

CHAPTER ONE

RESEARCH OVERVIEW

1.1 INTRODUCTION

This chapter presents the background of the research, giving the detailed explanation of its subject, and its aims and objectives, research questions, problems statement and gaps of the research. The summary of research methodology, scope, research significance, and structure of the research are also discussed in this chapter.

This research concentrates on the topic of integrating sustainability into the project planning process for Malaysian buildings. As the researcher was a town planner in a government and a private organization several years ago, the building project planning process and the challenges in integrating sustainability into the projects is quite familiar to her. The knowledge of town planning during her bachelor degree and the knowledge project management during her master's studies also made her convenience with this research topic. Both of knowledge are related and complement each other towards delivering an excellent sustainable built environment. It was her own initiative to join the Malaysian Green Building Confederation (MGBC) for their Green Building Index (GBI) facilitator program in April 2012 and registered to be an academic member of MGBC for the detail knowledge and practice of sustainable building in Malaysia. She realized that sustainability in building is not a simple fusion of green design, techniques and materials but it is a holistic solution to achieve the concept of sustainable development throughout the project life cycle.

1.2 BACKGROUND OF STUDY

There are many challenges facing the world today, among them are sustainable development, which has received encouraging attention since Rio Declaration on Environment and Development was signed up in 1992 Earth Summit. The Rio Summit agreed a set of action points for sustainable development, collectively referred to as Agenda 21 (agenda for 21st century), and government that signed up to these have committed themselves to action (Bell and Morse, 1999). Since then, many works have been carried out on sustainable development to promote balance between the need to

continue in business, without seeking profitability at the expense of the environment and society's needs (MaSC, 2002).

In Malaysia context, the focus on sustainable development, especially in devising policies, has been spelled out in government policies at national, state and local level as evidenced in Seventh (1996-2000), Eight (2001-2005), Ninth (2006-2010) and Tenth Malaysia Plans (2011-2015). According to Choo (1999), consideration for sustainable development has gained recognition and integrated in Malaysian government policies and legislation since 1970's. However, the sustainability dimensions pursued were heavily skewed towards economic and social gains. The statement that recognized the needs for preservation of environment as a result of rapid land, urban and industrial development only appeared in the Third Malaysia Plan (1971-1975). Since then, the stress for proper environmental management and balancing economic with environmental objectives was outlined in consequent development plans (Choo, 1999).

The growing awareness of a sustainable development's potential and benefits result in dramatic increases in the demand of a sustainable construction project (Robichaud and Anantatmula, 2011, Zainul Abidin, 2009). Sustainability in construction is believed to improve the project performance (Zainul Abidin, 2010; Zainul Abidin and Pasquire, 2007; Harris et al., 2001; Kamara et al., 2001), such as, increasing the quality of the output, productivity and profitability, whole life cost reduction and business enhancement (Hayles, 2004; The Economist, 2004). Many worldwide practitioners are beginning to appreciate sustainability and acknowledge the advantages of building sustainable. Four years after the Rio declaration, the International Organization for Standardization (ISO) established ISO 14000 to address the operational standards that relate to the environment and the standard was updated in 2004 to meet the environmental challenges face in the 21st century. Currently, compliance to the new standard is voluntary in most countries worldwide. More property companies have since applied for certification and invited their partners and vendors to do the same. Some of them changed their energy consumption patterns, while others even redesigned their buildings and facilities to take advantage of natural lighting or to use solar power (Mochal and Krasnoff, 2010).

The term of 'sustainable building' is increasingly important to tenants, owners and property developers (Newell and Manaf, 2008). More local governments worldwide are

adopting green and sustainable building standards and regulations or providing financial incentives for sustainable development. Some researchers believe that the concept of sustainability in building cost lower than conventional method and saves energy through efficient resource use, higher productivity and reduced risk (Yates, 2001). On the other hand, some of them suggested that sustainable buildings cost more to construct than conventional building, which is in the range of 5% to 7.5% to construction cost to be recovered in five to eight years (CBRE, 2009; Building Science Corporation, 2008). Thus, even if it is widely held that the longer term cost savings in the operation and maintenance of the building enables a recovery of the initial cost, (USGBC, 2006a; 2006b), unfortunately, the benefits of operational savings are no longer important, especially to speculative developers who have no long term interest in operating or leasing a building (Robichaud and Anantatmula, 2011; Choi, 2009).

Heerwagen (2000) and Bartlett and Howard (2000) highlighted that sustainability in building will contribute positively to better quality of life, work efficiency and healthy work environment. Whereby, Yates (2001) who explored the business benefits of sustainability concluded that the benefits are diverse and potentially very significant. The approach of sustainable construction will enable the construction players to be more responsible to the environmental protection needs without neglecting the social and economic needs in striving for better living.

