Title: BARRIERS TO SUSTAINABLE BUILDING PROJECT: SOLUTIONS THROUGH PLANNING PROCESS

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Corresponding Author: Mrs Nor Kalsum Mohd Isa, Msc
Corresponding Author's Institution: Sultan Idris Education University, Malaysia

First Author: Nor Kalsum Mohd Isa, Msc

Order of Authors: Nor Kalsum Mohd Isa, Msc; Anuar Alias, PhD; Zulkiflee Abdul Samad, PhD; Mohd Yazid Mohd Yunos, PhD

Suggested Reviewers: Siew Chong Chan Msc Town and Regional Planning Lecturer, Quantity Surveying, Linton University College
chansiewchong@gmail.com
He is expert in construction management and planning. He is also a Malaysian green building index facilitator and an academic member of Malaysian Green Building Confederation.

Melasutra Md Dali PhD Urban Planning Lecturer, Department of Urban and Regional Planning, University of Malaya melasutr@um.edu.my
She is an associate professor in the field of town and regional planning. She is also actively involves in many researches in the field of sustainable building project and sustainable planning
An efficient planning process can significantly improve the ability of a sustainable building project to be delivered within acceptable cost constraints and schedules. Therefore, the stakeholders who are directly involved in this process should strive to continuously improve their sustainable capabilities.

A sustainable project planning process is successful in overcoming challenges and barriers of a sustainable building for many projects with experts and stakeholders who are communicating and collaborating as a team.

Without proper planning, the sustainable building projects carry a lot of risks. Therefore, careful planning is needed where the integrated project team members apply an integrated design process with strict focus on the sustainable development orientation and are guided by sustainable regulations and code compliances.

The Principles of a Sustainable Project Planning Process are as shown in the figure below;

Source: Author (2012)
BARRIERS TO SUSTAINABLE BUILDING PROJECT: SOLUTIONS THROUGH PLANNING PROCESS

ABSTRACT

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. Therefore, a sustainable building project requires additional considerations on many aspects more than the conventional project. Although there are many researches on the paybacks of a sustainable building, nevertheless, huge numbers of barriers also contributes to the multiple failure of the projects within the market. There are five (5) main categories of barriers of sustainable building project deliveries that were reported, which are: (1) knowledge gaps, (2) communication shortfall, (3) ownership structure and operating cost responsibility, (4) funding issues and risks, and (5) process issues. Most researchers believe that the planning process holds the strategic position in overcoming the barriers all together. Modifications should be made to the traditional planning process and practices of the project in order to minimize risks and improve the chances of delivering the project successfully. Thus, this paper offers ideas and recommendations on the principles that should be considered throughout the project planning process towards delivering a successful performance of a sustainable building project.

Keywords: Sustainable Building Project; Construction Project; Project Planning Process; Barriers

Introduction

The growing awareness of a sustainable development’s potential and benefits result in dramatic increases in the demand of a sustainable construction project (Robichaud & Anantatmula, 2011; Zainul Abidin, 2009). There are many researches to show that sustainability in construction projects would improve their performance (Zainul Abidin, 2010; 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), yet sustainable building construction 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 and schedules (Doyle, 2009; Choi, 2009). The sustainable building projects are claimed to carry the risk of a higher first cost associated due to the requirement of more time to design and the need to bring together appropriately skilled professionals (Doyle et al., 2009), the need to study sustainable buildings and become familiar with research reports, the preparedness to take risks in developing new building prototypes, 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 (CBRE, 2009; McKee, 1998). Additionally, the risks become higher, especially in this uncertain business of property development (CBRE, 2009). Even if it is widely held that the longer term cost savings in the operation and maintenance of a sustainable building enables a recovery of the initial cost, unfortunately, the benefits of operational savings are no longer important, especially to speculative developers who have no long term interest in operating or

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leasing a building (Robichaud & Anantatmula, 2011; Choi, 2009). There are several major categories of barriers that should be overcome in order to encourage the development of a sustainable building project and gaining full benefits from them, which are;

1) Knowledge gap in sustainable construction among the stakeholders (Choi, 2009).
2) Communication loss among the stakeholders (Choi, 2009; Mochal & Krasnoff, 2010).
3) Funding issues (Robichaud and Anantatmula, 2011; Korkmaz et al., 2010; Choi, 2009 and Francis et al., 2009).
4) The risks of developing a new building approach (CBRE, 2009; Choi, 2009; Francis et al., 2009; McKee, 1998).
5) The process issues due to the lack of expertise and resources for a sustainable building project which cause delay (Doyle et al., 2009, Choi, 2009).

