

TOWARDS DEVELOPING A SUSTAINABILITY INTEGRATION FRAMEWORK FOR BUILDING PROJECT

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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 failing of the projects within the market such as knowledge gaps, communication shortfall, ownership structure and operating cost responsibility, funding issues and the risks, and other technical and process issues. Many researchers believe that project planning process holds the strategic position in overcoming the barriers all together. Modifications should be made to the traditional planning process and practices in order to minimize risks and improve the chances of delivering the project successfully. This paper offers ideas and recommendations on the initial concept of sustainability integration strategies that can be practiced throughout the project planning process towards delivering a successful performance of a sustainable building. The concept is very useful to be a starting point for the development of a practical 'Sustainability Integration Framework' during the planning process of a sustainable building project in the future.

Key words: construction project, project planning process, sustainable building project.

Introduction

The growing awareness of sustainable development potential and benefits result in dramatic increases in the demand of sustainable construction projects (Robichaud and Anantatmula, 2011; Zainul Abidin, 2009). There are many researches to show that sustainability would improve the performance of construction project (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 the practices of the concept are still dealing with heightened perceptions of the risks, especially related to the need for managing the project with tighter budgets, profit margins and schedules (Doyle et al, 2009; Choi, 2009). 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 leasing a building (Robichaud and Anantatmula, 2011; Choi, 2009).

There are several major categories of barriers were claimed to be overcome in order to encourage the development of a sustainable building project and gaining full benefits from them, which are; knowledge gap in sustainable construction among the project stakeholders (Choi, 2009), communication loss among the stakeholders (Choi, 2009; Mochal and Krasnoff, 2010), funding issues (Robichaud and Anantatmula, 2011; Korkmaz et al., 2010; Choi, 2009 and Francis et al., 2009), the risks of developing a new building approach (CBRE, 2009; Choi, 2009; Francis et al., 2009; McKee, 1998) and the lack of sustainability technical understanding and the project delivery process issues as well as the lack of expertise and resources on practising the project (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. Planning process at the early project stage is believed to be the most important process conducted in managing the whole life of projects (Zwikael et al., 2009). This process was claimed to hold the strategic position to integrate sustainability considerations to have the most sustainable effect on the overall project and overcoming the barriers all together (Reyes et al, 2014; Wu and Low, 2010; Hayles, 2004). Sustainable buildings are planned and designed in parallel rather than series so that the cumulative effect of planning and design decision concerning one system can be evaluated on other systems. To deliver a successful sustainable building to its actual meaning, sustainability principles are crucial to be integrated into the whole life of the building during the project planning process. Significant adjustments to the linear conventional project planning process should be identified. To response to the issue, this paper aims to explore the strategies to integrate the sustainability principles into building project through planning process by a means of reviewing various sources of relevant literatures. An initial concept of sustainability integration strategies through project planning process is formulated at the end of this paper which is very useful for the construction project stakeholders, especially for those who are directly involved in the planning process of a sustainable building project. By investigating the strategies, this research seeks to make a contribution towards formulating a clear guide of sustainability integration strategies that should be taken into account during the planning process of upcoming sustainable building project.

Project planning process

Project planning determines what is to be delivered, how much it will cost, when and how it will be delivered and who will carry it out (APM, 2012:7). Ritz (1994:88) listed several definitions of planning as follows;

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

The first definition stresses on making use of project prior experience, often gained from past mistakes, to avoid repeating them in present endeavor. The second definition cites the advantages of increased productivity by planning the unexpected and undesirable happenings out of existence before starting to work. The third one stress making a conscious effort to find and control the variables in a capital project. Planning is the process where the decision to proceed a project has been made and it is time to be more detailed in describing the project (Clark, 2002). This process requires the project manager to think through the project and remain focused on the end goal, which is the final deliverable. Naylor (1995) highlighted that a poorly thought-out plan will not anticipate many problems and can turn into a crisis.

