



**The Integration of Sustainability in Project  
Management and Its Impact on UAE Construction  
Projects Performance**

**دمج الاستدامة في إدارة المشاريع وتأثيرها على أداء مشاريع البناء في  
دولة الإمارات العربية المتحدة**

**by**

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of the requirements for the degree of  
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## DECLARATION

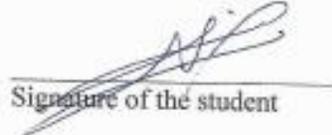
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## **Abstract**

Over the last few decades, a sustainability notion has arisen as an interdisciplinary and pioneering field endeavouring to conduct problem-driven research that associates knowledge with action. As the institutional attention to sustainability science continues to gain impetus both within the UAE and globally. The aim of this study is to examine how the integration of sustainability in project management impacts upon the performance of construction projects in the UAE.

In order to achieve this aim, a literature review has been conducted to facilitate a comprehensive understanding of how sustainability is construed within construction and project management and how it is integrated in their practices and techniques. This also facilitates an understanding of the current UAE construction project practices as related to not only the integration of sustainability into construction projects, but also how practitioners assess the impact of this integration process on the performance of construction projects in the UAE.

The research conducted a qualitative analysis where the structured interviews were used to gather data; 12 project managers were interviewed. The outcome of the qualitative study depicts some descriptive dimensions and themes relevant to the impact and functioning of the sustainable project management practices. These include impacts upon the corporation, leadership role, sustainability motivations and regulations, sustainability goals' achievement, and competency of sustainable construction among the traditional construction along with the various advantages of sustainable project management and sustainable construction clarifying its best techniques and strategies.

## الخلاصة

على مدى العقود القليلة الماضية، نشأت فكرة الاستدامة باعتبارها مجالاً رائداً متعدد التخصصات يسعى إلى إجراء البحوث القائمة على المشاكل التي تربط المعرفة مع العمل. وبما أن الاهتمام المؤسسي بعلوم الاستدامة لا يزال يكتسب زخماً داخل دولة الإمارات العربية المتحدة والعالم على حد سواء. إن الهدف من هذه الدراسة هو دراسة كيفية تأثير دمج الاستدامة في إدارة المشاريع على أداء مشاريع البناء في دولة الإمارات العربية المتحدة. من أجل تحقيق هذا الهدف، تم إجراء مراجعة الدراسات لتسهيل فهم شامل لكيفية تفسير الاستدامة في البناء وإدارة المشاريع، وكيفية دمجها في ممارساتها وتقنياتها. ويسهل ذلك أيضاً فهم الممارسات الحالية لمشروع البناء في دولة الإمارات العربية المتحدة، والتي لا تتعلق فقط بدمج الاستدامة في مشاريع البناء، ولكن أيضاً كيف يقيم الممارسون تأثير عملية الدمج هذه على أداء مشاريع البناء في الإمارات العربية المتحدة.

أجرى البحث تحليلاً نوعياً حيث استخدمت المقابلات المنظمة لجمع البيانات؛ تمت مقابلة 12 مديراً للمشروع. وتبين نتائج الدراسة النوعية بعض الرموز الوصفية / الفئات / المواضيع ذات الصلة بأثر وعمل إدارة المشاريع المستدامة. وتشمل هذه التأثيرات على الشركة، ودور القيادة، وتحقيق أهداف الاستدامة، وكفاءة الابنية المستدامة مقارنة بالابنية التقليدية، مستقبل إدارة المشاريع المستدامة، وأفضل التقنيات والاستراتيجيات المتبعة في ادارتها.

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## 1.0 Introduction

1.1 The agenda of the research is sustainability in accordance with project management and performance for construction projects.

This study is concerned with the ‘sustainability’ notion and the interrelation and interaction between three topics, namely ‘project management’, ‘construction industry’, and ‘performance’. The interest in these topics has exploded recently, as they have made their presence felt both on the policy agenda and in the corporate strategies. The contribution of sustainability to the project management practices and to the construction industry has been established relatively recently in the literatures (Pongiglione & Calderini, 2016).

The future of the upcoming generations is in danger due to global warming, increase in carbon ratios and demands for resources, and greater number of resource consumption (Stern, 2016). Hence, a unique solution is required to mitigate the hazard for the future by managing our resources and cultivating sustainable ways of saving the resources (Al-Tekreeti, 2015). In the last two decades, the notion of sustainability has gained impressive attention and grown very widely in recognition and importance in all fields (Gelhard & von Delft, 2016). Thus, sustainability has been studied by many researchers who have attempted to highlight sustainability as a notion with many other components and aspects (Wagner, 2015).

Sustainability has been commonly defined as “Economic and social development that meets the needs of the current generation without undermining the ability of future generations to meet their own needs” (World Commission on Environment and Development (WCED 1987, p. 43).

According to Kibert (2016), the definitions of sustainability differ mainly in their scope and areas of focus. He has highlighted that most of the researchers have attempted to examine the three aspects of sustainability in their researches, most of the times as one group or separately. The three main focus groups are the

environmental, economic, and social groups (Griggs et al., 2013). Brokhaus et al. (2017) emphasised the same, confirming the aforementioned as the main focus areas of sustainability. All other areas are only parts related to sustainability, while these are the three main pillars of sustainability.

Table 1: The focus areas of sustainability, groupings, and examples of researchers who addressed these focus groups in their researches in the last two decades.

<b>No.</b>	<b>Sustainability Scope/ Focus Area</b>	<b>Author/s</b>
1	Environmental	(Wilkinson, 1997; Hopkins, 2011; Montiel & Delgado-Ceballos, 2014)
2	Economic	(Stern, Common & Barbier, 1996; Bretschger & Smulders, 2007; (Mangra, Cotoc & Dumitru, 2014)
3	Social	(Lehtonen, 2004; Székely & Knirsch, 2005; Peeters, 2012)
4	Economic, Social, Environmental	(Berkes & Folke, 1998; Glaser, 2003; Ehr Gott, 2011; Bowles et al., 2016; Brokhaus et al., 2017)

Many other researchers attempted to highlight sustainability from the common aspect considering the three main focus areas and their relation to other main topics that the sustainability notion affects, i.e. project management, performance, and construction, which will be studied closely in our research.

Table 2: Sustainability notion's relation to the main topics affected

<b>No.</b>	<b>Sustainability Notion / Focus Area</b>	<b>Author/s</b>
1	Project Management	(Kotnour, 2000; Del Cano & de la Cruz, 2002; Silvius & Schipper, 2014)
2	Performance	(Villalonga, 2004; Labuschagne, Brent & Van Erck, 2005; Gelhard & von Delft, 2016)
3	Construction	(Huovila & Richter, 1997; Khalfan, 2002; Hwang & Ng, 2013)

Zuo and Zhao (2014) reported a critical review of existing studies linked to sustainable construction worldwide. The outcome presented that the studies in general were categorised into three key categories, i.e. the definition and scope, benefits and costs, and methods to attain sustainable construction. However, the review illustrates that most of the sustainability studies focused on environmental sustainability.