Although there are many researches on the paybacks of sustainability in building project, nevertheless, huge numbers of barriers also contributes to the multiple failing of the projects within the market. Building projects are still dealing with heightened perceptions of the risks related to sustainability, especially the need for managing the project with tighter budgets, profit margins (Robichaud and Anantatmula, 2011; Choi, 2009) and schedules (Doyle, 2009). Sustainability integration in building projects are claimed to carry the risk of a higher first cost and financial constraints associated due to the requirement of more time to design, the need to bring together appropriately skilled professionals (Doyle et al., 2009), the need to study sustainability aspects of buildings and become familiar with research reports, the preparedness to take risks in developing new building prototypes (Choi, 2009; Francis et al., 2009; McKee, 1998), the need for a proper understanding of the relationship between capital and the running costs in financial, energy and environmental terms (Francis et al., 2009), personnel hours (Korkmaz et al., 2010) and the use of innovative materials and technologies (Korkmaz

et al., 2010; CBRE, 2009; McKee, 1998). A survey among several building industry professionals conducted by McGraw-Hill Construction (2006) evidenced that perception of 'higher costs' or 'increase in the project first cost' is the most commonly found barrier to the sustainable building project. Added to that, there are problems which parallel to those of the sustainable client including time required for the design in relation to the client programme and fee, the risks and costs of innovation especially against competitive fee scale, the need to develop and test prototypes, the need to manage contractor/sub-contractor relationships and understanding, problems with certain contract forms such as design and build, the need for feedback and monitoring to inform new projects, lack of coherent government initiatives, lack of consistent performance standard and feedback and the lack of exemplar projects (Francis, 1998).

Robichaud and Anantatmula (2011) pointed out that sustainability integration in construction project will improve its chances for financial success if a cross-disciplines team is involved at the earliest planning stages and throughout the project. In project management, there is no any clear aspect concerning sustainability in project planning standards and guidelines was revealed (Wu and Low, 2010 and Grevelman and Kluiswara, 2010). The alignment between the aspects of project management and sustainability is still very rare and there is almost no attention for the integration of sustainability in project management (Labuschagne and Brent, 2005). Lack of collaboration and integration among project stakeholders caused of communication loss among them and become one of the reasons of project failure (Grevelman and Kluiswara, 2010; Muldavin, 2010; Choi, 2009). There are also lack of knowledge, expertise and awareness of sustainability and the integration process among the project stakeholders which ultimately cause of project delay (Choi, 2009; Doyle et al., 2009; Zainul Abidin, 2009)

Sustainable building projects are naturally different from conventional projects due to the requirement of special materials and building practices, as well as the management commitment to sustainability. Thus, sustainability in building project requires additional considerations on many aspects more than the conventional project. Choi (2009) highlighted that most sustainability integration in building projects do not meet their targets due to the failure of their planning process and practice. Conventional projects are completed in isolation that is built using the tools and techniques itemized in PMBOK. Sustainability principles, however mentioned that nothing sustainable can

occur in isolation and that to ensure sustainable development one must continuously examine one's activities in the light of their surroundings economic, social and environmental (Labuschagne and Brent, 2005). The current theoretical frameworks of sustainability do not efficiently take social and economic sustainability issues into account, it is often encouraged environmental measure in most cases for instance in the selection of materials and technology for construction project yet the rest of measure are less promoted (Francis et.al, 2009; Labuschagne and Brent, 2005). Recently, we have been introduced to Green Project Management (GreenPM) which encourages people who involve in project management to start taking the environment into account during the decision making process, its methodologies and processes (Mochal and Krasnoff, 2008). GreenPM considered various operational elements, such as responsibilities, authorities, procedures and resources. Even though GreenPM was observed as a good start for incorporating sustainability principles into project management process, but it was noticed to appreciate only on environmental consideration. This idea seems unappreciated the rest two of the bottom lines of sustainable development which are economic and social consideration.

Sustainability integration in building involves a holistic solution to achieve the concept of sustainable development throughout the project life cycle. Although the life-cycle concept is adopted by a majority of the professionals, but most concentration currently were tend to skewed on the design and technical related areas which is against the concept of sustainability itself. The term of 'sustainable' is always being diluted by the commercialization and marketing of the green movement. Both the words 'green building' and 'sustainable building' are often used synonymously and interchangeably. It was argued to be confusing people in understanding and practicing the terms (CBRE, 2009 and Schumann, 2010).