The planning process develops the Project Management Plan (PMP) and the project documents that will be used to carry out the project (Zwikael, 2009; Clement and Gido, 2006; Kerzner, 2003; Clark, 2002; Ritz, 1994). The 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. Planning and documentation are iterative and ongoing processes as significant changes occurring throughout the project life cycle trigger a need to revisit one or more of the planning processes and possible some of the initiating processes. During this process, all appropriate stakeholders are encourages to be involved to give their inputs towards the planning and developing PMP and project documents (PMI, 2008). Several planning processes should be executed when developing a PMP.

There are various different sources of project planning processes that exist. For instance, Rusell and Taylor (2003) identify seven 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 and Gido (2006) listed 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. Ritz (1994) suggested that the planning activities for a typical project are including construction execution plan, time plan (field schedules), and money plans (construction budget and cash flow) and resources plan (people, materials, systems and money). This implies that the procedure for the analysis of environmental and social impacts must ensure that any future environmental liabilities and costs, which can result from the implementation of the project, are taken into consideration.

Due to the complexity and various slightly different opinions within this field, PMBOK is chosen as the main source for the purpose of this study 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). PMBOK has listed twenty project planning processes - Develop Project Management Plan, collect requirements, define Scope, create Work Breakdown Structure, define activities, sequence activities, estimate activity resources, estimate activity durations, develop schedule, estimate costs, determine budget, plan quality, develop Human Resources Plan, plan communications, plan risk management, identify risks, perform qualitative risk analysis, perform quantitative risk analysis, plan risk responses and plan procurements (PMI, 2008).

Several types of planning are involved in a construction project. According to Ritz (1994) there are three (3) major types of planning; strategic planning, operational planning and 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 and 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).

Sustainability integration through project planning process

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 and 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 and 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; PMI, 2008) 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 paper focuses on the sustainability integration through planning process of building project, 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 'successful sustainable building project'. 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 authors

believe that project planning is a key factor in achieving sustainability in building project. This argument was supported by most of researchers and writers including BCA (2007) and Hayles (2004) who also accentuated that sustainability in construction project would improve construction project performance. Zainul Abidin (2009:812) also supported the proclamation 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.

Content analysis method for the review of the literature

Qualitative data analysis techniques lend themselves well to analyzing literature (Onwuegbuzie et al, 2012). Onwuegbuzie et al (2010) noted that, every selected literature whether representing qualitative, quantitative or mixed research that contains numerous of sources of qualitative data such as theoretical framework, author's conclusion and interpretation - thereby, justifying within-case qualitative analyses. Further, when two or more sources are compared and contrasted, then cross-case qualitative analyses are justified. Content analysis method was used to analyze and interprets the available relevant literatures within this study. This technique is one of the various qualitative techniques that commonly used to analyses literatures (Onwuegbuzie et al, 2012). Merriam (1998:160) explains that, 'in one sense, *all qualitative data analysis is content analysis in that it is the content of interviews, field notes and documents that is analyzed*'. The process of content analysis involves simultaneous coding of raw data and the construction of categories that capture relevant characteristics of the document's contents (Merriam, 1998). The crucial step in conducting content analysis for this research is to develop a list of the strategies to integrate sustainability through project planning process to be addressed throughout the development of the conceptual framework.

Identifying the sustainability integration strategies through project planning process and formulation of a conceptual framework

From literature reviews, there are twenty-one strategies to integrate sustainability through project planning process have been unveiled and to be addressed in developing the proposed conceptual framework. The strategies are divided into four main groups namely; 1) sustainable project orientation, 2) integrated project team 3) integrated design process and 4) regulations and code compliances. The process of grouping of the strategies into its own category was quite challenging as many strategies do not fall neatly under one sector. Due to this reason, the strategy were put into categories in which it is considered most important, likely to be mentioned and has most impact. Thus, although the principles were put under certain sectors, it is accepted that other interpretations are possible, as there are conflicts in categorization between published works. But as far as the author concerned, these indicators produced intended to put boundaries around the principles although in reality such boundaries do not exist. Details of the strategies listed under each category are discussed as follows;

