

Review Article

Critical success factors for sustainable housing: a framework from the project management view

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ABSTRACT

Housing is the critical issue in global urbanization which have a tremendous impact on the environment – both during construction and through out their. As the key element in urban development, housing plays a vital role in attaining the goal of sustainable development. Effective of project management is becoming increasingly important for sustainable housing to remain competitive in today’s dynamic business environment. This paper is attempted to establish a theoretical framework for project management success factors in sustainable housing development. Review on past literature on the subject were carried out to build the existing research works on the area and to establish critical success factors of project management best practices. At the end of this paper, a new area of managing sustainable housing for future direction of this research was identified. A list of critical success factors for project management practices for sustainable housing development was established.

Keywords: Sustainable, Housing, Development, Project Management, Critical Success Factors.

1. Introduction

Housing, as human basic need, is a very important issue of people’s everyday life. In 1948, the United Nations, in its Universal Declaration of Human Rights, stated that “*everyone has the right to a standard of living adequate for the health and well-being of himself and of his family including food, clothing, housing and medical care and necessary social services...*” According to Winston (Zinkernagel.R, 2001) housing is an essential aspect of life quality and it is also significant for sustainable development. As the key element in urban development, housing plays a vital role in attaining the goal of sustainable development. In order to be sustainable, housing initiatives must be economically viable, socially acceptable, technically feasible and environmentally compatible, Choguill (Choguill, C. L., 2007). Housing encompasses the immediate environment, sanitation, drainage, recreational facilities, and all other economic and social activities that make life worthwhile, Olejado (Olejado, E.O. 2003).

The World Commission on Environment and Development (WCED), (WCED, 1987), report, Our Common Future has led to a world-wide notion of the concept of sustainable development

(Meldon, 1998). Today there are over 300 published definitions of sustainable development, the products of diverse world views and competing vested interests (Moles and Kelly, 2000).

Our Common Future explores how sustainable development “*is not a fixed state of harmony but rather a process of change in which the exploitation of resources, the orientation of technological development, and institutional change are made consistent with future as well as present needs*” (Moles and Kelly, 2000). In other words, (WCED, 1987) it’s defined as “*development which meets the needs of the present without comprising the ability of future generations to meet their own needs*”. The Commission not only observed that environmental problems need to be addressed, but also socials problem, such as inequity, property, non-prosperity and the violation of human rights, that are related to explosive population growth and the enormous expansion of environmental harms caused by human activities. According to the Commission, solving these problems requires global economic growth whilst respecting ecological constraints (Klunder, 2004). Other studies, (Ding, 2008) defined sustainable development is as a concern of attitudes and judgment to help insure long-term ecological, social and economic growth in society.

Fundamentally, sustainable development addresses three major areas;

I. People living today are entitled to justice and equal rights;

II. Environmental degeneration must be alleviated or eliminated; and

III. Future generations must not be impoverished as a result of current actions (Redclift, 1987).

The detail of what comprises sustainable development is very context –specific and the same condition and practice cannot apply everywhere. Therefore, sustainability has its diverse implications in every corner of the world and in every sector of a society (Bell and Morse, 2003). “Sustainable Housing” is a new concept in developing countries and unearthing projects covering all aspects of sustainability proved to be difficult (Ebsen, 2000). For construction project, it processes would bring environmental responsibility, social awareness, and economic profitability objectives to the fore in built environment related projects (Langston and Ding, 2001).

Housing that make up a great proportion of building, sustainable housing could be defined as housing practices, which strive for integral quality (including economic, social, and environmental performance) in a broad way (John et al, 2005). Previously, general factor of a sustainable housing practice that is applicable under various circumstances, depending on the conditions where it’s implemented (Larasati, 2006). Traditional project management practices have evolved over time as the requirements of managing and controlling construction project (housing development) unfolded. However, with the advances of management techniques and ICT, traditional practices have proven to be insufficient in meeting the new project requirements. Doing so, the objective of this paper is to develop a framework for successful project management in sustainable housing.

2. Problem statement

Malaysia is a developing country heading towards industrialization. Malaysian urban population expected to grow by between 40% to 50% by 2030 from 70% to 80% of total population. The growths of industries bid rapid housing expansion due to the high demand from the customer. A good housing area has to fulfill the health aspect from the building, drainage, clean water supply, domestic waste management and suitable ventilation. The quality of housing and its social, economic and environmental performance is critically important for sustainable development. However, the lacks of project management success factors practices in housing development activities may often bring about water, air and land pollutions thus affecting the natural environment, health and quality of life.