There are many intellectual publications on the subject of sustainable building, but the ones that relate to the sustainability integration into the planning process of the project are very few. Several papers were discussed the importance of planning process towards integrating sustainability in building projects. These papers however were more theoretical-based than research-based. The fact is, it is a definite need to develop a framework for integrating sustainability into the project planning process for buildings. The sustainability principles of building should also to be identified in order to provide a clear sustainability guideline for the stakeholders throughout the integration process.

Significant adjustments to the conventional project planning process should to be explored. It is also important to explore the strategies for containing cost during the planning phase of the project to reduce developers first cost in delivering the sustainable building project (Korkmaz et al., 2010).

Sustainability in building projects will only results from building professionals working together to achieve this common objective and clients who are sympathetic to this ideal, user who understands and values the concepts and designers and contractors who as a team evolve the design with a sustainable outlook (Edward, 1998). A good planning process allows everyone involved to understand and perform their part in the project. It also serves as a monitoring tool, allowing early action to be taken if things go wrong (HRDC, 2003).

1.2.1 The Need to Study Sustainability in Building Project

Building sector is the largest (40%) sources of greenhouse gas emission worldwide (Jalendran, 2011; Wu and Low, 2010). In 2003, 44% of carbon emissions in the United Kingdom were generated by buildings (CBRE, 2009). Building sector consumes about one-third of the world's energy (Wu and Low, 2010). Buildings also responsible for 40% of solid waste generation globally and utilized a quarter of the world's resources. Building use 12% of the world's water and contribute up to five times more pollutions in its indoor air quality than outdoor air (Jalendran, 2011). Malaysian urban population is expected to grow more than 80% of total Malaysian population by 2030 parallel with their consumption of energy and resources as well as their carbon emission contribution (GSB, 2012a). Opportunely, many researches show that sustainable building can considerably reduce the consumption of energy and in turn reducing the carbon emissions (Robichaud and Anantatmula, 2011). Capital costs also are not higher for many sustainable building elements and even where upfront costs are more elevated, they can be offset by decreased operational costs (Yates, 2001). Therefore, the encouragement and serious attention towards sustainability integration in building project implementation is seen very urgent in order to overcome or reduce the conventional building phenomenon in a hyper urbanization as Malaysia is one of the fastest growing building industry in the world (ABCSE, 2007) with the current urban population of nearly 70% (GSB, 2012).

1.2.2 The Need to Study Sustainability Integration into the Project Planning Process

A major part of the activities performed in construction project management deal with initiating, planning, executing, monitoring and controlling the project (Zwikael, 2009; PMI, 2008; Clement and Gido, 2006; Clark, 2002). However, planning process is claimed to be a critical to successful accomplishment of a project through establishing and implementing a well-thought plan as a whole project is going according to its plan (Zainul Abidin, 2009; Clement and Gido, 2006). Particularly, this study focuses on the sustainability integration into the project planning process for buildings, because of its high importance in determining project success (Zwikael et al, 2005 and Kerzner, 2003), or in this study, 'project success' is referred to 'sustainable building project success'. Wu and Low, (2010:68) highlighted that, 'the planning session during the pre-design stage is of critical importance to realize the goal of sustainability because it is the starting point to achieve sustainability.' Project planning process require the longest time of process in project management which is approximately 35% of the project manager's time over the life of the project (Clark, 2002). Through project planning, project manager need to think through the project and remain focused on the end goal, which is the final deliverable. Planning process is time to be more detailed in describing the project. Zwikael (2009:375) stated that, 'Project planning is defined as the establishment of a set of directions insufficient detail to tell the project team exactly what must be done, when it must be done and what resources to use in order to produce the deliverables of the project successfully'. Thus, as one of the important process conducted in managing the whole life of building projects, the researcher believes that the planning process holds the strategic position to integrate sustainability into building projects. The researcher agrees that successful sustainability integration in building project starts with planning. This argument was supported by most researchers and writers including BCA (2007) and Hayles (2004) who also accentuated that sustainability practices in construction project would improve project performance. Consequently, project planning is observed to be a key factor in achieving sustainability. This proclamation is supported by Zainul Abidin (2009:812) as she stated based on her study, that planning is the most critical stage to incorporate the concept of 'sustainability' to have the most effect on the overall pursuit of the project. She further argued that, incorporation of this concept after planning stage will be seen as a burden and most likely will add more cost to the budget. In this research, therefore, explore on

project planning process since the initial stage could create a solid foundation towards sustainable project.