To surmount the barriers, there is a need to search and introduce effective ways to deliver a sustainable building project. Significant adjustments to the conventional project planning process should be explored. This paper offers ideas and recommendations that are summarized from various sources of sustainable building projects’ studies and experiences on how to plan the project in a sustainable manner within the timeframe and with reasonable cost, having excellent quality and fulfilling the stakeholders’ satisfaction. This paper is very useful for the construction project stakeholders, especially for those who are directly involved in the planning process of a sustainable project.

Planning Process for a Sustainable Building Project

Most sustainable building projects do not meet their targets due to the failure of a planning process and practice in dealing with the barriers (Choi, 2009). A sustainable project is frequently regarded as a sustainable product such as a sustainable design and a sustainable building only rather than the process of completion of the projects whole life as it is completed (Wu & Low, 2010). Consequently, a common practice in determining the costs and benefits between a traditional development and a sustainable project is a comparison of the costs of comparable features. Thus, it is not surprising that sustainable building projects are usually seen as the more expensive option than a conventional building (Wu & Low, 2010; Choi, 2009). Regrettably, the implicit benefits which are formed by the sustainable building project, such as an integrated design, reduce change, and positive impacts on the community are usually not realized. As building expenses are never limited to just initial material and service costs, these implicit benefits using life cycle analysis are seen as a fairer assessment.

A major part of the activities performed in construction project management deal with initiating, planning, executing, monitoring and controlling the project (Zwikael, 2009; Clement & Gido, 2006; Clark, 2002). Achieving the set goals for these building projects within realistic financial and time constraints, superior planning, design, and construction processes are acutely needed (Korkmaz et al., 2010). Planning takes the longest time of the process in project management, approximately 35% of the project manager’s time over the life of the project (Clark, 2002). It is also the most important process conducted in managing the whole life of
construction projects (Kerzner, 2006; Zwikal et al., 2005; Turner, 1993). Hence, the planning process holds the strategic position to ensure a successful sustainable building project delivery. As proclaimed by Zainul Abidin (2009) and Hayles (2004), raising sustainability awareness early in the planning process of a project is very important in order to optimize the influential potential in determining the course of the project. The planning stage also brings together the relevant stakeholders early during and throughout the planning and design process of the project which allows everyone involved to understand and perform their part in the project (HRDC, 2003). Incorporation of a sustainable development concept after the planning stage will be a burden and increase cost to the budget (Zainul Abidin, 2009).

**Project Planning**

A project plan is a set of detailed directions for project team members on what must be done, when and what resources are needed in order to produce project deliverables successfully (Meredith & Mantel, 2006). There are several definitions of a planning process listed by Ritz (1994, p. 88) as follows;

1) Planning is a bridge between the experience of the past and the proposed action that produces a favourable result in the future.
2) Planning is a precaution by which undesirable effects or unexpected happenings can be reduced and thereby eliminate confusion, waste, effects and loss of efficiency.
3) Planning is the prior determining and specifying of the factors, forces, effects, and relationships necessary to reach the desired goals.

These definitions and practices ensure an efficient planning process is the best place to start toward delivering a sustainable building project successfully. Planning activities for a typical project includes the construction execution plan, time plan, construction budget and cash flow and a resources plan (Ritz, 1994). Besides producing a set of drawings and specifications, it also describes how planners bring together the people and other resources toward realization of the drawing (Naylor, 1995). The drawings and reports that are produced are aimed at a variety of workers and stakeholders who are all working toward the same goal. Therefore, a sustainable building project could be facilitated by considering sustainable development principles from the planning process, and being a guide throughout the whole life of the project.