Sustainable project orientation

Planning process for a sustainable building project is different from the traditional planning process due to its complexity and holistic approach. It held responsible towards delivering sustainable development goals (Molenaar et al., 2009; Yudelson, 2009). It is the process where ideas are made to achieve advance environmental and social standards so that maximum capital and whole life costs can be achieved (CIOB, 2010). A sustainable building project is recommended to be planned with sustainability orientation approach by implementing two strategies as follows;

- Consider specific sustainability goals and project priorities seriously in the planning process of the early stage of project development (Robichaud and Anantatmula, 2011; CIOB, 2010; Yudelson, 2009). At this stage, the level of understanding and commitment to sustainability may vary among different parties (Halliday, 2008). Thus, how the stakeholders are communicating and how the sustainability inputs are given to the stakeholders ensures this responsibility (CIOB, 2010; Molenaar et al., 2009).
- Integrating sustainable concerns during establishment of project scope, project charter, drawing, contract and detailed project plan. It is vital to include and mention the requirements clearly in the project plan and project documents (CIOB, 2010; Choi, 2009; Yudelson, 2009). Using this approach to select the best option among alternatives since the early stage of development is crucial to achieve sustainability targets (Zavrl, 2009; Essa and Fortune, 2008). The optimal sustainability performance will then evolve from project decisions made to meet the performance target.

Integrated project team

Active design professionals' involvement in planning was repeatedly claimed as the key to increase project success (Gibson and Gebken, 2003). To plan for a successful sustainable building project, the stakeholders who are involved in the planning process must fully understand the sustainability issues and 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 (Yudelson, 2009). The integrated project team approach is broken down into seven strategies as follows;

- The project team members is initiated and maintained throughout the process of project planning towards achieving a sustainable building project (Department of Health and Human Services, 2008). They are recommended to follow through all the way to the end of construction phase (Yudelson, 2009).
- Local community representative is involved in support of the project. Perkins et al. (2011) believed that an absence or low level of engagement on the part of team members inhibits planning across community sectors. Local community representatives, including a local government planner are suggested to be involved in planning process to support of sustainability integration in building project (Perkin et al, 2011; Luce, 2010). With local government stakeholders involved in the charrette, the project's initial design is more likely to comply with local, state and federal development needs and regulations. Their involvement provides opportunity to represent the local community voices for matters such as amenities, public transport and many more (Sayce et al, 2004).
- The team should assign an integrated design or sustainability coordinator who is a sustainable building specialist, for the project (Muldavin, 2010; Department of Health and Human Services, 2008; Smith et al, 2006). He/she is suggested to involve in the planning process from the earliest stage of development and must have experience delivering certified sustainable building project with integrated design process (Muldavin, 2010).
- The team members should have the core knowledge of sustainability in building project. The sustainable development education needs to reach beyond designers and architects for the acceptance of the sustainable building project. Without the knowledge, they will not be able to evaluate and deliver such projects accurately and effectively. Choi (2009:130) suggested that one of the factors that should be considered when evaluating project proposals is '*experience of design team with sustainable buildings and their ability to deliver products with less cost overruns and change orders*'. It would be very difficult for a design team without sustainable building experience and knowledge to build a structure that capitalized on all the social, economic and environmental benefits.
- Team members are crucial to be educated on sustainability issues and the project delivery process throughout this stage. The team members are including market representatives, such as lenders, appraisers, and brokers as they determine property value and viability (Mochal and Krasnoff, 2010; Choi, 2009; Glavinich, 2008). The project personnel, including vendors also, should be educated to ensure they follow the company's sustainable development methodology and focus on sustainability in their work for the projects (Halliday, 2008). Besides, to support the sustainable building project, all professionals, including customers and other stakeholders are need to be educated on sustainability issues in building and the expected performance of the building features (Robichaud and Anantatmula, 2011; Choi, 2009) so that they can better gauge the value of their investment and purchases. Lack of access to the knowledge, project's characteristics and materials, imposes the initial costs and lead to a defective delivery process for many developers (Choi, 2009; Smith, 2003). Shortage of integrated design training for all the project team members also caused some project fails (Yudelson, 2009).
- Sustainability quality and capability should be considered during the selection of a project manager, consultants, designers, contractors and the team members of a sustainable building project (Doyle et al., 2009; Bogenstätter, 2000). They are selected based on their right attitude, one of being willing to learn and participate in the new things and process (Yudelson, 2009). The priority is also given to those who are familiar with the product type and market, and having exposure to the project (Bogenstätter, 2000). Choosing a team with a portfolio of successful sustainable building projects is also beneficial to ensure the successful of the project (Choi, 2009).
- Sustainability goals and priorities of the project should be informed to the team members at the initial discussion of a new project (Hwang and Ng, 2013). Potential bidders are to be given

