Conceptual Framework of the Critical Success Factors of Green Building towards Sustainable Construction in United Arab Emirates

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Abstract

The green building construction industry requires high-tech technologies and innovative systems. In addition, the green building green building construction industry is currently facing overinvestment problems due to an unreasonable delay in completing the project; these factors affect the overall quality of the green building construction project. The aim of this study identify the critical successes factors affecting green building construction industry projects in the UAE. These factors should will be taken into consideration in developing a framework for critical success factor for sustainable building in UAE. The framework could be helping project managers in making a decision in the sense that the factors are crucial and should be gained more focus. However, since there are more building companies and many building projects do not meet scheduled completion dates. More specific, the data of this study will be collecting from the Al Naboodah Construction Group (ANCG). According to the company profile the total of employees around 14000 in UAE. This study is important for stakeholders in the green building construction industry in general and for UAE stakeholders in particular, including: project management companies.

Keywords
Green Building, Construction Industry, Technologies, Innovative Systems, UAE

1. Introduction

UAE's green building construction industry has experience of remarkable growth and the integration of project management approach is one of the important elements that assist such growth. The project management field focuses primarily on applying tools, techniques, skills and knowledge in order to fulfil project specifications and requirements (Ballal et al., 2007, Mahmoud et al, 2018). Project management approach has been applied in a variety of industries, from green building construction to IT. It has emerged as a new professional sector, but it has been implemented in an informal manner even during old buildings (Al-Hajj & Sayers, 2014). UAE was one of the first countries in the green building construction industry to implement the project management approach. Even the developed nations look to the green building construction industry of the UAE for its effectiveness and growth in a very short period of time.

Much of this development is focused on the project management approach being applied. It has been noted, however, that project managers lack project management skills but are still assisting green building construction companies by offering professional guidance, so it is necessary for individuals to obtain distinct project management qualifications to improve the green building construction industry and ensure that it contributes significantly to the economy of UAE.

UAE has been heavily dependent on its oil resources since the 20th century to support its economy (Green building construction Week Online, 2015). The authorities realized the importance of diversifying the economy towards the end of the 20th century and the resources became depleted at high rates. One of those possible industries in which the authorities assisted in further growth and development was the green building construction industry. This

research study analyses the current trends in the green building construction industry and analyses the approach to project management in UAE. For both the project contractor and the project owner, the time allowed for green building construction performance is an important consideration.

Sometimes the best investments are the ones you don't make. But sometimes the best investments are the ones with guaranteed returns and a valuable contribution to society. One thing is for sure: The most energy efficient, economically rational and ecologically acceptable energy source is saving. That's why we believe that the future for Green Building investment is green as shown in Figure 1.