The number of studies that focus on the social and economic aspects of sustainability are relatively less in comparison to the studies that focus on the environmental aspects, despite the large number of studies that emphasise their importance (Bowles et al., 2016). As per Brockhaus, Kersten, and Knemeyer (2013), sustainability gained huge attention on specific aspects only and applying those aspects on all sustainable fields will not be enough to achieve the sustainable goals and objectives.

The requirement for researches in the sustainability fields is extensive, and there are many sides and areas that are still left to cover (Kass, Shaw, & Steward, 2017). In this research, we will focus on some of these fields and areas, which are related to the optimisation of the sustainability notion for project management processes and the effect of this optimisation on the performance of the UAE construction projects.

This research facilitates a comprehensive understanding of how sustainability is construed within construction and project management literature, and in the process, gains an appreciation of its impact upon construction project performance. It also facilitates an understanding of how sustainability is integrated into construction and project management techniques and processes. Furthermore, this research employs empirical data to facilitate an understanding of the current UAE construction and project practices as it relates not only to the integration of sustainability into construction projects, but also to how practitioners assess the impact of this integration process on the performance of construction projects in the UAE.

This research presents three key questions, which are not only essential for the sustainability of the UAE construction projects, but also vital for highlighting the weaknesses of present practices of sustainability and the ways in which they can be improved:

RQ1: How is sustainability construed in construction industry literature and what are the implications of it upon construction projects?

RQ2: How is sustainability integrated into project management techniques and processes?

RQ3: What are the effects of sustainable project management on the construction project performance in the UAE?

### 1.1.1 Research questions addressed

In this research, we address the research questions pertaining to a brief literature review in order to discuss the ‘state of the art’ of the construction industry, project management, and sustainability researches. The first research question has been addressed in sections 1.5 and 2.3, the second research question has been addressed in section 2.4, and the third research question has been addressed in sections 2.5, 2.6, and 2.7.

## 1.2 The current situation of sustainability in construction projects

With the current unique weather fluctuations resulting from global warming, which has become bigger worldwide, the need of the international community for creating a suitable reaction policy to reduce the impacts of climate change has become more urgent (Stocker, 2014). Cheng and Hu (2010) stated that the construction industry and building operations are the main consumers of non-renewable resources and large producers of waste. For instance, only the building activities oversee almost half of the whole carbon dioxide emissions in the developed countries. Moreover, more than half of the energy is consumed for construction activities, building operations, and maintenance activities.

Enormous amounts of resources exist but energy gets consumed in the construction industry for the buildings, starting from the usage of resources and energy during the construction phases till the buildings' demolition. If these concerns are not undertaken seriously, they will further exaggerate and present more challenges towards sustainable construction (Dixit et al., 2010). Hartmann, Tank and Rusticucci (2013) warned of threats to humanity's survival from climatic changes, where the consequences of global warming are not afar, but need to be seen as a real danger, such awareness about global warming involves handling the issue not only at a national level, but as the worldwide level.

According to Yigitcanlar and Lee (2014), in order to obtain and sustain environment-friendly buildings, researches are necessary to develop building technologies, which are sustainable and to precisely determine the effects on the environment from building and construction-related activities during its entire life cycle, including its architecture design, construction, operation, and demolition. To invent an appropriate plan for reducing the environmental impact and improving the quality of life as the objectives of the plan, by using modern technologies to reduce raw materials, save energy, and recycle (Colicchia et al., 2013)

## 1.3 Projects

### 1.3.1 What is a project?

Many researchers and organisations have attempted to define the project in one form or another based on their experience and needs. Kerzner (2013) defined a project as a sequence of tasks that have precise goals to be achieved within certain specifications, start and end points, multifunctionality, funding parameters, and consumption of resources.

A project is defined as “a bounded piece of work which is non-routine for the organisation. It is not a part of business as usual (BAU) but has a defined start and end point [when it is integrated into BAU] ” (Melton & Iles-Smith, 2009, p. 15). A project has a unique purpose since there is always at least one of its parameters that

are different from the target, resource, and environment. Moreover, projects are temporary and not a repetitive operation. It develops, needs resources, includes an uncertainty, and has a precise set of operations intended to achieve a goal (Gertsen et al., 2016).

However, a program is defined as “a set of interdependent projects working together to achieve a defined organisational goal. There is dependency between project outputs/benefits” (Melton & Iles-Smith, 2009, p. 15). In terms of portfolio, it is defined as “a collection of projects using a common resource pool. These resources could be assets, people, or funding. There is a dependency between these project resources, which therefore need to be used optimally” (Melton & Iles-Smith, 2009, p. 15).

It is indicated by Turkulainen et al. (2015) that the main commonalities between projects, programs, and portfolios are that all apply the same project management procedures, require the achievement of the defined scope that needs completion of certain activities, have limited resources, and are used to bring improvements to the organisation.

### 1.3.2 The temporary nature of projects.

Based on the above definitions stating different perspectives of a project, we can see that they all define a project as a temporary task, which means once the deliverables are delivered, the project ceases to exist since its goal has been accomplished (Salunke, Weerawardena, & McColl-Kennedy, 2013). However, as the PMBOK® Guide 5<sup>th</sup> ed. (2013) states, nature of a project is temporary or, in other words, it is transient; ‘temporary’ in the definition refers to the duration of the project engagement and not the durability of the project’s consequence. A project has a definitive start and end; it cannot last endlessly and must finish when the objective is accomplished; otherwise it is terminated.

Lu (2015) states that projects are complex in nature and there are many aspects and characteristics behind project complexities coming from various number of variables

like ambiguity, uncertainty, unpredictability, dynamics, social structure, and interrelationships of the projects. Turkulainen et al. (2015) argued that project complexity can be categorised by factors, which can be classified into four groups, namely factors related to project size, project variety, interdependencies and interrelations within the project system, and context-dependency. However, all are essential but non-sufficient conditions for project complexity.

Gutierrez and Hussein (2013) state that there is a general agreement that a project, which contains many interdependent working individuals must be considered complex. Moreover, there is similar consensus that failure to recognise the complexity of the project usually leads to project failure, as does the incapability to identify the uncertainty. This means that the way project outputs are assessed is heterogeneous in nature. Lu (2015) emphasises on the relationship between how well-defined the objectives are and how appropriate the methods of attaining the objectives are, suggesting diverse managerial practices based on the uncertainties.

Project complexity depends on many variables, so it's widely accepted that larger, longer, and higher cost projects are considered to be more complex projects in general (Loosemore & Cheung, 2015). On the other hand, this cannot be taken as true, since long-duration or high-cost projects, such as excavation of land or filling an area with sand can be simple. However, the projects' complexity also arises from the fact that projects are handled by formless, continually evolving, and varying teams as well as transient project teams and stakeholders, which affects the project in many aspects. (Qazi et al., 2015).