1.3 STATEMENT OF THE PROBLEM

The growth of urbanization has been increasingly in Malaysia which led to greater economic growth in construction industry. Building construction is considered to be the highest demand of construction projects in Malaysia as it forms about 67.6% of the overall construction work (CIDB, 2008). The fast growth of building construction project however has created pressure on sustainability issues especially in urban area of the country. Malaysia's buildings were reported to consume about 12.85% of the total energy consumption and 47.5% of the country's electricity consumption, which most of the energy is used for lighting and air-conditioning (Department of Electricity and Gas Supply Malaysia, 2001).

Malaysia is looking at making their buildings more energy efficient and sustainable. The government of Malaysia has realized the important of saving the environment through sustainable building development especially toward reducing carbon emission and resources use (Md Darus et al, 2009; Zainul Abidin, 2009). The government of Malaysia has introduced the implementation of photovoltaic systems in buildings through the 'Malaysia Building Integrated Photovoltaic Program' (MBIPV). They have also launched renewable energy programme called 'SURIA 1000 for developers' to encourage the Malaysian property developers to be involved in renewable energy efforts (Zainul Abidin, 2010a). Sustainable building and energy efficient designs have also been ventured. The LEO (Low Energy Office) and GEO (Green Energy Office) buildings are the pilot projects that provide a platform for proof of the concept in driving forward the sustainability goals of the Malaysian building industry. Green Building Index (GBI Malaysia) has been developed in 2009 for the reason of evaluating the environmental design and performance of Malaysian buildings (GSB, 2012b).

Sustainability in Malaysian building project is also supported by the numerous current spatial planning of the country such as Malaysian National Physical Planning, National Urbanisation Policy, Development Plans and the development control activities (GSB, 2012b). A special attention is also given in the Tenth Malaysia Plan (2011-2015) towards improving sustainability in the building sector of the country including to the

economy plan to harness its energy savings potential and to reduce carbon emissions and dependence on fossil fuel. Revision of the UBBL (Uniform Building Bylaws) to incorporate MS1525 Code of Practice is highlighted in the plan for the integration of renewable energy and energy efficient systems in buildings. Wider adoption of GBI to benchmark energy consumption in the new and existing buildings is also emphasized (APEC, 2012). It can be considered that many efforts relating to sustainability in building project have been implemented in the country but the question remain is ‘why the unsustainable issues in this industry are still persist? This denotes that there are gaps concerning the sustainability integration practices within Malaysian building projects.

Building sustainably is fundamentally a process of best practices that leads to sustainable outcomes (Muldavin, 2010). Hence, it is critically important to get these processes right in order to deliver a successful sustainable building. Planning process is believed to be the strategic position to integrate sustainability considerations to have the most sustainable effect on the overall project (Reyes et al, 2014; Wu and Low, 2010; Hayles, 2004). However, in Malaysia, planning process is typically not conducted very well due to its complexity and extra costs that almost always associate with it (Mansur et al, 2003). There is also no a clear framework on the strategies to integrate sustainability into the project planning process was innovated in the current Malaysian building industry. The planning process that does not encourage sustainability matter clearly and limited interaction between various disciplines have hindered sustainable building projects from reaching the expected achievement. The traditional linear project planning process and minimal input from the operation and maintenance groups, construction manager and trade contractor or outside stakeholders during the design stage and planning process of building project made the sustainability principles are hard to be incorporated in the project (CIDB, 2003).

For that reason, this study attempt to response to these issues by proposing a framework for integrating sustainability into the project planning process for Malaysian buildings. There are two unanswered questions remain: ‘What are the most significant sustainability principles of buildings and how the principles should be integrated into the planning process of Malaysian building project? Answers for this question will become a prominence to bridge the gap between the ideal (successful sustainable building project) and the real situation in Malaysia -‘building projects used to be

delivered unsustainably’. A problem statement of this research therefore, is outlined as following;

‘Many efforts relating to sustainability in building project have been implemented in Malaysia but the unsustainable building development issues in the country are persisting. There is no clear framework concerning sustainability integration into the project planning process was innovated in the current Malaysian building industry. Thus, there is a need for formulating a framework to integrate sustainability into the project planning process towards delivering a successful sustainable building outcome.’

The next steps are begin tackling the question presented and help to bridge gaps by understanding the significant sustainability principles of building and the integration strategies into the project planning process relevant to Malaysian context and finally attempts to contribute to the development of the sustainability integration framework into the planning process of building project, which in turn breaking the gaps of the research.