The major outcome of the planning phase is a project plan (Zwikael, 2009; Clement & Gido, 2006; Kerzner, 2003; Clark, 2002; Ritz, 1994). A project plan is very important due to four main reasons; 1) a project plan ensures that the objectives of a project are clearly defined so that there is no disagreement later on, 2) a project plan helps to control and measure the progress of a project, 3) a project plan will help in dealing with any changes that may occur, and they inevitably do occur and 4) a project plan will help to cement stakeholders, with differing interests and perspectives, support over the coming months and years of the project (HRDC, 2003). By developing a detailed project plan at the outset, many problems on projects can be avoided or lessened.

Generally, a project plan contains the following elements, 1) an overview, 2) project objectives, 3) general approach, 4) contractual aspects, 5) schedules, 6) resources, 7) personnel, 8) a risk management plan 9) a marketing strategy and
evaluation methods (Meredith & Mantel, 2006). Meanwhile, HRDC (2003) stress that there are seven (7) elements that should be included in a project plan as follows;

1) A Project Charter
2) A Calendar of Activities
3) A Time Schedule
4) A Responsibility Matrix
5) A Project Plan Budget
6) Major Milestones with Target Dates
7) A Risk Management Strategy

In addition, Angus et al. (2000) added another two (2) important elements that should not be forgotten in preparing a project plan;

8) Production Specification and,
9) Working and Detail Drawing

Several types of planning are involved in a construction project. According to Ritz (1994, p.90) there are three (3) major types of planning (refer to Figure 1), which are:

1) Strategic planning, which involves a high-level selection of the project objectives.
2) Operational planning, which involves a detailed plan to achieve the strategic objectives.
3) Scheduling which puts the detailed operational plan on a time scale set by the strategic objectives.

Strategic planning is done by the owner’s corporate planners who make the important decisions for the project such as project goals, and the start and completion dates (Ritz, 1994). The project development and initiating phase involves a great deal of strategic planning which requires a thorough study on the input of market analysis, financing planning, and project feasibility and so on before the project can get approval (Clement & Gido, 2006; Clark, 2002). The operational plan for a typical project is the job of putting the plan onto a time schedule which falls to the project schedulers. Upon approval of a master plan, a more detailed operational plan, including the schedule, budget, and project resources plan, should be prepared (Ritz, 1994) (refer to Figure 1).
Figure 1
The Project Planning Process

<table>
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<th>Planning</th>
<th>Execution</th>
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<th>Closing</th>
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- Close-out activities
- Feedback
- Lesson learned
- Team transitions
- Document archiving

Project Management Process

Source: Author (2012)

The Project Planning Process

Several planning processes should be executed when developing a project plan. There are various different sources of project planning processes that exist. However, the main processes that are discussed by most of the sources still focus towards the same main principles of a planning process. For instance, Rusell & Taylor (2003) identify seven (7) planning processes which include defining project objectives, identifying activities, establishing precedence relationships, time estimates, determining project completion time, comparing project schedule objectives and determining resource requirements to meet the objectives. Meanwhile, Clement & Gido (2006) list the planning process as defining project objective, determining work elements or activities to be performed, developing a responsibility matrix, defining activities, developing the network plan, cost and resource planning and time estimates. Project Management Book of Knowledge (PMBOK) has listed sixteen (16) commonly used project planning processes which are: 1) project plan development, 2) scope planning, 3) scope definition, 4) activity definition, 5) activity sequencing, 6) activity duration estimating, 7) schedule development, 8) resource planning, 9) cost estimating, 10) cost budgeting, 11) quality planning, 12)
organizational planning, 13) staff acquisition, 14) communications planning, 15) risk management planning, and 16) procurement planning.

For the purpose of this study, PMBOK guide is chosen as the main source as this body of knowledge is recognized as a standard by the American National Standard Institute and continuously updated by project management practitioners, as well as used by most of the large organizations all around the world (Zwikael, 2009).