These issues are often raised today as problems of uncontrolled development of housing growth, as the concern for environment is not considered. With this concern in mind, housing has become priority in today's development programs which aimed at improving the quality of life and contributing towards the formation of a caring society. However in Malaysia, the issues of sustainable housing are still new and not that familiar. With referring back the house being built in the past decade, that house does not meet the essential criteria of sustainability and unfortunately, there are little to none; in depth studies on this matter. According to Maylor (1999) those organizations that are most resourceful in seeking out the best practices and making those aspects work for them will be the most successful. Hence, success factors of project management were established to develop a new area for further studies to ensure its potential for future sustainable housing.

3. Critical success factors for project management practices

Nowadays, companies are increasingly using projects in their daily work to achieve company goals. The only way organizations can be driven to achieve excellence is by keeping an eye on competition and world best practice in all aspects of the business (Bendell et. all, 1998). Recently more and more organizations are recognizing that translating corporate strategies into actions requires project management. The Chartered Institute of Building (1996) has defined project management as the overall planning, co-ordination and control of a project from inception to completion aimed at meeting client's requirements in order to produce a functional and financially viable project that will be completed on time within authorized cost and to the required quality standard. The Project Management Institute (PMI) described project management as "the application of knowledge, skills, tools, and techniques to project activities to meet project requirements" and characterized "high quality projects deliver the required product, service, or result, within scope, on time, and within budget" (PMI, 2004). Similarly, Kerzner (2001) characterized project management success as the completion of an activity within the allocated time, at or under budget, to specified performance levels and the satisfaction of the client.

According to Mobey and Parker (2002), to increase the chances of a project succeeding it is necessary for the organization to have an understanding of what are the success factors, to systematically and quantitatively assess these factors, anticipating possible causes and effects,

and then choose appropriate methods of dealing with them. Once identified, the success of the project management can be achieved.

Generally, the success of a construction project depends on a number of factors, such as project complexity, contractual arrangements, and relationships between project participants, the competency of project managers, and the abilities of key project members (Chua et al., 1999). Bayliss, (2002) in his report said that successful project delivery requires the concerted effort of the project team to carry out the various project activities, but it is the project manager who, at the center of the project network, is responsible for orchestrating the whole construction process.

The search for factors that influence project management success has been growing interest over the past decade. It has been argued that project management success can influence project success, but would be unlikely to prevent project failure (Baccarini 1999, Lim et al 1999, Munns and Bjeirmi 1996, Pinto and Mantel 1990, Wit 1988). Project management is essentially intended to accomplish three objectives: completing the project within budget, on time and meeting specifications. On the other hand, project success deals with the effect of final deliverables (Baccarini 1999, Cooke D. 2002). As in their findings, Pinto and Slevin (1989) concluded that 10 factors were critical to the success of R & D projects. There is, however, little advice on how such key success factors can be used to help alleviate the many problems that occur with project management in practice.

As referred to the ten critical success factors developed by Pinto and Slevin (1989), Pinto and Mantel (1990) suggest that “these critical success factors were found to be generalisable to a wide variety of project types and organizations”. Their model is one of the most widely quoted lists of critical success factors (Muller and Turner, 2007). However a single set of project success factors may not be suitable for all industries (Lim et al, 1999; Hartman et al, 1996). Liu and Walker 1998 suggest that as industries operate differently, “a set of critical success factors may not be transferable from one project to another project...only generic areas can be identified and used as broad guidelines.”

A comprehensive review of the literature on success factors of project management was conducted. Table 1 gives a list of the critical success factors developed by various literatures. As a summary from that table, it can be said that project management success can be measured on the basis of different variables/factors. Several researchers have identified the factors that significantly determine project management success. Based on the frequency analysis, the critical success factors are prioritized as shown in Table 2.