an opportunity to understand the vision of the project team and the importance of the project's sustainability aspects in a pre-bid meeting (Doyle et al., 2009).

Integrated design process

The traditional project management process runs linearly and usually has minimal input from engineering disciplines, operation and maintenance groups or the outside during the planning process (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 (Prowler, 2012; Choi, 2009; Smith et al., 2006; Riley et al., 2004). Sustainability integration in building is expected to be delivered successfully by applying an integrated design process throughout the project planning process that consisting of the following suggested strategies;

- An integrated design approach of a sustainable building project requires all stakeholders who would usually be involved and influenced at every cycle of the building's whole life including designers, engineers, construction teams, environmental planners, financier, cost estimator owners and commissioning agent if applicable, based on the suitability of the project, to commit and collaborate throughout the project planning process since the conceptual and development stages to address project goals, needs and potential barriers in order to optimize the whole construction project (Robichaud and Anantatmula, 2011; Muldavin, 2010; Choi, 2009; Smith et al., 2006). Every stakeholder has to participate during planning process and no one allowed considering just their own special interest (Yudelson, 2009). The multidisciplinary integrated design approach can be a very effective tool to understand the clients' needs and requirements, evaluate and correct design flaws, determine proper sustainable material usage and installation, and foster communication among all of the stakeholders. The team should also include the operation and maintenance staff that will run the building during occupancy to ensure the buildings are operated and maintained in a sustainable manner.
- 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 (Choi, 2009; Yudelson, 2009; Smith et.al. 2006). Ugwu and Chaupt (2005) highlighted that there is a need to adopt strategies that facilitate collaborative working among project teams, as a prerequisite to achieving sustainability objectives. They are also crucially needed to commits to the integrated design process to ensure that the project attains its desired performance goals (Yudelson, 2009).
- Bringing all the stakeholders together as early as possible during the planning process of early conceptual and design stage (Robichaud and Anantatmula, 2011; Yudelson, 2009) allows the project team to take a whole building approach towards achievement of a sustainable building at lower costs (Lapinski et al., 2006; Beheiry et al., 2006). Early involvement allows the project team to create a highly effective analysis of the project and to leverage synergies between various building functions and site characteristics (Bogenstätter, 2000). Perkins et al. (2011) highlighted that how well teams functioned in the early stages is strongly related to the quality of their later preparations for sustainability.
- It is important to incorporate the requirements for integrated design, the process and the sustainability principles into the project documents including the strategic and comprehensive plan. The cost, benefits and the performance target of a sustainable building and sustainability issues must be documented and communicated to expand the market for a sustainable development (Luce, 2010; The State of Minnesota, 2009; Choi, 2009). The integrated design process could be even more important than the design of the building for delivering a successful sustainable building (Muldavin, 2010).
- Recent research shows that whole building designs or the holistic approach is very important towards delivering a successful sustainable building project (Hwang and Ng, 2013; Prowler, 2012; Robichaud and Anantatmula, 2011). It requires an integrated design team and all affected stakeholders work together to evaluate the design for the life cycle cost analysis (Doyle et al., 2009; Department of Health and Human Services, 2008), quality of life, future flexibility, efficiency, overall impact, productivity, post-occupancy evaluation and how the occupants will be enlivened (The State of Minnesota, 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 should be done when possible (Glavinich, 2008; Muldavin, 2009).