**Overcoming the Barriers of Sustainable Building Project through a Sustainable Planning Process**

It is very difficult to achieve a high level sustainable outcome without a proper planning process. Recent researches agree that there are four (4) main principles of a sustainable project planning process that should be considered towards facilitating the development of a sustainable building project successfully which are as discussed below;

*Sustainable Project Orientation*

Planning process of a sustainable building project is different from the conventional ones due to its complexity and holistic approach. It is a sustainable development oriented planning process which held responsibility toward delivering sustainable goals (Molenaar et al., 2009). To deliver a sustainable project, sustainability goals and project priorities must be set since the strategic planning stage of the project as they establishes the framework in which all future project decisions are made (Robichaud & Anantatmula, 2011). The early planning of the project generally includes a group discussion about the needs and requirements for the project. At this stage, the level of understanding and commitment to sustainability may vary with different parties. They should be involved in a planning process which is the starting point of achieving sustainability to realize the goal of sustainability (Wu & Low, 2010). Thus, sustainability principles should be introduced to the team members as early as this stage so that they are able to improve the end result by ensuring that all building systems work cooperatively in the most cost effective manner (Glavinich, 2008). There are several requirements that need to be considered and applied throughout the planning process of a sustainable building project, such as create sustainable development requirements in planning, contract and construction drawing, prepare a project quality management plan focused on sustainability and stakeholders expectation (Mochal & Krasnoff, 2010), prepare energy used forecasting, a site specific sustainability plan, post occupancy evaluation and a corrective action plan if the overall occupant is dissatisfied with the overall comfort of the project or building (GBI, 2009). The process can be further improved by improving communication among the stakeholders (The State of Minnesota, 2009; Mochal & Krasnoff, 2010).

*Integrated Design Process*

The traditional project management process runs linearly and usually has minimal input from engineering disciplines, operation and maintenance groups or the outsider during the planning and design stage (Doyle et al., 2009; Choi, 2009). Unlike a conventional project, a sustainable building project works best when the expanded group of stakeholders work together to concentrate the majority of their creative
efforts very early in the planning process (Riley et al., 2004; Prowler, 2011; Muldavin, 2010; Department of Health & Human Services, 2008). A sustainable building project is delivered successfully by applying an integrated design process through the planning process which incorporates six (6) main concepts as follows;

1) Committed and Collaborated project team members

An integrated design approach of a sustainable building project requires all stakeholders who are involved and influenced at every cycle of the building’s whole life (Muldavin, 2010; The State of Minnesota, 2009; Department of Health & Human Services, 2008) based on the suitability of the project, to be committed and collaborated. The team members who are involved early on and throughout the project in the planning and development stages to address project goals, needs and potential barriers in order to optimize the whole construction project (Muldavin, 2010; Choi, 2009). However, depending on the developer’s goals and the type of project, an integrated design team will include different combinations of professionals to accommodate the project’s specific skills and service needs. It is crucial for all members of the integrated design team to share their knowledge and work together throughout the planning process to ensure that the systems they put in place are complementary. It is also vital to include market representatives and local authorities who may financially support or approve the project in the planning phase so that the approval process can go smoothly, or offer perks and incentives that are exclusive to sustainable projects.

On contrary, the linear and split processes of traditional construction management methodologies can cause rework later in the project and add further costs for features that are unnecessary for the whole building system (Choi, 2009). It is less expensive to address sustainable issues in the planning stage of the project than to work them in during the implementation stage (Robichaud & Anantatmula, 2011; Doyle et al., 2009). Hence, an integrated design approach which involves multidisciplinary project team members can be a very effective tool to understand the clients’ needs and requirements, evaluate and correct design errors, determine proper sustainable material usage and installation, and foster communication among all of the stakeholders (Choi, 2009).

2) Early involvement during the planning and design stage

Bringing all of the stakeholders together as early as possible during the planning and design stage allows the project team to take a whole building approach towards achievement of a sustainable building at lower costs (Robichaud & Anantatmula, 2011; Beheiry et al., 2006). The team will also have more influence on some of the most significant and important project decisions, such as site selection, strategic planning, and the preliminary design concepts. Early involvement also allows the project team to create a highly effective analysis of the project and to leverage synergies between various building functions and site characteristics (Zainul Abidin, 2009; Bogenstätter, 2000). Inputs from their collaboration are able to minimize sustainable building costs throughout all phases of a building’s lifecycle. Using this approach can organize priorities to align with a project’s budget. It can also help in avoiding cost overruns, minimize delays, and decrease the change orders during construction. In addition, it can streamline operations and the maintenance of the building in the post-occupancy phase, also provide lower utility and maintenance costs because of its superior planning and design from the onset. A well-designed
sustainable building benefits from full recognition of its features as well as a smooth approval process from the local planning or buildings department (Choi, 2009).