According to DeMarco and Lister (2013), projects are vastly susceptible to failure in nature. Besides, if the work teams keep evolving and changing, in the short duration of involving teams and stakeholders, the chances of project failure increase. Salet, Bertolini, and Giezen (2013) stated that the smaller the project team and the lesser the deliverables, the better the chances of project achievement. Consequently, the project management teams must breakdown the work packages as much as possible to lesser

projects. Team fatigue and burnout also direct to complex human interactions and staff turnover, which are both hard to forecast and control.

### 1.3.3 Types of projects

Projects differ in their types based on many categories related to project size, level of technical difficulty, degree of uncertainty, and complexity of the relationships within the project team and the surrounding. However, projects can be different due to many aspects and characteristics. These types are unlimited because of the unlimited final products that can be accomplished (Baars, 2006).

The size of the project is related in a straight line to how big the project is and is usually dignified in terms of its total value. Nevertheless, the project's size is not directly related to the complexity of the project, since it might be an inherently simple job like filling millions of cubic meters of sand (Salet, Bertolini, & Giezen, 2013). Haidar and Ellis (2010) suggested that construction of a megaproject is defined as a construction project characterised by big cost, thrilling complexity, amplified risk, and high perceptibility, which is a combination that signifies a major task to the stakeholders, a major influence on the public, and pushes the bounds of the construction experience.

Giezen (2012) states that technical difficulty related to any project is a combination of the project goals to be accomplished and the characteristics of the output and deliverables of the project. Moreover, the technical difficulty is compounded by the two factors – time and pressure – to accomplish the needed work.

The degree of uncertainty of the project has a direct relation with certain goals and activities of the stakeholders', which leads to these goals. The fewer the number of stakeholders certain of their goals and requirements, the bigger the uncertainty associated with the successful completion of the project and the greater the efforts needed to achieve the project goals (Giezen, 2012).

Complexity of a project is linked with people in general, which includes the project team and the surroundings. Moreover, this aspect of a project is unpredictable and concentrates on the effectiveness of the relationships (Gutierrez & Hussein, 2013).

#### 1.3.4 Project organisations.

Kerzner (2013) defined the organisations as groups of individuals who must direct their activities towards achieving the organisational goals. The work needs coordination and communication between the groups and a clear understanding of the connections and interdependencies among individuals.

Therefore, an organisational structure can be defined as the system to characterise the parts and duties, work flow, reporting framework, and decision-making system (Kerzner, 2013). However, there is no such thing as a good or bad organisational structure, but there are only suitable and unsuitable structures. Furthermore, the success of the project relies on its organisational structure, main personnel capability, and work process flow in which the decisions are made (Lock, 2014).

According to Jacobs et al. (2013) there are four elementary types of organisations: functional, matrix, projectized, and composite. In functional organisations, the power rests with a functional manager. The functional manager has the ability to allocate resources and usually, project managers have lesser power; once the project finishes, the resources normally go back to the functional manager. In matrix organisations, the project manager has more power than the functional manager and can make decisions about allocation of resources. A project manager's power normally depends on how much strong the matrix is. However, the projectized organisation is the perfect type of organisation for the project manager, since he has the highest authority and independence. Finally, the composite organisation is a mixture of all other types of organisations. As of now, the composite organisations are the most widely accepted in modern businesses and organisations (Abeles & Goldstein, 2016; Lock, 2014; Jacobs et al. 2013).

It is mandatory for the project manager to distinguish in advance the exact type of organisation they are working with so they can realise their level of power, what in other terms is called the project-oriented organisation in which a considerable part of its procedures and activities take place in the form of projects (Senge, 2014). In the project-oriented organisation, the project manager has full power to establish priorities and manage the activities of the people allocated to the project. In the project-oriented organisation, projects are an ordinary portion of its operation (Salunke, Weerawardena, & McColl-Kennedy, 2013).

### 1.3.5 Construction projects.

Construction is a term used for the processes and procedures that consist of structuring or erection of buildings or infrastructure (Khattak & Qureshi, 2015). General construction is the creation of houses, office buildings, commercial stores, public service buildings, farm buildings, etc., or the construction of civil engineering works such as highways, roads, bridges, channels, railways, ports, and other water, irrigation and sewerage projects, pipelines and electric lines, etc. (Kent & Becerik-Gerber, 2010).

Alzahrani and Emsley (2013) stated that what distinguishes the construction industry from other industries is that its projects are big, constructed on-site, and commonly unique. Time, money, labour, equipment, and materials are the kinds of resources that are used for the project. Moreover, general construction varies from industrial construction. In that industrial construction typically includes big production of similar deliverables without a selected customer, whereas general construction typically takes place at a location for a known client with specific requirements.

As per Bender (2009) these projects are usually conducted by a specialised team, which includes members such as architects, designers, engineers, quantity surveyors, and project managers as well as skilled and unskilled workers. More outstandingly, the project team individuals have specific tasks for themselves for the entire life span of the project. These tasks in general are assigned depending on the scope and

characteristics of the project intentionally to see that the project successfully takes off and eventually achieves the desired goals (Senge, 2014). Normally, the construction project's scope is agreed in contract amongst the client and the contractor, and witnessed by the project team. A construction project is divided into stages, and every stage has different milestones and specific scope in order to manage and track the project progress (Kerzner, 2013).

According to Baars (2006), there are different types of construction projects based on many aspects, such as size, complexity, clients, etc. But the most common aspect of specifying the type of construction projects is based on what the goal of building is; however, even here, there is no common agreement on the exact specification. Virginia (2012) stated that there are three main types of construction projects which are, building construction, heavy/civil construction, and industrial construction. To each type of them needs a distinctive team to plan, design, execute, and operate the project.

## 1.4 Project performance

### 1.4.1 What is project performance?

Richard et al. (2009) stated that project performance refers to managing and conveying the parts of the casual models that direct to the opportune achievement of specified goals within constraints to the organisation and the situation.

According to Carlson (2013) performance needs a system that can measure it and a quantifiable indicator that assesses how well the organisation is doing in order to attain their desired goals. He defined the performance measurement system as the procedure of quantifying the efficiency and effectiveness of actions by using specified metrics. However, Kelly and Ilozor (2013) defined metrics as the standard of estimation for productivity, execution, performance, and quality of deliverables', on which the progress of the project or product can be evaluated.

Metrics help in building expectedness, enhancing an organisation's decision-making, lay out what is working well and what is not working inside the organisation and lead the top management's attention in the correct path (Wang & Khan, 2013).

#### 1.4.2 Types and forms of project performance

Diverse models and forms of performance management were stated in the literatures. Such models have emphasised on the significance of a structure for handling organisational performance and employee performance, or for integrating both, the management of the organisation and employee performance (Carlson, 2013).

As per Sharahi and Abedian (2009) there is no solitary conventional model of performance management. Many professionals have expounded the notion of performance management in their ways. Van Dooren, Bouckaert and Halligan (2015) have stated that the model of performance-management system in the form of 'performance management cycle' has five essential elements which propose in what way performance management system must be applied in any organisation. The elements of the performance-management system cycle comprise set the purposes, measuring the performance, feedback of performance outcomes, prize system based on performance results, and modifications to objectives and activities. There are other theories that are clarifying the concept of performance management. Conferring to Todorović et al., (2015), there are two key notions underlying the performance management which are the goal setting theory and expectancy theory.