Although the analysis requires more upfront time than a standard design process, but it can maximize potential of sustainable benefits (Hwang and Ng, 2013).

- A commissioning process is suggested to be added during the planning process and described in a specific commissioning section to make sure that all the systems perform as designed (The State of Minnesota, 2009; Halliday, 2008; Glavinich, 2008; Smith et al., 2006). The availability of a competent commissioning agent is a key risk factor influencing cost and quality of the project (Yudelson, 2009). The commissioning agent should be able to coordinate and collaborate with the architects, engineers and contractors in order to complete commissioning. Since the commissioning agent serves as check on the work of others to ensure the project meets the design intent and perform up to expectations, bringing commissioning agent on in planning process at pre design phase will ensure that any problems that arise can be fixed during the design stage at minimal cost to the owner (Muldavin, 2010).
- The decision making in planning process involved in determining the future life of a building should take into account the needs of both internal and external stakeholders. A truly sustainable development should recognize all the stakeholders in decision making as they have rights, whether or not they are enshrined in legislation. For instances, the investing building owner will frequently take a primary short-term economic view while the planners need to take a long term perspective recognizing external stakeholders needs (Sayce et al, 2004).
- Design should consider the user's community needs and fit for purpose as a building which are loved are more likely to be maintained and to be sustainable (Luce, 2010 and Mochal and Krasnoff, 2010; Sayce et al., 2004). The team should works with prospective occupants or end user to establish their requirements and interiors spaces, adjacencies and other programming requirements (Yudelson, 2009). This can be achieved by involving at least a representative of the end user during planning process (Department of Health and Human Services, 2008). It is vital to ensure that the project is built with high level of user involvement in the planning process of conceptual and design project phase or the client and designers cannot be expected to produce distinctive and forward looking sustainable buildings.
- Effective communication and charrette are significant to be practiced throughout the project planning process. 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. This inhibits the project from taking advantage of system optimization, which can save time and money (Reed and Gordon, 2000). Communicating with stakeholders early during the planning process of the project assures that key groups understand and support the project's sustainable goals (Hwang and Ng, 2013). The most effective way for effective communication and exchanging ideas among the project stakeholders group is the incorporation of charrette at the beginning of the project. This involves regular progress meetings and a multiday charrette during the planning process (NCI, 2003). Successful charrettes often result in stakeholders feeling included and listened to, even if they do not agree with every aspect of the end product (Robichaud and Anantatmula, 2011; Muldavin, 2010).

Regulations and code compliances

Sustainable project often encounter regulation and code compliance problems in meeting broader regulations. Problem often arise due to conflicting goals between sustainable process and performance, the ability to measure and document performance and failure in communications. Regulation and code compliance problems can occur due to the gap that often exist between the aspirational statements of city leaders or building owners and the realities of day to day implementation of regulation and code compliance with specific building code and building operational personnel. Building codes that were written for conventional developments often do not allow more sustainability systems (Choi, 2009). The risks related to the problem include delays in project completion and additional costs due to delays or design modifications. Appropriate research and communicate with the local and state officials are crucial to achieve the compliances (Muldavin, 2010; Choi, 2009).

