features (BRE, 2007).

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3.5 Matrix of the Building User Manual (BUM) In Relation To Reference Documents

The building user manual is the document that comprises all the building information and features and is a very important document that should be handed over to the building owner. However, according to the study, the DPAK, MPAM, and HOBO documents play important roles in providing sustainable construction and maintenance for the building. Table 1 shows the matrix, and its scope of work for each document listed based on Table of Contents (TOC) in the Building user Manual.

Table 1 Matrix of Building User Manual

No	*TOC of Building User Manual*	*DPAK*	*MPAM*	*HOBO*	*GBI*
1	**SECTION 1 (INTRODUCTION)**				
	1.1 GENERAL				
	1.1.1 Purpose	**X**	**X**	**X**	**X**
	1.1.2 Scope	**X**	**X**	**X**	**X**
	1.1.3 Project Quality Objective				**X**
	1.1.4 Handing Over Management			**X**	
	1.2 MALAYSIAN TOTAL ASSET MANAGEMENT (PAM)				
	1.2.1 Dasar Pengurusan Aset Kerajaan (DPAK)	**X**			
	1.2.2 Manual Pengurusan Aset Menyeluruh (MPAM)		**X**		
	1.3 GOVERNMENT NEEDS STATEMENT	**X**	**X**		
	1.4 GOVERNMENT REQUIREMENTS		**X**		
2	**SECTION 2 (PROJECT INFORMATION)**				
	2.1 INTRODUCTION OF THE PROJECT (Project Name)				
	2.1.1 Site Background				**X**
	2.1.2 Site Characteristic				**X**
	2.1.3 Environmental Studies			**X**	**X**
	2.1.4 SWOT Analysis				**X**
	2.1.5 Site Proposal			**X**	**X**
	2.2 PROJECT INFORMATION / DESCRIPTION			**X**	**X**
	2.3 MAINTENANCE ORGANIZATION/ CONSULTANT				
	2.3.1 Maintenance Department Organization	**X**	**X**	**X**	**X**
	2.3.2 Scope of Work – Technician, Technical Assistant, PRA	**X**	**X**	**X**	**X**
	2.4 RULES, REGULATIONS AND STANDARDS				
	Akta Parit, Jalan dan Bangunan, UBBL		**X**	**X**	**X**
	2.5 LOCAL AUTHORITY DOCUMENTATION				
	2.5.1 Process of Plan Approval – From D.O – Complete			**X**	**X**
	2.5.2 Records of Plan Approval			**X**	**X**

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	2.6 BUILDING BACKGROUND / INFORMATION				
	2.6.1 Fire Safety Manual / Health & Safety			**X**	**X**
	2.6.2 Design Philosophy			**X**	**X**
	- Special Design Features				
	2.6.3 Drawing and Drawing Record		**X**	**X**	**X**
	-As Built Drawing- inclusive of soft copy				
	-Technical Specification-inclusive of softcopy				
	2.6.4 Construction Phase		**X**	**X**	**X**
	- Knowing the construction process				
	2.6.5 Change Management			**X**	
	2.6.6 Asset Register	**X**	**X**	**X**	**X**
	- Inclusive of Warranty & Guarantee Management–M&E				
3	**SECTION 3 (BUILDING OPERATION & COMMISIONING)**				
	3.1 INTRODUCTION OF BUILDING OPERATION AND MANUAL				
	3.2 OPERATION AND MANUAL				
	3.2.1 Description and Operation of Civil Works		**X**	**X**	**X**
	3.2.2 List / Contact person of Supplier & Manufacturer			**X**	**X**
	3.2.3 Structure of the building		**X**	**X**	**X**
	3.2.4 List / Contact person of Supplier & Manufacturer			**X**	**X**
	3.2.5 Operation of Mechanical System		**X**	**X**	**X**
	3.2.6 List / Contact person of Supplier & Manufacturer			**X**	**X**
	3.2.7 Operation of Electrical System		**X**	**X**	**X**
	3.2.8 List / Contact person of Supplier & Manufacturer			**X**	**X**
4	**SECTION 4 (BUILDING MAINTENANCE MANAGEMENT)**				
	4.1 INTRODUCTION OF BUILDING M'CE AND MANAGEMENT				
	4.1.1 Maintenance Schedule and Frequency	**X**	**X**	**X**	**X**
	4.1.2 Planned Preventive Maintenance (PPM)	**X**	**X**	**X**	**X**
	– Building-Daily, weekly, monthly, yearly				
	4.1.3 PPM for C&S - Daily, weekly, monthly, yearly	**X**	**X**	**X**	**X**
	4.1.4 PPM for M&E- Daily, weekly, monthly, yearly	**X**	**X**	**X**	**X**
5	**SECTION 5 (APPENDIX)**				

The following is a brief description of each section.

a. Section 1 (Introduction)
Section 1 comprises the basic functions of the project, including the project purpose, scope of the project, project quality objective and the process of handing over management. It also contains the Malaysia Total Asset Management document, the Government Needs Statement and the Government Requirement document.

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b. Section 2 (Project Information)
Section 2 contains additional project information, including background and characteristics of the project, information regarding the maintenance organization, all of the rules, regulations and standards that pertain to the project, any documentation necessary for local authorities, such as a record of the planning process, and all background information on the building.

c. Section 3 (Building Operation and Commissioning)
Section 3 consists of documents related to building operation and commissioning, including documentation for the mechanical and electrical systems and documentation on the building's structure. This section also includes contact information for the supplier and manufacturer of each of these components.

d. Section 5 (Appendix)
Section 5 comprises of all the drawings and operations manuals, as well as all related documents from the pre-construction, construction and post construction phases for record-keeping purposes.

4 Conclusion

In conclusion, the Building User Manual is the most important document that will be handed over to the building user. The Building User Manual describes and documents the entire construction process through completion. Using the proper documentation and handing-over process ensures that the building user will have all the necessary information pertaining to the building, including its operation, maintenance management and all trouble-shooting procedures. Furthermore, after the process of documented a Building User Manual is completed; the consultant of the project is advised to participate in training and demonstrations with the building user or the maintenance department. By adhering to these procedures, it can be ensured that the building will continue to appreciate in value added to the building itself.

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