Goal setting theory suggests that the objectives recognised by an individual employee play an essential role in encouraging them to perform better. This is the reason that the employees follow their objectives. If these objectives are not accomplished, they either enhance their performance or change the objectives and make them more truthful. Regarding the performance enhances it will product in success of the performance-management system goals (Todorović et al. 2015)

Expectancy theory is built on the hypothesis that individuals regulate performance in the organisation on the expected satisfaction of objectives set by themselves. The

individuals change their behaviour to lead them to their objectives. Expectancy theory inspires the concept of performance management as it is supposed that performance is affected by the expectations regarding future proceedings (Braglia & Frosolini, 2014).

### 1.4.3 Managing project performance

Without having the ability to measure anything we will lose the ability to manage it and enhance the performance to reach the required objective. However, continual improvement is a prerequisite for any project's success (Mir & Pinnington, 2014).

Cheung et al. (2004) indicated that measuring the project performance can be done by a large number of performance indicators that could be associated with many proportions like time, cost, quality, client happiness, stakeholder's variations, business performance, health, and safety. There can be many different project management metrics characterised on the basis of difficulty and nature of the project (Sharahi & Abedian, 2009).

According to Obolinx (2013) there are five project management metric groups that cover the important aspects of the project which are used to measure and evaluate the project during the implementation, namely schedule and effort/cost variance, productivity and resource utilisation, change requests to scope of work, quality and customer satisfaction, and gross margin.

Table 3: Project management metric groups and their purposes.

<b>Project management metric groups</b>	<b>Purpose/goals of the metrics</b>	<b>Author/s</b>
<b>Schedule and Effort/Cost Variance</b>	The purpose of this metric is to measure the performance and achievement of the project compared to the signed baselines. it is very significant metric and it is the solid for profitability of the project.	(Phillips, 2013; Ahmad, Mallick & Schroeder, 2013; AF Ragab, & Arisha, 2013)
<b>Productivity and Resource Utilisation</b>	The goal of this metric is to quantify the efficiency and productivity of all human and machinery resources, intricate in the project, and give the project manager access over or under-utilisation cases.	Phillips, 2013; Ahmad, Mallick & Schroeder, 2013; AF Ragab, & Arisha, 2013)
<b>Change requests to Scope of work</b>	Any alteration to the signed scope should be done in organised manner and reflect on the scope baseline, which in line has an impact on cost and time baseline and on the resource.	Phillips, 2013; Ahmad, Mallick & Schroeder, 2013; AF Ragab, & Arisha, 2013)
<b>Quality and Customer Satisfaction</b>	Measure the quality by using the quality assurance tools to identify any defects delivered through the project lifetime and compare it with the customer expectations.	Phillips, 2013; Ahmad, Mallick & Schroeder, 2013; AF Ragab, & Arisha, 2013)
<b>Gross Margin</b>	The goal of this metric is to measure the profit by finding the difference between the total revenue and the total cost spent on the project.	Phillips, 2013; Ahmad, Mallick & Schroeder, 2013; AF Ragab, & Arisha, 2013)

#### 1.4.4 Factors that may constrain project performance

Identifying the critical success factors and the possible pitfalls at an early stage is essential to make sure of the project's success (Han, 2014). Likewise, considering the important factors that affect the project's performance during the early stages would increase and enhance the successful achievement of the project (Slater, Mohr, & Sengupta, 2014).

There are many critical factors that constrain a project's performance. Dealing with them in the correct way would enhance the performance, which will lead to the project's success in terms of technical performance, project manager experience, clear objectives, project team selection, cost estimate, scheduling, communications, top management support, early and continual client observation, risk management and risk assessment, organisational philosophy, delegate authorities, facility support, and market intelligence (Wi & Jung, 2010; Jun, Qiuzhen & Qingguo, 2011; Han, 2014).

There are many researches and studies that have been conducted to observe the factors that constrain the project. Faridi and El-Sayegh (2006) stated that lack of efficient manpower, deprived organisational structure and deprived management on-site, inappropriate control, and deficiency and failure of equipment among others lead to construction delays in the United Arab Emirates. Moreover, Wi and Jung, (2010) observed reasons behind the customers' displeasure in the South African construction industry and stated clashes between parties, deprived workmanship, and ineffectiveness of contractors to be among the elements which influence the project's performance in a negative way.

#### 1.4.5 Project performance in projects and project management

There are various factors that govern whether a project is a success or a failure, which fluctuates based on the preliminary objectives of the project. If the chief goal is to upturn the company's efficiency by a specific percentage, project performance management will make observations before and after data collection considering if

the project strategy was suitable or not and how much the efficiency enterprise cost against income or improvement it created (Kissi, Dainty, & Tuuli, 2013). The main financial objective will be studied fundamentally for the expenditures against profits percentage; also, it could check how efficiently the budget was spent to reach the goals (Mir & Pinnington, 2014).

Braglia, and Frosolini, (2014) suggested that project performance management can be used to evaluate the performance of individuals or teams on any project. This is characteristically done by interviews, reviews or questionnaires; however, the project may fail because of bad communication, uneven amount of work or lack of collaboration between workers or teams. Managing project performance can aid define which, if any, of these factors are hindering advancement and may help to suggest a solution to put a project back on track.

Organisations or projects might decide to appoint an expert from outside the organisation as the project performance manager or use the manager of a division or project to collect required data and information. However, the performance manager from outside consents a further objective view about the performance deprived of the personal relationship with employees or expectations to advance inside the company. Instead, an internal performance manager has a greater knowledge about the business and its operations, which will allow more suggestions and solutions for development that are appropriate to the organisation or project goals (Gu, 2016).

In some cases, employees may find project performance management to be offensive, unfair, and annoying. Therefore, it is essential to have an actual proof that shows performance management gains to the workers and teams in the company (Tepper & Simon, 2015).

#### 1.4.6 Project performance in construction projects

The factors that constrain the project performance in the construction projects are diverse in their effecting degree from area or country to another based on many influences like resources, environment, culture, weather, and political and economic aspects (Enshassi, Mohamed, & Abushaban, 2009).

Considering the present levels of competition, projects are executed in complex, dynamic, and uncertain environments (Kerzner, 2013). As project management is being incorporated more in the organisations, performance measurement of projects is increasing to comprise more aspects of performance. As a result, companies who are project-oriented organisations must use a cohesive performance measurement system that assimilates all project objectives (Yang, Huang, & Hsu, 2014).

Mir and Pinnington, (2014) stated the important factors that affect the project performance in construction industry and specified them as cost, time, quality, productivity, stakeholders' agreement, community gratification, people, health and safety, and environmental factors. Moreover, they found that there is agreement between the owners, contractors, and consultants on the importance of these factors and the effecting degree of the project performance.