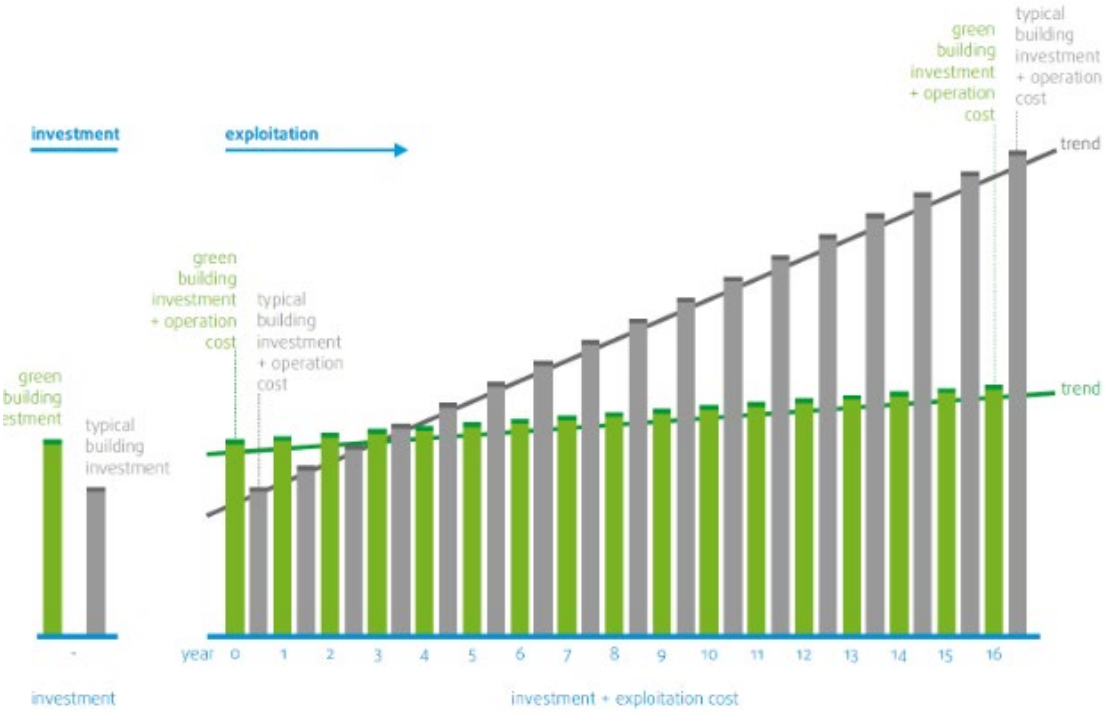

Figure 1: Green Building investment in UAE

To ensure that projects are carried out within the time constraints of the budget, it is important to recognize the reasons for success factors so that once such factors become apparent and stakeholders can take constructive steps to avoid these circumstances (Batool and Abbas, 2017; Gardezi *et al*., 2014). Aziz (2013) argues that there has been little effort to curtail time delay in project execution. Such delays in the completion of green building construction projects in developing countries (such as the UAE) are a common phenomenon. A trio of performance indicators such as time, cost and quality are used to measure time overrun (Iyer & Kumar, 2016; Marzouk & El-rasas, 2014; Doloi, 2013).

Meanwhile, factors affecting the successful completion of green building construction projects have been identified and analyzed over the past decade; however, a deeper understanding of the existence of these critical success factors affecting the completion of the project is still much needed (Al-Dairi, 2011).

Therefore, it is imperative to identify the critical success factors causing green building construction projects completion on time. This will be by means of critical success factors model (CSFs) that affecting green building construction industry projects in UAE.

1.1 Objectives

The aim of this research is to develop a Critical success factors model (CSFs) that affecting green building construction industry projects in UAE. The specific objectives for this research are:

1. To identify the critical successes factors affecting green building construction industry projects in the UAE.
2. To determine the significant effects of the critical successes factors affecting green building construction industry projects in the UAE.
3. To identify the impact of green building success on sustainability in UAE

2. Literature Review

Green building construction project involves unique challenges and risks throughout the entire green building construction process across many issues (Adnan et al, 2011). A green building construction project goes through the design, procurement, contracting, building, operation and maintenance phases of the project. The levels of the key participants and investors varies, as do the associated technical expertise, techniques and expertise (Meng, 2012). Increasing difficulty in planning and involving multiple stakeholders in modern green building construction projects, adding additional obstacles to successfully deliver the plan (Wuni et al, 2019; Shen et al., 2017; Adnan *et al*, 2011).

This research study analyses the current trends in the green building construction industry and analyses the approach to project management in UAE. For both the project contractor and the project owner, the time allowed for green building construction performance is an important consideration.

To ensure that projects are carried out within the time constraints of the budget, it is important to recognize the reasons for success factors so that once such factors become apparent and stakeholders can take constructive steps to avoid these circumstances (Batool and Abbas, 2017; Gardezi et al., 2014). Aziz (2013) argues that there has been little effort to curtail time delay in project execution. Such delays in the completion of green building construction projects in developing countries (such as the UAE) are a common phenomenon.

Poor performance is typical in green building construction projects in practice, such as time delays and cost overruns, and the factors behind these issues have attracted the attention of green building construction professionals and researchers (Teng et al, 2019; Meng, 2012).

In the UAE, several local green building construction projects reported poor performance due to numerous evidence-specific factors such as: unavailability of materials; unnecessary design and drawing modifications; weak participant communication, inadequate monitoring and input, lack of skills in project leadership and political situation (Enshassi *et al*, 2019).

The importance of determining factors affecting the quality needed to improve the green building construction industry's output has now been recognized at various levels in several countries. Bottom-up relationships between the factors that contribute to project performance can provide important insights into success (Cserháti and Szabó, 2014). Identifying success factors can also help in the selection of project team members, identifying their development needs, forecasting the project's performance level before it begins and helping companies decide their strategic position on the project (Toor and Ogunlana, 2008).

In UAE, it is very rare that green building construction projects completed within the specified time and cost. There are many large green building construction projects in UAE, which suffers delays in project completion or in some cases suffered suspension or abandonment (Mir et al., 2014, Gunduz et al, 2018). Therefore, it is imperative to identify the critical success factors causing green building construction projects completion on time. This will be by means of critical success factors model (CSFs) that affecting green building construction industry projects in UAE.

Having reviewed the literature on project success factors for sustainable building, the factors can be broadly categorized into six groups namely project related factors, procurement related factors, client related factors, project participant related factors, project management related factors and external environment related factors as shown in Table 1.