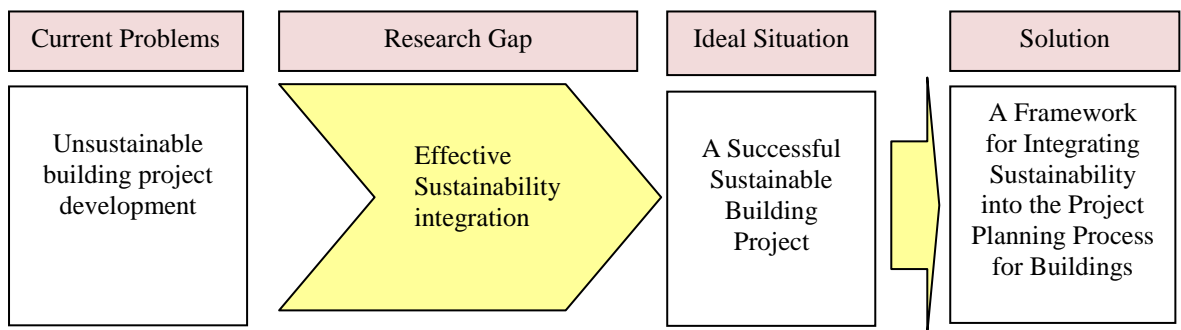


Figure 1.1: The Research Problems, Research Gaps and Solution

The preliminary observations, literature review, experiences and phenomenon of the sustainability integration in building project exercises instigated the researcher to think about an effective framework to integrate sustainability into the project planning process that could be a guide toward integrating sustainability into buildings to its actual meaning.

1.4 AIM, RESEARCH QUESTIONS AND OBJECTIVES

This study aims to develop a framework for integrating sustainability into the project planning process for Malaysian buildings. The framework development however should take into account the international, national and local research findings. To achieve the research aim, this study seeks for the answers to the following five research questions;

- 1) What are the sustainability principles of buildings, how to integrate the principles into the project planning process and their impact on influencing the project performances?
- 2) To what extent is the sustainability concept being practiced in Malaysia?
- 3) Do project stakeholders integrate the sustainability principles into the project planning process of Malaysian sustainable building? What? How?
- 4) How the sustainability integration practices into the planning process influence the project performances?
- 5) What are the most significant sustainability principles of buildings and how the principles should be integrated into the planning process of Malaysian building project?

To find out the answers of the research questions and ultimately achieve the aim of the study, the following objectives have to be completed:

- 1) To identify the key principles of sustainability integration in building project.
- 2) To examine the current sustainability practices in Malaysian building projects.
- 3) To evaluate the most significant factors to be addressed in the proposed framework that relevant to the Malaysian context.
- 4) To propose a framework that enables sustainability to be integrated into the project planning process for Malaysian buildings.

1.5 RESEARCH METHODOLOGY

Several research methodologies were used to achieve a thorough study for this research which are quantitative, qualitative and case study approach (mixed-methods). By using the multiple research methodologies different views are provided on the subject. This

research was undertaken in four main stages; preliminary research, fieldwork, data analysis and framework development as depicted in Figure 4.1 (p139).

1. Preliminary Research

Preliminary research provides overview of the research to be undertaken. During this stage, the researcher has undertaken extensive and related practitioners to gain understanding on the subject to be investigated. As Balnaves and Caputi (2001) stated, a literature review is a preliminary investigation of what has been done or what is being done in an area of study. It gave insights on gaps, issues, problems, past experiences and progress achieved elsewhere in that subject. Based on the information gathered literature review, having discussion with academicians at this stage, research model is devised including designing questionnaires and interview questions, case study selection and conducting pilot study. The review of available knowledge offered a starting list of sustainability principles of building and the strategies to integrate the principles into the project planning process (refer Table 3.8, p132) to be investigated for their possible inclusion in the proposed framework. Due its significance, the literature review process will be an ongoing process throughout this whole research study.

2. Fieldwork and Data Collection

This stage involves the actual process of going to the site is carried out. During this stage, the process of questionnaires survey, interviewing, direct observation on the condition of buildings, photographing and reviewing of the relevant documents were conducted by the researcher. Structured questionnaire surveys were distributed to seven groups of Malaysian building project stakeholders (architects, engineers, developers, contractors, local authorities, town planners, universities) since the framework development should involve the local building project stakeholders. The questionnaire survey respondents were selected based on their contribution to the green and sustainable building projects, sustainability related research projects and/or publications and involvements in the formulation of GBI Malaysia and sustainability related policies, guidelines or other relevant government initiatives. The competent respondents were also recommended by the related professional bodies and the government institutions. Case study interviews, site observations and the project documents review were conducted to assess sustainability practices among the selected Malaysian sustainable

building projects. A series of open-ended semi-structured interviews with five groups of the project stakeholders (3 owners, 3 energy consultants, 3 main contractors, 3 local authorities' officers and 3 energy managers) of the selected cases were carried out. The case studies projects are as follows;