Traditionally cost, schedule, quality, and safety are the points deliberated as the most serious for achievement of construction projects. However, (Austin, 2013) identified eight performance indices. The performance indicators signify Schedule Performance Index (SPI), Billing Performance Index (BPI), Profitability Performance Index (PPI), Quality Performance Index (QPI), Team Satisfaction Index (TSI), Client Satisfaction Index (CSI), Project Performance Index (PI), and Quantification of the Priority Weights(QPW).

## 1.5 Sustainability

### 1.5.1 ‘Green’ and ‘Sustainability’ within the context of construction:

Over the last few decades the word green has expanded its definition, which currently goes way further than colour. Nowadays, green or being green has recognised in our dictionary as an adjective, noun, and verb that is integrated in many aspects. One of those aspects is the construction industry around the world (Zuo & Zhao, 2014).

Green from the construction perspective is usually related to the green buildings (Poerschke & Gampfer, 2013). According to Yudelson (2013) green building is a general perception that begins with the idea that the constructed environment can have reflective influences, together good and bad, on the environment, in addition to the public living in the building. Green building is an effort to intensify the good and alleviate the bad of these influences through the whole life-cycle of a building. Kibert (2008, p.8) defined green building as: “healthy facilities designed and built in a resource-efficient manner, using ecologically based principles”. This definition mostly emphasises on the environmental influence of the building, and does not comprise how the building affects and interrelates with its atmospheres and populations. The US Green Building Council (2003) defines ‘Green Building’ as the significant reduction or elimination of the negative impact of buildings on the environment and on the building occupants. Green building design and construction practices address sustainable site planning, safeguarding water and water efficiency, energy efficiency, conservation of materials and resources, and indoor environmental quality.

RICS (2009, p.6) put forward the following definition of sustainable buildings: “Sustainable buildings should optimise utility for their owners and occupiers and the wider public, whilst minimising the use of natural resources and presenting low environmental impact, including their impact on biodiversity”. This definition has a broader scope since it integrates the end-users, perceptions, and the building’s interface with its surroundings. This definition is in accordance with Berardi (2013,

p.74) who claims that “a sustainable building should not only deliberate the environmental features, but also be ’designed and operated to be fit for use with minimum environmental impact”. There are uncountable meanings of the word ‘sustainable’ around the world. As has already been noted, nobody has the same exact meaning (Kibert, 2016). However, Hart and Milsten (2003) defined sustainability as the prospects of refining the community and environmental performance of the present generation without comprising the ability of next generations to meet their community and environmental requirements.

Strange and Bailey (2008) unpack many definitions of sustainability and explicit that sustainability is more about integration and developing techniques that welfare the broadest probable range of segments, across boundaries and even among generations. In other words, our choices must take into consideration the possible influence on the society, the environment, and the economy. Our activities will have effects somewhere or the other and our actions will have an impact on the future.

Cole (1999) claimed that there is discrepancy between green and sustainable building assessment: a green building concentrates on the local environmental features, using conservative building applies as a reference point, whereas a sustainable building is considered using pre-defined worldwide sustainable (economic, environmental, and social) targets. Yanarella, Levine and Lancaster (2009) illustrated that green and sustainable are frequently used interchangeably in construction and other industries. There are differences between them but the most noticeable difference is that sustainable means capable of being continued with least long-term result on all the components including the whole system; while green is a word that is particular in the methodology of being environmental friendly or good to the environment.

Table 4: The Green vs. Sustainability: A Typology of Differences (Source: Yanarella, Levine, & Lancaster, (2009), P. 297)

<b>Dimensions</b>	<b>Green</b>	<b>Sustainable</b>
<b>Relation to sustainability pillars</b>	Only one pillar (environmental improvement)	All three legs (environmental, economic, and social)
<b>Focus</b>	Single component	Interplay of each single component and whole system
<b>Tactics/Strategy</b>	Tactical implementation of actions that promote separate changes and improvements to make the world less unsustainable	Strategic examining of a decent scale that will make regulations successive and actions easier and less costly by designing and applying a sustainable self-balancing system
<b>Political orientation</b>	Conventional, practical and, realistic	Innovative, idealistic, and revolutionary
<b>Scale</b>	Individual devices, products, indicators, practices, buildings as most tractable level for greening	Community as the level at which human and social disequilibrium and ecological insults can be dynamically rebalanced
<b>Risks or excesses</b>	Greenwashing	Ideal fantasising or top-down controlling policy action
<b>Definition of success</b>	Progress of incremental improvements	Reduction of ecological footprint in the city regions

The differences between Green and Sustainable exist, but it is hard to not link the two words together. Hence, using sustainable products can help make things green, and those organisations who want to be green need to use sustainable products or use the sustainable concept (Adams, 2003).

### 1.5.2 Types and forms of ‘Green’ and ‘Sustainability’ in construction

Any building, new or old, large or small, commercial or residential, can be ‘greened’. One can apply the greening or sustainability principle on it in many ways and efficiencies (Yudelson, 2013). According to Kibert (2016) there are many different methods and systems to apply the sustainability aspect to the buildings. The understanding of buildings’ primary purpose and usage will dictate the best ways to achieve the sustainable objectives.

Wilson, Hargreaves and Hauxwell-Baldwin (2015) highlighted that considering that the main purpose of a home is to live in, a home’s utmost environmental challenges are energy and water consumption. Judson, Iyer-Raniga and Horne (2014) confirmed that for existing homes, human can green their homes by buying products and fittings that are efficient and save energy. New homes can be greened by designing and constructing the home using sustainable ways and designs that help achieving the green concept.

Hall (2014) conducted a study on commercial buildings and office spaces clarifying that because of all the computers, devices, and equipment that companies need for operations. Commercial spaces usually use a great amount of electricity; therefore, focusing on methods to decrease energy consumption by using renewable energy sources like solar panels or wind turbines on the roof, can create energy independence. With this mind, Ryan-Fogarty, O'Regan and Moles (2016) studied the sustainability of healthcare and hospital facilities as it is considered a huge consumer of a plentiful amount of electricity and water. They can advantage from sustainable objectives of dropping energy consumption. Moreover, it creates a significant amount of waste. To reduce the production of waste, greening objectives for healthcare facilities, for instance, buying medical products that are harmless to reuse and applying recycling systems, can prove to be beneficial.

McKenzie-Mohr (2013) states that the green construction goes beyond specific building types. Public planning creativities are rising within the sustainability

movement, focusing on the building environment and also the infrastructure and the communities as a whole. As per Judson, Iyer-Raniga and Horne (2014) there are uncountable forms and frameworks of green public planning, from devoted park space to bike lanes to nearby public transportation, all of which can contribute to a more sustainable community.

### 1.5.3 Implementing ‘Green’ and ‘Sustainability’ in construction

While the practices, or tools, active in sustainable buildings are constantly developing and could vary from area to area, there are essential philosophies that persevere from where the technique is derivative: Placement and construction design efficiency, energy efficiency, water efficiency, materials efficiency, internal environmental quality improvement, operations and maintenance optimisation, and waste and toxics reduction (Kibert, 2016).