Table 1: Summary of literature reviews from various author’s for project management success

Success Factors for Project Management	Authors						
	Pinto & Slevin (1989)	Chua et al (1999)	PMI (2004)	Turner & Muller (2007)	Walker et al (2004)	Hyvari (2006)	Khang & Moe (2008)

Project Understanding					√		√
Top Management Support	√		√	√		√	√
Information/Communication	√	√	√		√	√	
Client Involvement	√	√	√		√	√	√
Competent Project Team		√		√	√		√
Authority of the Project Manager/Leader		√		√	√	√	√
Realistic Cost and Time Estimates	√		√		√	√	√
Adequate Project Control			√	√			√
Problem Solving Abilities	√				√	√	
Risk Management	√		√				
Adequate Resources							√
Planning	√		√	√	√		√
Monitor performance and feedback		√		√	√	√	
Project mission /common goal	√		√		√	√	

Remark: “√” critical success factors that is determined by the authors either on a conceptual or empirical basis.

Table 2: Prioritization of CSFs

Critical Success Factors	Frequency of Occurrence	Prioritized Rank
Client Involvement	6	1
Authority of the Project Manager/Leader	5	2
Top Management Support	5	2
Realistic Cost and Time Estimates	5	2
Information/Communication	5	2
Planning	5	2
Competent Project Team	4	3
Project mission /common goal	4	3
Monitor performance and feedback	4	3
Adequate Project Control	3	4
Problem Solving Abilities	3	4
Project Understanding	2	5
Risk Management	2	5
Adequate Resources	1	6

The table analysis revealed that majority of authors agreed that client involvement, authority of the project

The table analysis revealed that majority of authors agreed that client involvement, authority of the project manager/leader, top management support, realistic cost and time estimates, information/communication and planning become the most important to the project management success. For the competence project team, project mission, and monitor performance and feedback factors have their presence in third frameworks respectively.

The other critical success factors (adequate project control, problem solving, project understanding and risk management) are presented in very few frameworks (Table 1 and 2). Meanwhile, the factors were not commonly found in the literature which is adequate resources. Based on the analysis survey on project management factors, thirteen factors that listed by researchers have been selected. These factors were used for the purpose of establishing critical factors for project success.

4. Sustainable housing criteria

In recent years, a growing number of sustainable building project have become conscious and sustainable building is increasingly becoming part of worldwide building practice (Klunder, 2004). The implementation of sustainable building characteristic has been a beneficial act for the sustainable development. Winston (2007) has explore some important characteristics of sustainable housing include: sustainable land-use planning; resisting scattered settlements; housing close to employment and public transport; higher residential densities; sustainable construction; high standards of energy efficiency in use in dwellings; housing availability, affordability and quality; access to green space, and a high quality residential environment.

According to Bennett and James (1999), the effective sustainability measurement should consider the complete triple bottom line of economic, environmental, and societal performance

which is:

a) Social Sustainability - healthy internal environment, safety (personal, household and environmental), provision of social amenity, provision of recreation amenity and accessibility to jobs and amenities

b) Economic Sustainability - cost efficient over time, adaptability with minimum cost, affordability, job creations and local economy

c) Environmental Sustainability - energy efficiency, water efficiency/conservation, reduction of greenhouse gas emissions, waste management / recycling, material efficiency, pollution prevention– noise, water, air, optimization & conservation of land, protect and enhance biodiversity, reduction of car dependency.

This in line with European Union defining sustainable housing in the following perspective: construction (e.g. quality of construction), social and economic factors (e.g. affordability and psychological impacts) and eco-efficiency (e.g. efficient use of non-renewable resources). The focus on sustainable housing implies a perspective of flows (Klunder, 2004). From this viewpoint, a sustainable housing is characterized by the minimization of the environmental impacts of material use, energy consumption and water consumption during the whole service life of the building.

As refer to Sinou and Kyvelou (2006), the dimension tools for sustainability that have been developed worldwide are built upon various principles and different evaluation items, data and criteria. However, they discovered that the vast majority of these tools do not take into clarification the lifetime parameters. Meaning that, the assessment is based on original conditions and characteristic, whereas the alterations of the building elements' attributes are not taken into consideration (Sinou and Kyvelou, 2006).

A review of the most frequently used tools and a comparison of general criteria measuring sustainable development has been carried out. Several methods give different variables to measure sustainable development depending on its nature, location and environment and thus climate.