- Government policies to encourage sustainable development can heavily influence whether the sustainable project get built. For example policies that educate stakeholders about the benefits and true cost of sustainable building are key success of the sustainable buildings

movement (Beatley, 2008). Governments at all levels can show leadership in sustainable development by including sustainability requirements for all their building projects. The government can use the experience to shape all future land and building development within their authority to be aligned with their sustainability goals.

- Regulatory processes and codes that meet the sustainability goals are significant in helping to promote sustainability integration in building project practices (Luce, 2010; Choi, 2009). Codes and ordinances can be used as a regulatory tool to encourage sustainable development by setting clear sustainability criteria that developers need to meet. It is vital to adopt and align codes to meet sustainability goals and use codes, utility fees and process improvements to promote the practices (Choi, 2009). Codes for sustainability practices should be continually developed and improved. This will allow more sustainable building plans to be assessed efficiently and ultimately minimizing developers' frustration with the regulatory process.
- Providing Incentives is one of the significant efforts to facilitate sustainable project. Regulatory guidelines and processes are the areas where incentives or allowances can be adjusted to encourage sustainable practices (Muldavin, 2010; Choi, 2009). Monetary or process-oriented incentives can be offered such as to ease the initial cost differential or difficulty factor. 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 (Choi, 2009).

Details on the list of the identified strategies and among of the supporters are tabulated in Table 1. The strategies were then addressed in the formulation of the conceptual framework as presented in Figure 1.

Table 1: Strategies to Integrate Sustainability through Project Planning Process and the Supporters

Strategies to Integrate Sustainability through Project Planning Process		Supporters
SUSTAINABLE PROJECT ORIENTATION		
1.	Specific sustainability goals and project priorities	CIOB (2010); Muldavin (2010); Yudelson (2009); Halliday (2008); Robichaud and Anantamula (2011); Mochal and Krasnoff (2010); Wu and Low (2010); Molenaar et al. (2009)
2.	Sustainable concern during establishment of project scope, project charter, drawing, contract and detailed project plan	CIOB (2010); Muldavin (2010); Yudelson (2009); Robichaud and Anantamula (2011); Mochal and Krasnoff (2010); Wu and Low (2010); Zavri, M. S., et al. (2009); Essa and Fortune (2008)
INTEGRATED PROJECT TEAM		
3.	The project team is involved and maintained throughout the planning process	Yudelson (2009); Department of Health and Human Services, USA (2008)
4.	Local community representative is involved in support of the project	Sayce et al (2004); Perkins et al (2011); Robichaud and Anantamula (2011); Choi (2009); Luce (2010)
5.	An integrated design/ sustainability coordinator is appointed as one of the project's team members	Muldavin (2010); Department of Health and Human Services, USA (2008)
6.	The team should have the core knowledge of sustainable building project	CIOB (2010); Yudelson (2009); Hwang and Ng (2013); Robichaud and Anantamula (2011); Mochal and Krasnoff (2010); Choi (2009); Luce (2010); Glavinich (2008); Halliday (2008); Smith (2003)
7.	Team members are educated on sustainability issues and the process including vendors	CIOB (2010); Yudelson (2009); Glavinich (2008); Halliday (2008); Robichaud and Anantamula (2011); Mochal and Krasnoff (2010); Choi (2009); Smith (2003)
8.	Team Members' Selection With Sustainable Development Quality And Capability	Yudelson (2009); Choi (2009); Doyle (2009); Riley et al, 2004; CIDB (2007)
9.	Team members are fully informed on sustainability goals and priorities of the project.	CIOB (2010); Yudelson (2009); Hwang and Ng (2013); Robichaud and Anantamula (2011); Choi (2009); Doyle (2009)