Case Study 1: LEO Building (Low Energy Office) Putrajaya (Appendix D, p323)

Case Study 2: GEO Building (Green Energy Office) Bangi (Appendix E, p330)

Case Study 3: Diamond Building, Putrajaya (Appendix F, p341)

3. Data Analysis

The goal of the quantitative phase was to identify the most significant sustainability principles of building and the integration strategies (the factors), to be incorporated in the proposed framework. Data collected from the questionnaire survey were analyzed using Statistical Package for Social Sciences (SPSS) Version 17.0 for Windows software and Microsoft Office Excel 2007 by employing quantitative analysis method. During this process, the literature review findings were synthesized and refined to reveal the relevant factors to be addressed in the proposed framework. Stage 1 and stage 2 frameworks were generated at the end of this process (shown in Table 5.60, p213 and Table 5.63, p217). The factors identified from, and refined in the quantitative analysis were then brought into the case study and qualitative phase for further refining process and the external validation. During the case study analysis, qualitative content analysis, and replication logic and cross case analysis technique were utilized. Final framework of integrating sustainability into the project planning process for buildings was generated at the end of this process (shown in Table 6.20, p251).

4. Framework Development

As the main contribution, this research has introduced a framework to integrate sustainability into the project planning process for Malaysian buildings as presented in Table 6.20 (p251). The framework consists of the lists of sustainability principles of building and the strategies to integrate the principles into the project planning process. The framework has considered the Malaysian context through involvement of the local building project stakeholders' expertise, views and preferences. The proposed framework will provide an essential guide for the project stakeholders during the project

planning process towards achieving successful integration of sustainability in Malaysian building projects in the future.

1.6 SCOPE

This study specifically focuses on accessing the most significant sustainability principles of building, the strategies to integrate the principles into the project planning process and their impact on influencing the project performances specifically in term of sustainability performances, cost, time, quality and stakeholders' satisfaction. The planning process discussed in this study is limited to the pre-construction stage. To this extent, this study agreed with Zainul Abidin (2009, p812) as she stated that 'planning is the most critical stage to incorporate the concept of 'sustainability' to have the most effect on the overall pursuit of the project and incorporation of this concept after planning stage will be seen as a burden and most likely will add more cost to the budget.' As mentioned earlier, building sector was chosen due to the fact that this sector is the largest sources of greenhouse gas emission worldwide and others unsustainable issues.

In general, the research scope encompasses four basic areas. The first area of study is the determination of sustainability principles of building, the strategies to integrate those principles into the project planning process and their impact on influencing the project performances. This stage includes the activities of literature review and piloting for identifying knowledge gaps, issues, problems, past experiences and progress achieved in the subject. The knowledge and information were then used to determine the most significant sustainability principles of building and the strategies to integrate the principles into the project planning process to be addressed in the preliminary framework.

In order to answer the research questions and to achieve the aim and objectives of the research, the second area of study – fieldwork study and data collection was carried out. It consist of questionnaire survey and case study interviews, direct observations which involved site visit and photography on the condition of the buildings as well as reviewing some project documents which allowed by the respondents in order to get a deeper view on the case projects. This process of information gathering is important in order to understand the nature of sustainability integration practices during the project

planning process as well as to investigate the project performances influenced by the practices.

The third area of this study- data analysis is to assess the most significant sustainability principles of building, the strategies to integrate the principles into the project planning process (the framework's factors) and their impact on influencing the project performances. The literature review findings were synthesized at this stage to assess the relevant factors to be addressed in the formulation of the proposed framework. The findings were generalised by employing quantitative, qualitative, cross case analysis and the use replication logic in multiple-case studies approach.

The fourth area is developing a framework of integrating sustainability into the project planning process based on the findings and the refining process generated during the data analysis stage of this research. Findings of the impact of sustainability practices on the case studies project performances are very useful to support the validity of the proposed framework.

1.7 RESEARCH SIGNIFICANCE

This study has been stimulated by the gaps of research on this topic. Although there is a great quantity of literature on sustainable development, but the discussion on sustainability principles of building and the strategies to integrate the principles into the project planning process is still little. In Malaysia context, research works on sustainable development has been discussed by several researchers such as Zainul Abidin, 2007; 2009; 2010b; Newell and Manaf, 2008; Shafii, 2007 and Sham, 1993. Most of them discussed on green and energy efficient building, building performances assessment systems and sustainable construction, but none of them has discussed specifically on the sustainability principles of building and how the principles are integrated especially during the project planning process. Therefore, there is very significant to study this topic to ensure that the sustainability concept can be realized into practice and integrated efficiently into the planning process of the project. Consequently, it contributes to the body of knowledge particularly to integrate sustainability into the project planning process towards delivering a successful sustainable building in response to the world issues of sustainable development.