3) Project documentations, strategic and comprehensive plan

It is important to incorporate the requirements for a sustainable building project and an integrated design process into the project documents in the strategic and comprehensive plan. The cost, benefits and the performance of a sustainable building and sustainability issues must be documented and communicated to expand the market for a sustainable development (The State of Minnesota, 2009). To support a sustainable building project, all professionals, customers and other stakeholders, will need to be educated on sustainable buildings including the expected performance of sustainable building features (Choi, 2009; Mochal & Krasnoff, 2008) so that they can better gauge the value of their investment and purchases.

4) Whole building design and system analysis

Recent researches show that whole building designs or the holistic approach is very important towards a successful sustainable building project (Prowler, 2011; Robichaud & Anantatmula, 2011). It requires an integrated design team and all affected stakeholders work together to evaluate the design for the life cycle cost analysis, quality of life, future flexibility, efficiency, overall impact, productivity, post-occupancy evaluation and how the occupants will be enlivened (GBI, 2009). It draws from the knowledge pool of the stakeholders across the life cycle of the project. A whole-systems analysis that treats the building as a system and takes into account the interactions and synergies between the different components also needs to be done (Glavinich, 2008). Besides, a commissioning process should be added during the design process and is described in a specific commissioning section (Muldavin, 2010)

5) Reflect user community and the project stakeholders

Planning should reflect the user’s community and all the project stakeholders for the ultimate excellent performance and satisfaction (Mochal & Krasnoff, 2010). This can be achieved by involving at least a representative of the end user and a local community representative, including a local planner in support of the project (Department of Health & Human Services, 2008).

6) Effective Communication and Charrette

A common challenge in conventional construction projects is a lack of effective communication among various technical experts who tend to use their own tools, protocol, and industry standards for making decisions and tracking information (Sappe, 2007). This situation makes it difficult to manage changes, mitigate risks, and contain costs with a holistic view of the project (Robichaud & Anantatmula, 2011). This inhibits the project from taking advantage of system optimization, which can save time and money (Reed & Gordon, 2000). Buildings not only affect their immediate users but also impact a broad range of other people, land use and communities (Robichaud & Anantatmula, 2011, Kibert, 2005). Therefore, communicating with stakeholders early during the planning stage of the project assures that key groups understand and support the project’s sustainable goals. Thus, the most effective way to gather input from a broad range of stakeholders, and to ensure that they are fully informed, is the incorporation of charrette at the beginning of the project, this is seen as very significant. This involves regular progress meetings and a multiday charrette since the planning process has to be applied in this
sustainable building project for effective communication and exchanging ideas among the project stakeholders group. The level of communication and an inclusive design charrette process across the project team and careful project planning, needs to be enhanced to minimize or eliminate the extra cost of the sustainable building project (Robichaud & Anantatmula, 2011; The State of Minnesota, 2009).

The adoption of these six (6) concepts in an integrated design process ensures the lowering of overall building costs by the promotion of synergies between building systems that may minimize or eliminate the need for certain building features. Early incorporation and the modelling of design features may minimize change orders during later stages where costs may be much higher and enable the production of a more efficient, durable structure, which will lower long term operating and replacement costs (Choi, 2009; Doyle et al., 2009).

**Table 1**

Comparison of Conventional vs. Integrated Design Process

<table>
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*Source: Adapted from Choi (2009, p.114)*