INTEGRATED DESIGN PROCESS

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| 10. | Involve diverse set of stakeholders on the team | CIOB (2010); Muldavin (2010); Yudelson (2009); Choi (2009); Doyle (2009); Riley et al (2004); Gibson and Gebken (2003); Prowler (2012); Department of Health and Human Services, USA (2008); Smith et al. (2006); Matthiessen and Morris (2004) |
| 11. | Committed and collaborative team throughout the process | Muldavin (2010); Yudelson (2009); Choi (2009); Doyle (2009); Ugwu and Chaupt (2005); Riley et al (2004); Gibson and Gebken (2003); Prowler (2012); Department of Health and Human Services, USA (2008); Smith et al. (2006); Matthiessen and Morris (2004) |
| 12. | Bringing the team together as early as possible during planning process | Muldavin (2010); Yudelson (2009); Perkins et al (2011); Robichaud and Anantatmula (2011); Choi (2009); Doyle (2009); Zainul Abidin (2009); Beheiry et al. (2006); Lapinski et al. 2006; Riley et al, 2004; Gibson and Gebken (2003); Bogenstätter (2000); Prowler (2012); Department of Health and Human Services, USA (2008); Smith et Al. (2006) |
| 13. | Integrated design requirements and the process are included into the project documentations, strategic and comprehensive plan. | Muldavin (2010); Yudelson (2009); Choi (2009); Doyle (2009); Riley et al (2004); Prowler (2012); Luce (2010); Department of Health and Human Services, USA (2008); Smith et al. (2006) |
| 14. | Do whole building design and systems analysis | Muldavin (2010); Yudelson (2009); Glavinich (2008); Hwang and Ng (2013); Robichaud and Anantatmula (2011); Choi (2009); Doyle (2009); Hwang and Ng (2013)3; Prowler (2012); Department of Health and Human Services, USA (2008); Smith et al. (2006) |
| 15. | Commissioning process is added during this process and described in a specific section | Muldavin (2010); Yudelson (2009); Glavinich (2008); Halliday (2008); Choi (2009); Doyle (2009); Riley et al (2004); Prowler (2012); Department of Health and Human Services, USA (2008); Smith et al. (2006) |
| 16. | Planning should reflect all the project stakeholders | CIOB (2010); Muldavin (2010); Yudelson (2009); Sayce et al (2004); Mochal and Krasnoff (2010); Choi (2009); Doyle (2009); Riley et al (2004); Prowler (2012); Luce (2010); Department of Health and Human Services, USA (2008); Smith et al. (2006) |
| 17. | Design should reflect the end user community | Muldavin (2010); Sayce et al (2004); Mochal and Krasnoff (2010); Choi (2009); Doyle (2009); Riley et al (2004); Prowler (2012); Luce (2010); Department of Health and Human Services, USA (2008); Smith et al. (2006) |
| 18. | Effective communication and incorporation of charette process | Muldavin (2010); Yudelson (2009); Hwang and Ng (2013); Robichaud and Anantatmula (2011); Choi (2009); Doyle (2009); Sappe (2007); Hwang and Ng (2013)3; Prowler (2012); Department of Health and Human Services, USA (2008); NCI, (2007); Smith et al. (2006) |

REGULATIONS AND CODE COMPLIANCES

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| 19. | Government policies to encourage sustainable development | Muldavin (2010); Choi (2009); Beatley (2008) |
| 20. | Compliance with code and regulatory tool to encourage sustainable development | Muldavin (2010); Choi (2009); Luce (2010) |
| 21. | Incentive to encourage sustainable development | Muldavin (2010); Choi (2009) |