The focus of this research is potentially significant as a means of enriching and enhancing knowledge concerning the integration of sustainability principles of building through the project planning process. It will help awareness and broaden understanding of the importance of incorporating sustainable development approach during the project planning process among the construction players. This research can be a part of references by the government in the future program for sustainable development especially in the aspect of building construction project. In this regard, this research study not only contributes to the body of knowledge by exploring the latest dimension of sustainable development effort but also to the development of a practical sustainable development approach in project planning process in the current pressure to balance development and sustainability.

The study will provide a better understanding to the stakeholders on their roles and responsibility and the strategies to integrate sustainability since the early stage of building project development and throughout the life cycle of the project so that unsustainable manners such as wasting of materials, consumption of unsustainable materials, project delay, abandoned project, cost overrun and many more through the process of producing the deliverables could be avoided. Sustainability is not only measured from the final product but also throughout the process of producing the final product. Most project stakeholders have overlooked this issue, therefore, the researcher believes that the proposed framework at the end of the study is very significance to guide and educate them so that sustainability in building is successfully integrated.

1.8 THE THESIS STRUCTURE

The thesis structure is organized into seven chapters as illustrated in Figure 1.2 (p19).

Chapter 1 presents the background of the research, giving the detailed explanation of its subject, and its aims and objectives, research questions, problems statement and gaps of the research. The research methodology, scope, research significance, and structure of the research are also discussed in this chapter.

Chapter 2 consists of a review of literature mainly about the key aspects of sustainable development and sustainability in building by reviewing a number of international key documents such as Agenda 21 (UN, 1992), The Rio Declaration on the Environment

and Development (UNESCO, 1992), World Development Report (World Bank, 1992), The Framework Convention on Climate Change (UNFCCC, 1992) and Kyoto Protocol (UN, 1998), The Millennium Declaration (UN,2000), The Johannesburg Plan of Implementation (JPI) (UN, 2002)) and other references concerned with. This chapter also reviews Building Performance Assessment Systems (BPASs) currently being used in Malaysia, the GBI system and in developed countries including the BREEAM system (UK), the LEED system (US), the SBTool System (Canada), the Green Star System (Australia) and the Green Mark system (Singapore). It then, explores the strategies to integrate the principles into the project planning process and investigated the impact of the sustainability integration practices on influencing project performances by reviewing several project management body of knowledge documents such as PMBOK guide (PMI, 2008), Code of Practice for Project Management for Construction and Development (CIOB, 2010), APM Body of Knowledge (APM, 2012) and other references concerned with. These reviews are important in order for the study to conclude, simplify and suggest the sustainability principles of building and the integration strategies into the project planning process to be recommended in the proposed framework. Through this chapter, a list of sustainability principles of building, strategies to integrate the principles into the project planning process, key criteria of successful project performance and the supporters are identified.

Chapter 3 gives an overview of sustainability practice in the Malaysian building and the project planning process, the country commitments and achievement toward sustainability. It explores related issues and problems associated with the integration of sustainability in the project. It also examines the extent to which sustainability principles have been practiced during the planning process of building project in the country. Considering the findings of Chapter 2 and Chapter 3, a theoretical framework and a preliminary framework to integrate sustainability into the project planning process are formulated at the end of this chapter to provide guidance in conducting this research.

Chapter 4 discusses the research methodology. It explains the development of the research strategy and the process of carrying out the research. It also explains the selection of the research methods and the techniques for data collection. The discussion on the theoretical framework and preference for mixed method of research is also highlighted. Besides, it also explains the research data sources, the piloting stage, choice

of subjects, multi-case study research design, procedures of the case study selection, the sampling procedures, interview and questionnaire based survey process and explanation of how the data were analyzed.

Chapter 5 analyzed the empirical findings of quantitative survey which involved the views of Malaysian building project stakeholders. This chapter proceeds to assess the theoretical framework and refine the preliminary framework that has been constructed throughout the literature review process in Chapter Two and Chapter Three of this study. The findings are mainly based on an analysis of data using the Statistical Package for Social Science (SPSS) version 17.0 for Windows and Microsoft Office EXCEL 2007.