Table 1: Project success factors

<table>
<tr><td colspan="2">Project influential Factors
1. Project's Location
2. Project's Size
3. Clear and realistic goals/objectives
4. Project's adequate funds/ resources
5. Effective procurement and tendering methods
6. Design team's contribution to construction
7. Contractor's technical capacity
8. Shares and exchanges environmental information
9. Provides environmental technical advice to suppliers and help them to meet environmental criteria</td></tr>
<tr><td>Procurement influential Factors
1. Contractor financial strength
2. Effective subcontractor coordination
3. Effective allocation and control of manpower
4. Availability of experienced managers & skilful workforce
5. Project manager's experience
6. Project manager skills</td><td>Project management influencing factors
1. Effective monitoring and control
2. The employees' in the organization receive an adequate amount of training in the environmental management
3. Feedback mechanism from employees and other parties
4. Appropriate organizational structure
5. Realistic schedule
6. Well allocation of resources
7. Adequacy design detail and specification
8. Effective communication among project team
9. Effective risk management
10. Top management support</td></tr>
<tr><td>Project participant related factors
1. Competence
2. Commitment
3. Ability to solve problems
4. Communication among project stakeholders
5. Capability to adopt change</td><td>External factors
1. Political stability
2. Economic stability
3. Weather factors
4. Social factors (Public acceptance toward project)
5. Advancement of construction technology</td></tr>
</table>

Sources; (Wai & Tey, 2012)

2.1 The green building Success

The green building in construction industry is a sector of the economy, which is responsible for planning, designing, constructing, maintaining and eventual demolition of buildings and works (Wells, 1986). It is essentially a service industry, obtaining its inputs and outputs from various sectors of the economy with which it is interrelated and interlinked, often in quite complex ways. The importance of green building in construction derives from its role in the generation of constructed physical facilities, and in employment, which in turn, play a critical and highly visible role in the process of development of a country (Salleh, 2009).

Construction encompasses all civil engineering works and all types of new building projects, as well as the maintenance and repair of existing facilities. In developing countries, as much as half of the total construction output may be in civil engineering projects, transport facilities, power projects, irrigation, drainage, water supplies, housing buildings, hospital, schools, offices, factories, hotels (Wells, 1986).

The green building in construction industry is considered one of the oldest industries organized on a project basis (Gollenbeck, 2008). Well, known examples are the Egyptian pyramids (3rd millennium B.C.) and the aqueducts carrying water to cities and industrial sites that were constructed in Rome in 312 B.C. (Gollenbeck, 2008). One thing that is common to all these historic structures is the use of both human and material resources which are planned, organized, coordinated and controlled for the sole aim of realizing the projects. It also involves a complex structure of different trades and professionals working in harmony towards the realization of the projects.

The green building in construction industry is of strategic importance to any nation due to the role it plays in the economy (Gollenbeck, 2008). It is responsible for the provision of infrastructure and contributes to a country's Gross Domestic Product (Dada, 2012). The industry worldwide accounts for a sizeable proportion of a nation's economic activities and globally accounts for about 10% of the world economy (Freeman, 2011).

The industry can be used for the socio-economic development of developing economies (Hamilton, 2006). This is because of its unique ability to facilitate the development of a nation by providing direction for human needs, stimulating investment, and generating employment (Hamilton, 2006). In developing countries, the construction industry is a key barometer of economic performance. The green building in construction industry contributes a significant percentage of the Gross Domestic Product (GDP) of these countries and provides employment to a substantial proportion of the working population (Bohari *et al*., 2015).

2.2 Sustainability

In the year 2011, the share of construction sector in the total GDP of UAE was 10.3%. During the years 2012-2016, the construction industry was expected to grow around 9.5% as a compound annual growth rate, as per the reports from analysis done by RNCOS. During the beginning of the year 2013, a total of USD 903.05 billion worth projects were ongoing in the sectors of infrastructure, real estate, power, oil & gas and water.

The main leaders in the construction industry of UAE include Arabtec Construction, Giga Group, Danube Group, Emaar, Drake & Scull International, Dubai Contracting Company, Al Habtoo Leighton Group, Dubai Holding, Nakheel Properties, etc. These leaders have been capable of bringing the best projects in the UAE and also significantly contribute towards the growth and development of construction industry. Many of these players now have become international companies after ensuring success in the UAE (ADUPC, 2015).

The construction industry has still not been able to contribute more than an average 10% to the GDP due to certain shortfalls. There are many challenges that have become hurdles in the way of growth and development. One such challenge is that most of the projects are mega projects and the companies are not realizing the value and benefits of small projects. These mega projects hold up huge amount of capital investments, which turns up to huge losses in case of failure or even in case of delay.