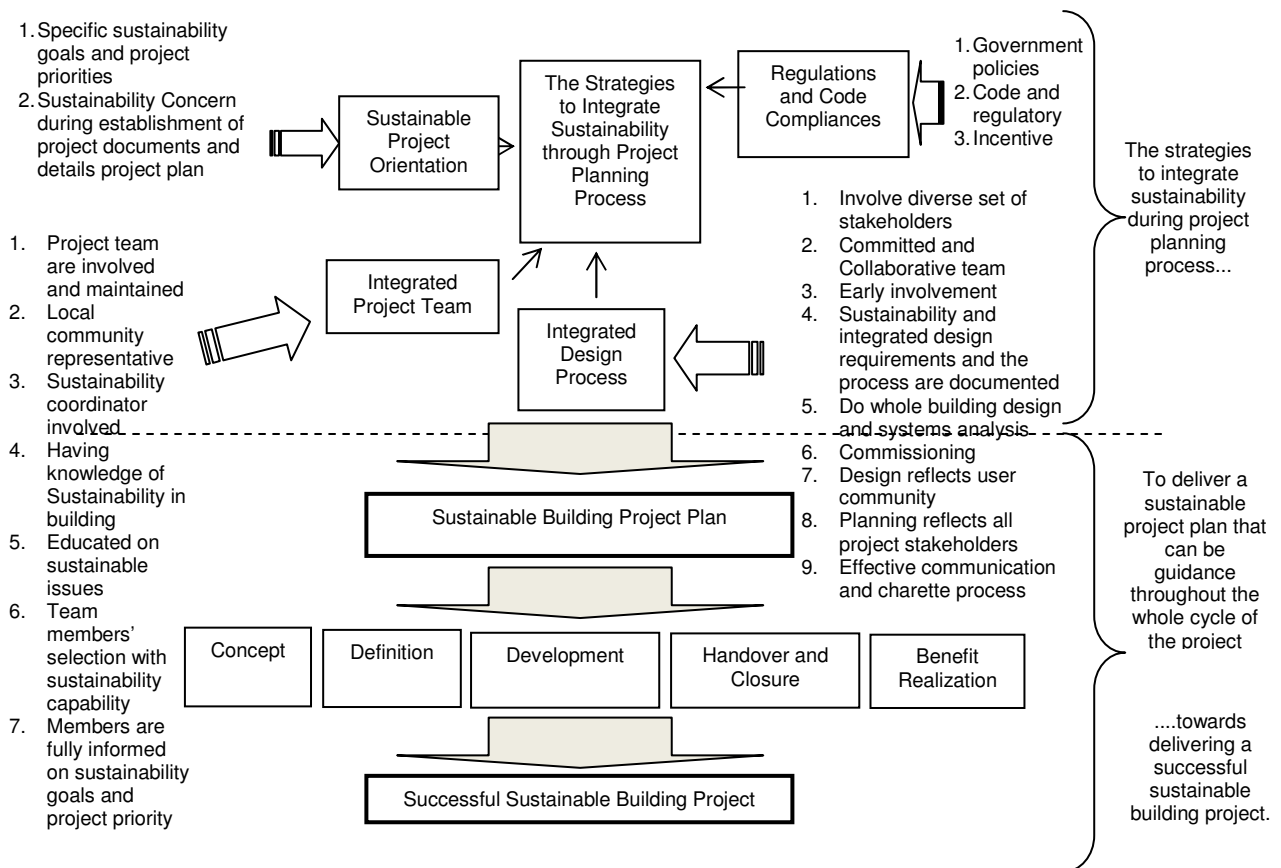


Figure 1: Conceptual Framework of Sustainability Integration Strategies through Project Planning Process for Project Success

Conclusions

Efficient sustainability integration during the planning process of a building project can significantly improve the ability of the project to be delivered to the actual meaning of sustainability within the project constraints. However, the project stakeholders should strive to continuously improve their sustainable capabilities. A successful sustainable building project requires the stakeholders who are sympathetic to this idea and, as a team, evolve the planning and design of the project with a sustainable outlook. This research sought to formulate a conceptual framework of sustainability integration strategies through the building project planning process. The framework was developed by reviewing available relevant literatures including the published research papers, books, guidelines, experiences and other published documents. The framework is very useful to provide an essential guide to the project stakeholders and researchers especially for formulating a clear guide of sustainability integration strategies during planning process for future sustainable building projects. For further studies, it is interesting to investigate in depth the proposed conceptual framework for its possibility to be practiced within the industry.

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