On the appealing side of green-building architecture is the viewpoint of designing is in coherence with the natural landscapes and resources near the construction site. There are important steps in designing sustainable buildings: stipulate 'green' building raw materials from native sources, decrease loads, improve systems, and produce on-site renewable energy (Sayigh, 2013). Kubba (2012) and Maltzman and Shirley (2012) have stressed that the green building concept is integrated in all construction project phases and stages and could be implemented in each part of the project life cycle.

Brockhaus, Kersten and Knemeyer (2013) highlighted that the sustainability notion and green buildings have many practices that come under seven general groups, namely, siting and structure design efficiency, energy efficiency, water efficiency, materials' efficiency, indoor environmental quality enhancement, operations and maintenance optimisation, and waste reduction.

Siting and structure design efficiency

Basis of any construction project is entrenched in the notion and design phases. The design and concept phase is one of the main stages of the project life cycle, as it has the biggest influence on cost and performance. Therefore, in designing environmentally ideal buildings or green buildings the goal is to reduce the entire environmental impact accompanying all the life-cycle phases of the project. Though, building as a procedure is not as simple as an industrial procedure, and differs from one building to the other, certainly does not reiterate itself identically. Furthermore, buildings are very difficult products, consisted of different materials and elements (Akadiri, Chinyio, & Olomolaiye, 2012).

### Energy efficiency

Green buildings have regular methods to decrease energy usage. Consequently, to upturn the effectiveness of the building covering, we might use high-efficiency windows and filling in walls, ceilings, and floors. Furthermore, strategy like passive solar building, is frequently applied in low-energy houses by orienting windows, walls and house canopies, porches, and plants to shade windows and roofs throughout the summer, while increasing the solar improvement for the winter. There are many practices that can be implemented like window location (daylighting), which can give more light and reduce the requirement for electric lighting during the day; using sun water warming which can reduce energy costs; generation of renewable energy through solar energy, wind energy, and hydro energy; using biomass which can noticeably reduce the environmental effects of the building (Sussman, 2008).

### Water efficiency

Decreasing water usage and keeping water quality are one of the key goals of sustainable buildings. To the best extent possible amenities should upsurge their reliance on water that is collected, recycled, filtered, and used again on-site and during the construction. Water conservation during the course of the life of a building could be done by designing dual plumbing that recycles water from toilets. Excess water may be reduced by using water-conserving fittings like low-flow shower heads

also waste water could be used for landscaping around the buildings. (Ali & Al Nsairat, 2009)

#### Materials efficiency

Raw materials are considered one of the most important parts of the green building and some consider it the part which defines the green building along with the design. However, green building overall material selection standards are the following: resource efficiency, indoor air quality, energy efficiency, water conservation, and affordability. Furthermore, as part of the trending aspect to convert to green, the associations and organisations have found and invented replacement for each important material that is affecting the environment which are considerably friendlier to the environment (Spiegel & Meadows, 2010).

#### Indoor environmental quality enhancement

Indoor Environmental Quality (IEQ) includes the circumstances of a structure – air quality, lighting, thermal situations, and ergonomics – and their influence on residents. Tactics for addressing IEQ embrace those that protect human health and decrease stress and possible incidence and can also improve the lives of building residents, upsurge the resale price of the building, and decrease liability for building landlords. (Lee & Guerin, 2009)

#### Operations and maintenance optimisation

Buildings which have been designed and constructed in a sustainable and green way can remain the same if they are operated and maintained with the same green and sustainable aspect by making sure that the operations and maintenance (O&M) people are acting according to the project's planning and improvement procedure. However, every feature of green building is combined with the O&M stage for the building's lifetime by implementing green practices (Robichaud & Anantatmula, 2010).

## Waste reduction

Green architecture looks to minimise the waste of energy, water, and materials consumed during the construction phase. For instance, to decrease the quantity of material going to landfills. Well-designed buildings also minimise the quantity of waste produced by the residents (Spiegel & Meadows, 2010).

## 1.6 The research map

### 1.6.1 The current research situation:

Sustainable construction has gained global attention and motivated researchers to distinguish and solve elaborate difficulties in its implementation over a project's life cycle (Singh et al., 2012). It is a progressively significant subject in the matter of delivery of construction projects. Moreover, it is an area that has gained momentous consideration in many researches done in the last few decades (Brokhaus et al., 2017).

Xia et al. (2015) conducted a review on sustainable construction and published researches to identify the status of the current research that would offer guidance for future researches. They emphasised on the amount of attention given to sustainability around the world, as they stated that the numbers of published researches related to sustainability have been increasing steadily. It has increased more than four times between the years 2000 and 2012. According to Bowles et. al (2016), Al-Tekreeti (2016), and Kibert (2016) sustainability is still a relatively new field and there are many areas that have still not been considered in a proper way or have still not been discovered especially from the management aspect. They stated that further investigations are still required, which would prove to be beneficial in the long term.

Sustainable construction's objective is to move projects far from narrowly attentive traditional management concerned with drives of time, cost, and quality, and giving devotion to economic, environmental, and social effects of the construction projects.

To that end, we need more focused researches that would highlight sustainable construction as a practice related to the project management processes, which would have a clear impact on the deliverables and their performance (Brockhaus, Kersten, & Knemeyer, 2013).

### 1.6.2 The research Map

<b>Problem Statement</b>	<b>Research Aim</b>	<b>Research Objectives</b>	<b>Research Questions</b>
<p>The requirement for researches in the green and sustainability fields is extensively open. There are many sides and areas still left to cover, since sustainability is still relatively new. Nevertheless, in this research we will focus on some of these fields and areas which are related to the optimisation of the green and sustainability notion of the project management processes and the impact of this optimisation upon the performance of the construction projects in the UAE.</p>	<p>The aim of this study is to examine how integration of sustainability in project management impacts upon the performance of construction projects in the UAE.</p>	<p>To facilitate a comprehensive understanding of how sustainability is construed within construction and project management literature and in the process, gain an appreciation of its impact upon construction project performance.</p>	<p>RQ1: How is sustainability construed in construction industry literature and what are the implications of it upon construction projects?</p>
		<p>To facilitate an understanding of how sustainability is integrated into construction and project management techniques and processes.</p>	<p>RQ2: How is sustainability integrated into project management techniques and processes?</p>
		<p>To employ data of an empirical nature to facilitate an understanding of current UAE construction and project practices, as it relates not only to the integration of sustainability into construction projects, but also how practitioners assess the impact of this integration process on the performance of construction projects in the UAE.</p>	<p>RQ3: What are the effects of sustainable project management on the construction project performance in the UAE?</p>

## 2.0 Review of Literatures

### 2.1 Introduction:

The construction industry delivers the elementary living circumstances for the sustainability and development of social life on the planet (Lim et al., 2015). Zuo and Zhao (2014); Bowles et al. (2016) and Brokhaus et al. (2017) emphasised on the sustainability notion in order to manage with an ever-growing population, density on land, and growing economic movement. The construction projects which are in growing demand are thriving in many countries; at the same time, sustainable growth and globalisation is the new time spirit of our century. Sustainability is vital for the construction industry, since construction activity, mostly, has a bigger influence on the environment compared to the other industries, which creates consequent crucial requirement to implement sustainability principles for construction industry practices (Kibert, 2016) and (Hwang & Ng, 2013).