**Integrated Project Team**

To plan for a successful sustainable building project, the stakeholders who are involved in the planning process must fully understand the issues and concerns of all parties and interact closely throughout the planning processes of the project. Each project shall have a core integrated project team that shall be cross-functional to accomplish the various tasks of the project. Stakeholders from the operation and maintenance group, financial, environmental, health and safety, security, information technology and facilities, or space planning, also should be included and are involved and maintained during the whole process of project planning and delivery (The State of Minnesota, 2009; Department of Health & Human Services, 2008). They have to be committed and having core knowledge of sustainable development and sustainable buildings design (Mochal and Krasnoff, 2010; Department of Health & Human Services, 2008).
The sustainable development education needs to reach beyond designers and architects for the acceptance of the sustainable building construction. The project personnel should be educated to ensure they focus on sustainability in their work for the projects (Halliday, 2008). Besides, the market representatives, such as lenders, appraisers, and brokers also should be educated on sustainable development issues because they determine property value and viability (Choi, 2009; Glavinich, 2008). Moreover, to the marketing and finance fields that support these projects, the development of a sustainable building education is most urgent in the engineering, construction, maintenance, vendor and operations fields (Mochal & Krasnoff, 2010). The project team members should be informed and fully understand sustainability issues. Without a sustainable building project knowledge base, they will not be able to evaluate and deliver such projects accurately and effectively (Choi, 2009; Mochal & Krasnoff, 2010). Sustainability quality and capability should be considered during the selection of the team members during the feasibility and planning stage. They are selected based on their familiarity with the product type and market, and will have exposure to all phases of the sustainable building project (Doyle et al., 2009; Bogenstätter, 2000). Continual communications and training for all project personnel are essential during the planning phase to ensure the accomplishment of sustainable project goals in a cost effective manner (Mochal & Krasnoff, 2010). The lack of understanding of a project’s characteristics will lead to a defective delivery process and increased cost for many developers (Smith, 2003).

Regulations and code compliances

Regulatory processes and codes that meet the sustainability goals can help to promote sustainable building construction practices (Muldavin, 2010; Choi, 2009) for example, government policies can heavily influence the development of a sustainable building construction. Codes and ordinances can be used as a regulatory tool to encourage a sustainable development by setting clear criteria that developers need to meet. Meanwhile, regulatory guidelines and processes are areas where incentives or allowances can be adjusted to encourage sustainable practices. Monetary or process-oriented incentives can be offered such as to ease the initial cost differential or difficulty factor. Monetary incentives can offset any cost differential or provide savings for choosing a sustainable building, making the adaptation to a sustainable development more feasible for property owners and developers (Choi, 2009). It can also be used to fund an integrated design or bring in expertise for consultation. Additionally, a well-advertised or marketed incentive can bring positive publicity to the practices, offering developers an alternate design where the developers and the community may both benefit.

Conclusion

An efficient planning process can significantly improve the ability of a sustainable building project to be delivered within acceptable cost constraints and schedules. Therefore, the stakeholders who are directly involved in this process should strive to continuously improve their sustainable capabilities. The sustainable project planning process is successful in overcoming challenges and barriers of a sustainable building construction for many projects with experts and stakeholders who are communicating and collaborating as a team. However, it requires stakeholders who are sympathetic to this idea and, as a team, evolve the planning and
design with a sustainable outlook (Edward, 1998). Without proper planning, the sustainable building construction projects carry a lot of risks. Therefore, careful planning is needed where the integrated project team members apply an integrated design process with strict focus on the sustainable development orientation and are guided by sustainable regulations and code compliances (refer to Figure 2).

**Figure 2**
The Principles of a Sustainable Project Planning Process

![The Principles of a Sustainable Project Planning Process](image)

Source: Author (2012)

**References**


## Table 1
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- Risk management planning
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- Managing the project progress
- Implementing quality assurance procedures

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- Quality assurance/control
- Organization and staffing
- Project reporting

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- Close-out activities
- Feedback
- Lesson learned
- Team transitions
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Source: Author (2012)
The Principles of a Sustainable Project Planning Process

To deliver a sustainable project plan that can be guidance throughout the whole cycle of the project... ....towards delivering sustainable projects

Source: Author (2012)
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Nor Kalsum Mohd Isa\textsuperscript{a*}, Anuar Alias\textsuperscript{b}, Zulkiflee Abdul Samad\textsuperscript{b}, Mohd Yazid Mohd Yunos\textsuperscript{c}

\textsuperscript{a}Faculty of Human Science, Sultan Idris Education University, Perak, Malaysia
\textsuperscript{b}Faculty of the Built Environment, University of Malaya, Kuala Lumpur, Malaysia
\textsuperscript{c}Faculty of Design and Architecture, University of Putra Malaysia, Selangor, Malaysia

*Corresponding author tel: +6019-6213277
Email address: umie772003@yahoo.co.uk (N.K Mohd Isa), anuar_a@um.edu.my (A. Alias), zulkiflee1969@um.edu.my (Z. Abdul Samad), yazidarch@yahoo.co.uk (M.Y Mohd Yunos),