The methods are GB Tool (Green Building Tool), LEED (Leadership in Energy and Environment Design), CASBEE (Comprehensive Assessment System for Building Environmental Efficiency), BREEAM (Building Research Establishment Environmental Assessment Method), HQE (High Environmental Quality), VERDE, EEWH (Green Building Evaluation System), Green Star, Green Mark, HK_BEAM and recently launched in Malaysia, the Green Building Index (GBI). A detailed analysis of sustainable development variables by different methods is presented in Table 3.

Table 3: Analysis of sustainable development variables by different methods.

Variables	Green Mark	HK_BEAM	VERDE	GBI	Frequency of Occurrence	Prioritized Rank
	Singapore	Hong Kong	Spain	M'sia		
Energy Efficiency	X	X	X	X	11	1
Sustainable Site	X	X	X	X	10	2
Materials Resources		X	X	X	10	2
Water Efficiency	X	X	X	X	10	2
Indoor Environment Quality	X	X	X	X	9	3
Management	X			X	5	4
Health & Comfort			X		4	5
Innovation	X	X		X	4	5
Pollution					4	5
Transportation			X		3	6
Build Environment Quality & Performance					3	6
Services/Quality			X		2	7
Economic			X		2	7
Social			X		2	7
Ecology					2	7
Land Use					1	8

Variables	CASBEE	LEED	GB Tool	BREEM	HQE	EEWH	Green Star
	Japan	USA	Europe	UK	France	Taiwan	Australia
Energy Efficiency	X	X	X	X	X	X	X
Sustainable Site	X	X	X	X	X		X
Materials Resources	X	X	X	X	X	X	X
Water Efficiency	X	X	X	X	X		X
Indoor Environment Quality	X	X	X		X		X
Management				X	X		X
Health & Comfort				X	X	X	
Innovation		X					
Pollution	X		X	X			X
Transportation				X			X
Build Environment Quality & Performance	X		X		X		
Services/Quality	X						
Economic			X				
Social			X				
Ecology				X		X	

Based on the discussion, sixteen variables that listed by different method have been selected. The analysis of the parameters/variables (Table 3) showed that variables such as Sustainable Site, Indoor Environment Quality, Energy Efficiency, Materials Resources and Water Efficiency were involved in almost of the methods. On the contrary, other variables were considered by fewer methods. Services/Quality, Economic, Social and Ecology were evaluated by only two of the eleven methods and the land use only by one. For the purpose in this study, all variables were used to measure sustainable housing development.

5. Conceptual model for project management success factors in sustainable housing

Project success is a complex and often illusory construct. The subject of project management is vast and numerous authors continuously add to the body of literature on the subject. Bjeirmi and Munns (1996) suggested in their research that there is an overlap between project management and projects, in that the former is a subset of the latter. Dey (2002) added that current project management practices of organizations in the industry sector do not always ensure success. Successful project management can contribute towards project success but it is unlikely able to prevent project failure (de Wit, 1988). Furthermore, project success reflects the effective sustainable achievement of the project purpose and long term goals (Khang and Moe).

This study focused on project management success factors that contribute in sustainable housing development. The various variables affecting the project success are identified in the previous section followed by criteria of sustainable housing. It is expected that study of project management in the extent of project success could lead toward meeting criteria of sustainable housing. This approach in sustainable housing area will provide much needed information to local authorities to take more effective control of housing issues.

Figure 1 provides a theoretical framework that incorporates the critical success factors of project management and the criterion of measuring sustainable housing. To date, it was clearly that most research focused on identifying and analyzing project management success factors and sustainable housing criteria as separate groups. So, this study aims to represent a contribution towards formulizing or integrating the relationship among the two groups of factors. This is a first step for further conceptual and empirical developments in identifying to which extend does project management success factors compliment the sustainable housing. This adopted approach may help in developing the way forward.

6. Conclusion

The implementation of success factors for project management in sustainable housing is important in other to ensure project success and therefore to suit Malaysian local climate, culture and practice. Apparently, the housing expansion is one of the major contributors to the development of any country. Unfortunately, the issue of sustainable housing development is still new and not yet the proactive action had been taken to develop the housing sector in sustainable way. Thus, this research is proposed to identify success factors for project management best practices in sustainable housing area. At the end of this paper, a new area of managing sustainable housing for future direction of this research will identified. Further work is needed to

explore in more detail which factors are important and to understand how the factors interact with each other in sustainable housing area.



Figure 1: Conceptual Framework of Project Management Success Factors in Sustainable Housing

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