Al-Tekreeti (2016) stated that the companies have only been constructing sustainable buildings for the past 30 years. During that time, the sustainable movement increased continuously. The history of sustainable building goes back by much more than these thirty years, it would have been perceptible as an efficient practice during the energy crisis of the 1970's, when sustainable building in studies was realised. In the light of Hwang and Tan's (2012) explanation that it started when constructors and designers were searching for a method to decrease the dependency on fossil fuels for constructing buildings and homes, one of the solutions that emerged was the solar panels, which were used to make more environment-friendly homes. However, the implementation of solar panels was only in minor numbers because of the high initial costs.

The basic understanding of sustainability is, according to the Brundland Report, an expansion which meets the requirements of the current without compromising on the capability of coming generations to fulfil their own requirements (WCED, 1987). This explanation has since been expanded to encompass government missions to

achieve sustainability in different industries. The existing sustainability strategy forms the keystone to build environment activities, generally, with the environmental element being the main feature for the last two decades (Stocker, 2014) and (Edum-Fotwe & Price, 2009). According to Prasad and Hall (2004), Hartmann, Tank and Rusticucci (2013), and Kass, Shaw, and Steward, (2017) sustainability offers a synthesis of environmental, economic and social substances. It also offers shelter for people, infrastructure for the public, and it is the one of the main part of the economy. Its enterprise sets the form for resource consumption over its comparatively longer lifetime.

## 2.2 Sustainability pillars as drivers:

In 2005, the World Summit on Social Development (WSSD) identified three essential cores points that contribute to the notion and social science of sustainable development. These ‘pillars’ in many nationwide principles and certification schemes form the support to tackle the core areas that the world currently faces (Katende, 2007). Griggs et al. (2013) recommended that the three pillars, namely economic, environmental, and social, must be incorporated at the national level by building capacities for amplification of science and technology policies and strategies.

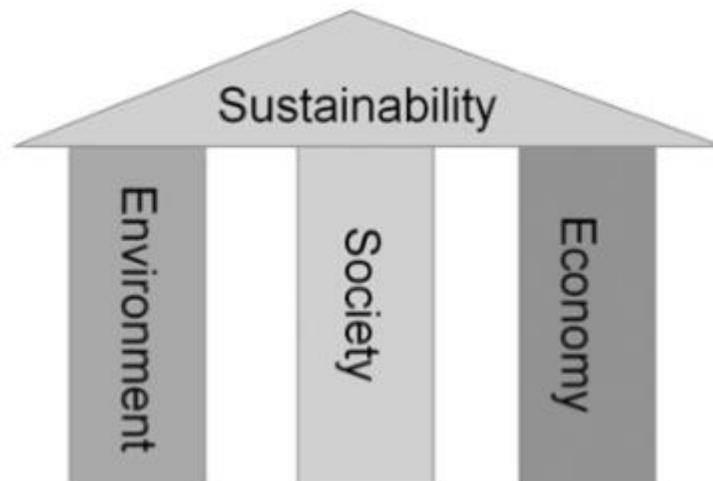


Figure 1: The Three Pillars of Sustainability (Adams 2006, p. 2).

Sancha, Longoni, and Giménez, (2015) defined the sustainability drivers as any natural or human-induced features that cause changes in an ecosystem, in direct or indirect ways. Lunke, Haavaldsen and Lohne (2016) confirmed that past researches highlighted the three pillars as powerful tools that can define sustainability problem, drivers, benefits, and challenges. Social, economic, and environmental pillars are the three main pillars for sustainability. Furthermore, if any pillar is insubstantial then the whole system of sustainability shall get affected and become unsustainable. However, Aiking (2014) and Gray, Adams and Owen (2014) described the sustainability pillars in another way; through the concept of the triple bottom line – people, profit, and planet.

According to Anand and Kumar (2014, P. 244), “Most national and international problem-solving efforts focus on only one pillar at a time. For example, the United Nations Environmental Program (UNEP), the environmental protection agencies (EPA) of many nations and environmental NGOs focus on the environmental pillar. The World Trade Organisation (WTO) and the Organisation for Economic Cooperation and Development (OECD) focus mostly on economic growth, though the OECD gives some attention to social sustainability, like war reduction and justice, as well. The United Nations attempts to strengthen all three pillars, which have minor impact due to its consensual decision-making process and small budget. The United Nations focuses mostly on the economic pillar, since economic growth is what most of its members want the most, especially developing nations”.

Montiel and Delgado-Ceballos (2014) emphasised that by going deeper in relations of the three pillars of sustainability, we would find that the environmental pillar is the largest and should receive the greatest priority among the three pillars. It also comprises of the other two pillars under the concept of the final aim of sustainability. The economy is within the society since the human economy needs interaction between people. However, the society is completely inside the environment since the basic needs come from the environment, also do the energy and raw materials.

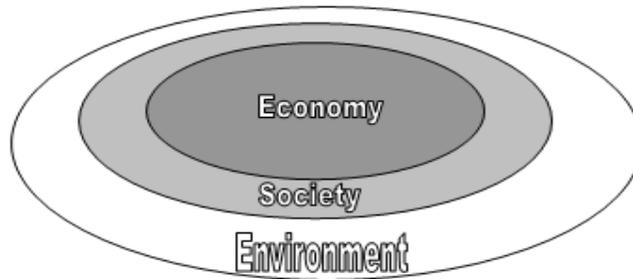


Figure 2: The relationship between the environment, society and the economy  
 (source: Olsson, 2004, P.4)

Table below classifies a variety of factors related to the economic, social, and environmental pillars of sustainability and illustrates how they generally stimulate sustainability.

Table 5: Sustainability pillars – factors and indicators.

<b>Pillars/Drivers</b>	<b>Factors and indicators</b>	<b>Author/s</b>
<b>Economic</b>	National economy, Capacity of the market, Stakeholder assessment, Novelty, Development of the country, Return on investment, Market presence, Obligation, Revenue sharing, and Business performance	(Murphy, 2012)
<b>Social</b>	Workers standards, Health and safety, Public rights, Social justice, Human original rights, Traditional problems, Fairness, Culture, and Religious understandings	(Bina, 2013)
<b>Environmental</b>	Resource consumption, Raw materials selection, Resources preservation, Effectiveness of energy, Emissions lessening, Biodiversity and nature protection, and Water and Air effluence,	(Moldan, Janoušková, & Hák, 2012)

Epstein and Buhovac (2014), emphasised that all sustainability and sustainable construction drivers can be categorised under the three main pillars' umbrella. They all, in one way or another, refer to one or more of the three main strands that complete the definition of sustainability.

Many researchers have addressed the three pillars as drivers of sustainable construction. They emphasised in specific on each pillar and studied their associated stimulation points. Dugarova, Utting and Cook (2013) deeply studied the social drivers and paid exact attention to matters that have frequently been neglected by national and international development policy, Reed (2013) emphasised precisely on the environmental stimulations driving to sustainable construction, and Bina (2013) explored the economical drivers of sustainability to achieve the sustainable construction.