The main challenge that is faced by the construction sector of the UAE is that even when the demand for large scale projects is there but it is unbroken. The industry is trending more towards mega projects and thus the mid-scale projects are reducing. In mega projects that are also known as the EPC projects, the investors expect that only one main contractor should be appointed and he should take complete responsibility of the project whatsoever it may be (AHK, 2013). Joint Ventures are the main element of the industry projects in UAE. These joint ventures are mainly between local organizations of the UAE and foreign companies or individuals. As per the rule of the government, foreign companies cannot retain more than 49% of the shareholding in the registered companies of UAE and thus the shareholders account for 51% of the share capital in construction projects. However, the percentage of ownership does not determine distribution of profits, which is flexible and can be determined with the consent of all the shareholders.

On the other hand, UAE has been on high rise and also is accredited in the global market due to its ambitious construction projects. The tallest building of the world stands in Dubai and further its major project showcase creativity and innovation. Green building construction projects of UAE have guided the world and bought drastic changes in the methods and techniques of construction used all around the globe. This industry is still growing and is capable of serving extended needs of the UAE citizens (Kerr et al., 2013).

Fig. 2 obtained from the data results, shows the percentage of being green, pseudo green and energy-monger for each of the ten green buildings of the Middle East. We can find that the Sustainable Bamboo Dome building has the highest green factor of 45%. Also, this building has the highest pseudo green factor of 55%. The Dubai Pearl building has the highest energy-monger factor of 52%. Therefore, we can conclude that the rate of being green based on design criteria in these buildings is between 30% and 45%.

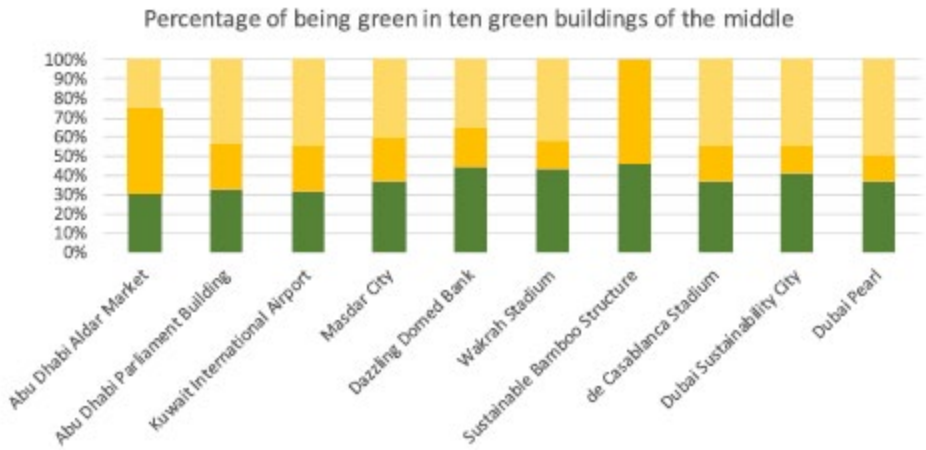

Figure 2: Percentage of being green, pseudo green and energy-monger in ten green buildings of the Middle East base on Designer checklist

3. The Related Theory

The fundamental definition of stakeholder is "any group or individual who can affect or is affected by the achievement of the organisation's objectives" (Freeman, 1984). The general idea of the stakeholder concept is a redefinition of the organisation. Essentially, the concept is about what the organisation should be and how it should be conceptualised. The stakeholder concept has gained an extensive reputation among academics, media and managers in the area of successful completion of projects as it is acclaimed as being capable of changing management practice (Friedman, 2006).

Friedman (2006) states that the organisation itself should be to manage their interest, needs and viewpoints of stakeholders. The stakeholder management is thought to be fulfilled by the manager of a firm. The manager should manage the corporation on one hand for the interest of its stakeholders in order to secure their rights and the support in decision making and also, the authority must act as the stakeholder's agent to ensure the survival of the firm to protect the long-term of each group.

The concept of stakeholder in the past few years has boomed a lot and academics have written extensively on the concept. Also, Non-Governmental Organisation (NGOs), regulators, media, business and policymakers find the concept of immense importance. In the work of Friedman (2006), he submits that a very common way of differentiating the different kinds of stakeholders is to consider groups of people who have a classifiable relationship with the organisation or project.

Further by drawing a clear relationship between definitions of what stakeholders are and identification of whom the stakeholders are which include client, employees, contractor, suppliers and contractors/consultants and other shareholders in accordance with the organisation or project. It can be deduced as such that stakeholders are those needed in an organisation or project to work as a team to ensure successful completion within the set space of time.