Chapter 6 reports cross-case analysis between the three case studies projects. Discussion and analysis of findings are specifically arranged to show replication logic. It presents results from semi-structured interviews, direct observations and project documents reviews undertaken with the stakeholders of the selected case projects. This chapter analyses in depth the interviews, responses and the comments about the sustainability principles and the integration strategies that have been practiced in the case projects. The sustainability and the project performances that are influenced by the practices are also evaluated. Last but not least, this chapter sets out to further refine the framework (stage 2) proposed in Chapter Five by the means of case studies interviews. The Framework of Integrating Sustainability into the Project Planning Process (Final Stage) is proposed at the end of this chapter, which is the major contribution of this research.

Chapter 7 summarizes the works that have been undertaken over the course of the study, highlights the most important findings, revisits the aim and research questions of the research, provides a summary finding of the study, recommendations, limitations of the research and suggestions for future research areas.

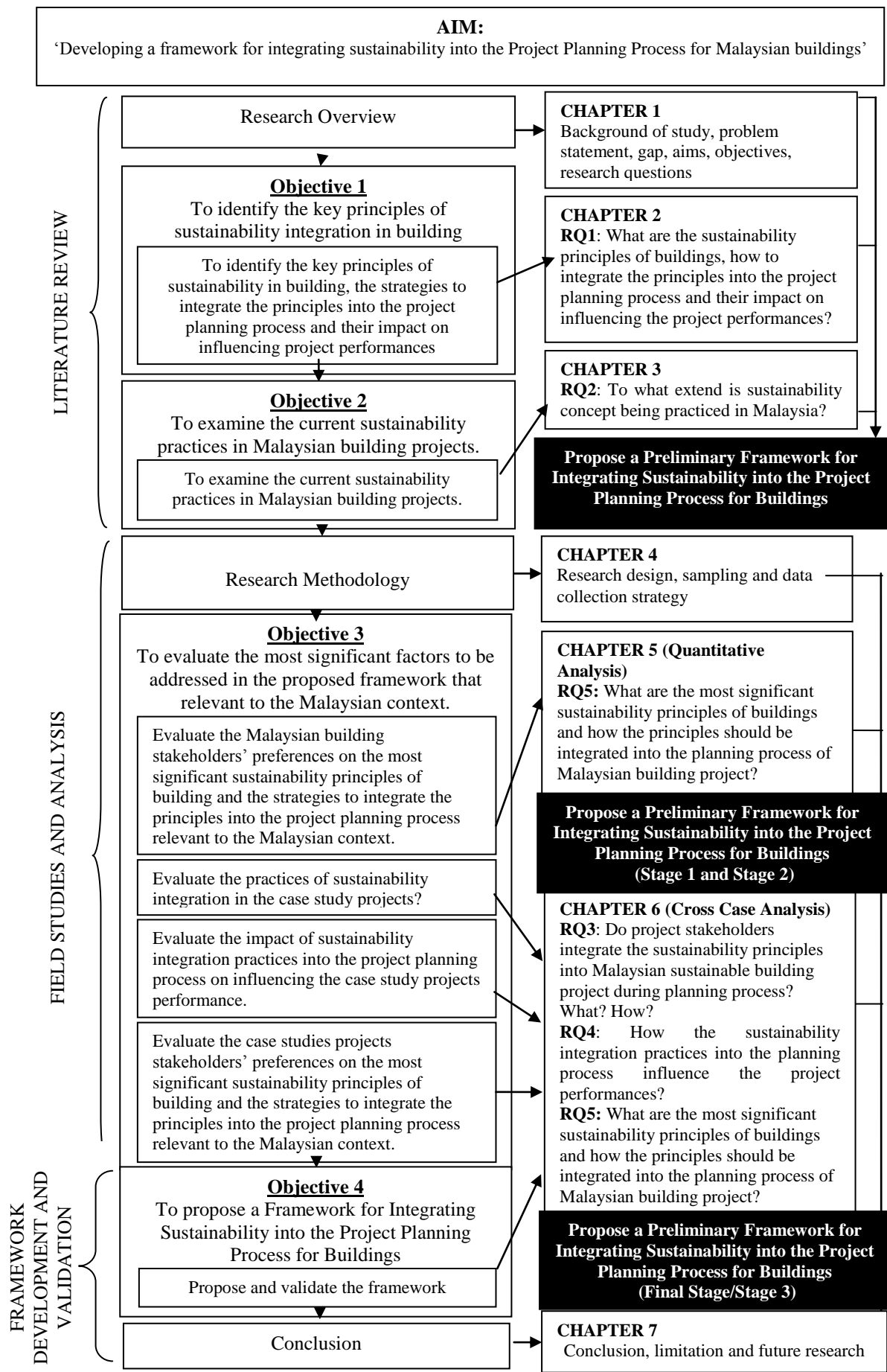


Figure 1.2: The Thesis Structure