4. The Conceptual Framework Proposed for the Research

Includes all activities and interactions needed to settle and close contract agreement established for the project, as well as define those related activities supporting the formal administrative closure of the project. This procedure involves both product verification (all work completed correctly and satisfactory) and administrative closure (updating of contract records to reflect final results and archiving that information for future use).

The contract terms and conditions, changes to the contract and other documents (such as the technical approach, product description or deliverable acceptance criteria and procedures) can also prescribe specifications for contract closure that must be part of this procedure. Early termination of a contract is a special case of contract closure that could involve, for example, the inability to deliver the product, a budget overrun or lack of required resources (PMI, 2000). Figure 3 show the conceptual framework for this study.

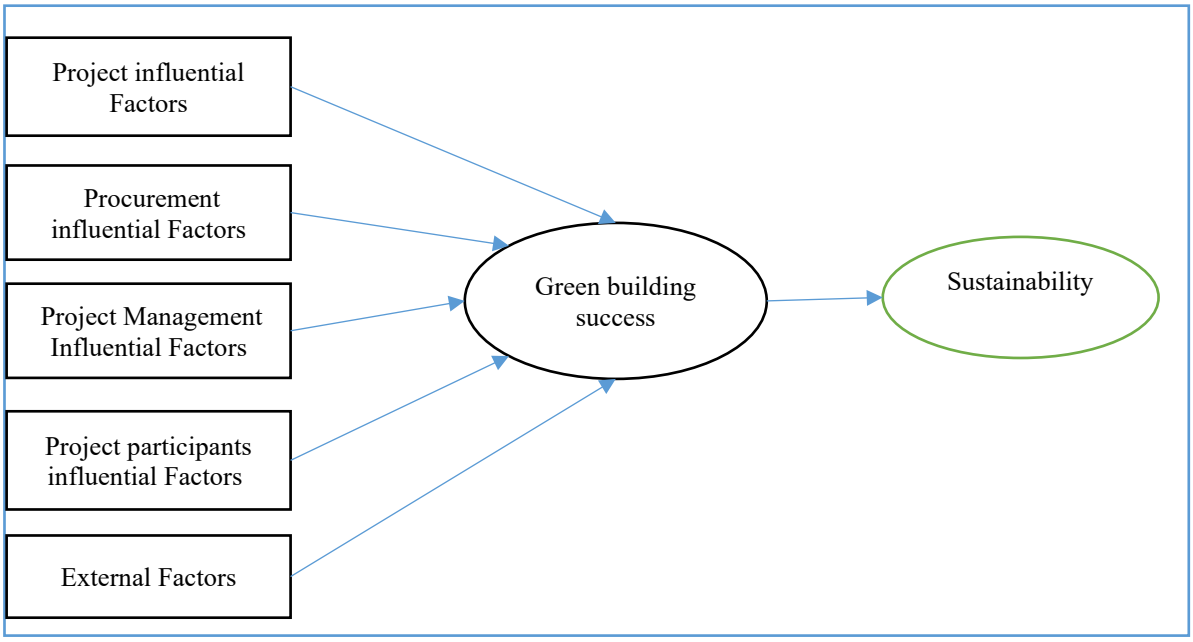

Figure 3: The conceptual framework proposed for the research.

5. Conclusion

This study is important for stakeholders in the green building construction industry in general and for UAE stakeholders in particular, including: project management companies- to identify current trends and requirements in the green building construction industry. Furthermore, to Abu Dhabi authorities-by helping them to develop better plans that can be integrated into the Abu Dhabi 2030 Plan and Project Manager & Employees-to understand the scope, significance and relevance of the project management approach in the green building construction sector and how it can be implemented for UAE green building construction projects. Given the significance of sustainable building, a list of success factors obtained from various literature sources have incorporated into a survey instrument. The framework could be helping project managers in making a decision in the sense that the factors are crucial and should be gained more focus. As this paper covers only success factors of sustainable building, it is a logical step that success factor should come in pair with success criteria as well. In a sense, the success factors help to develop good measures or more popularly known as criteria or performance indicators. The limitation of this paper lies in the rather small sample size. It is generally agreed that a sample size of more than 200 is needed to obtain a robust result. However, this should not be overlooking the contribution of this paper given the reliability of variables still attainable. Moreover, this paper serves only as an exploratory research. More empirical research should be conducted to obtain a reliable framework. Given the limitations, future research should be focused on several issues such as sample size, research method (more robust method like principal component analysis and confirmatory factor analysis) and examined success factors from case studies to achieve methodological pluralism.

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