Lozano (2015) stressed that beside the three main drivers there should be motivations that would persuade sustainability and sustainable construction in general. The results indicate that internal leadership of the business case is the most essential motivation, whilst the most essential external motivations are reputation, consumer needs and anticipations, and rules and legislations.

### 2.3 Sustainable construction:

Sustainability within the context of construction in general is related to the green building concept. The green building can be recognised as an environmentally sustainable building, which is designed, constructed, and operated to decrease the entire oversee environmental influences through strategies including the minimising of energy consumption, saving of water and recycling of waste (Poerschke & Gampfer, 2013). In other words, green building signifies the practice of establishing a constructed environment that is a well-organised resource in terms of energy, water, tools, and materials at the same time mitigates building-related bad environmental influences on people health and the environment throughout the course of the

building's life cycle, by better sitting, design, construction, operation, maintenance, conversion of use, and deconstruction. (Kibert, 2016)

Arroyo, (2014) suggested that green building pertains to the practice of constructing structures through procedures that have considerable benefits for the environment and are resource-efficient during the building's life-cycle, starting from design and continuing till its execution, operation, maintenance, renovation, and demolition. This practice enlarges and accompanies the traditional building design anxieties of economy, utility, durability, and comfort. A green building is similarly recognised as a sustainable building.

Poerschke and Gampfer (2013), Yudelson (2013), Wilson, Hargreaves and Hauxwell-Baldwin (2015), and Brokhaus et al. (2017) have supported the concept of sustainable construction as a method, in comparison to the traditional model of project management, which endorses the achievement of goals allied with the three pillars of sustainability:

- Economic sustainability – increasing cost-effectiveness by using the resources, labour, materials, water and energy more efficiently.
- Environmental sustainability – avoiding dangerous and possibly permanent impacts on the environment by cautious usage of natural resources, reducing waste, and defending and improving the environment anywhere possible.
- Social sustainability – reacting to the requirement of the people at every phase of participation in the construction progression, providing extraordinary client satisfaction and working closely with customers, providers, employees, and local societies.

## 2.4 Sustainable project management

### 2.4.1 Sustainable project management

Sustainable project management is a concept that from the beginning aims to incorporate the environmental and sustainable policies into the project management processes. The main purpose of sustainable project management is not to make every decision linked to the project to be environment friendly, but to keep the environmental feature into consideration while making decisions and not ignoring it (Silvius, 2013) and (Al Takriti, 2015).

Project managers during the construction are in charge of ensuring the complete success of the project while taking into account the constraints of cost, time, and quality requirements (Kerzner, 2013). However, due to the fluctuating environment and the extraordinary challenges in the construction industry, at present it is not adequate to take care of just these customary criteria of project management. It was previously recommended by many researchers to enhance the iron triangle with other features like safety, environmental sustainability, information system, and stakeholder or organisational benefits (Ahlemann et al., 2015).

Økland (2015) indicated that maybe sustainability integration in project management practices is addressed well in academic literatures. Nevertheless, the field is still in the emerging and development phase, since the publications on this subject are still relatively new; likewise, he stated that resolving what honestly will contribute to sustainability in an exercise is a hard job. Hornstein (2015) and Gmelin and Seuring (2014) explicated that appropriate competence is needed from decision makers and project teams, along with a momentous mind change to realise the extent of this., Where to address the mapping of the mental models of project teams, project landlords, and stakeholders with respects to sustainability will be a promising begin. Furthermore, considering if the mental models' support is applied to project management it can help recognising the influence points required for sustainability to be an integral part of project management practices.

## 2.4.2 Sustainability project management techniques and processes.

As highlighted earlier in this study, the sustainable project management is a relatively new concept. Thus, not many researches have been done on sustainable project management processes. On the other hand, the increasing interest in environment and demand for sustainable buildings will increase the research effort in this field to assist green projects (McKenzie-Mohr, 2013).

The success of sustainable construction depends on the implementation of environmental standards (Tseng, Tan, & Siriban-Manalang, 2013). Brones, Carvalho and Senzi Zancul (2014) provided that the chief purpose of sustainable project management is to please the stakeholders and the natural environment's demands. Silvius (2013) suggested that sustainability can be assimilated in the knowledge areas of project management. The project management institute (PMI) (2013) identified nine knowledge areas of project management, which are involved in the project management processes and are generally enclosed in the project management methodologies.

Table 6: Knowledge areas of project Management and the sustainable processes and practices

<b>Knowledge areas of project management</b>	<b>Sustainable project management processes and practices</b>
<b>Project Integration Management</b>	<p>The environmental and sustainability aspect will be incorporated in the estimation procedure for any variation in the project work as part of the decision-making process.</p> <p>Regularly, project charters contain a fragment for environmental anxieties. Nevertheless, most project managers will give the required attention to it while defining the project.</p>
<b>Project scope management</b>	<p>Bearing in mind the environmental influence on the scope of management process as well the business value, project effect will be a way to present sustainability into the project.</p> <p>Moreover, adding new packages to the activities to emphasise the alignment of the company's strategy with environmental policy.</p>

<b>Project time management</b>	Adding new activities that support the environmental policy of the company to be additional into the project's schedule when a company implements sustainable project management.
<b>Project cost management</b>	Shall comprise the extra charges associated with the environmental activities and processes.
<b>Project quality management</b>	Specifying quality standards that suit the definite project and strengthen the company's environmental policy. Moreover, expanding the quality discussion that related to shareholders' satisfaction and expectations to contain the environmental aspects of the project.
<b>Project human resources management</b>	Educating project team on green practices since project teams will be in charge of appraising the sustainable processes and give another possibility as well as endorsements for the project.
<b>Project communication management</b>	Managers must include, in their communication, any work that would assist to improve the consciousness of stakeholders about green processes.
<b>Project risk management</b>	Evaluating the risks related to adapting sustainable processes and their influence on the company. Sustainable project management is a relatively new model in the business so it poses higher risks.
<b>Project procurement management</b>	providing appropriate education to the suppliers who are working on projects about sustainability processes that the company adopts. The chief idea is not to make new processes but to implement sustainable project management into existing processes.

Silvius (2013) stated that sustainability could be extended further than project management knowledge of thinking to a higher level that might include the project management offices (PMO's) and portfolio management as well. Eskerod and Huemann (2013) assessed that in sustainable construction management the importance of knowledge areas differs from the traditional construction and their aims and goals.

Young (2016) and Silvius, Schipper and Van Den Brink (2012) emphasised that the project manager competency role is to integrate and incorporate the sustainability in project management practices. Hence, the future of project management needs project managers to develop and integrate sustainability in business orientation as growing anxiety, as well as, taking all management decisions keeping in mind the main aspects of sustainability i.e. reduce resource consumption, minimise the environmental dispossession, and aim for a healthy environment for the project and all stakeholders, which extend to be the surrounding and the community. As per Ebbesen and Hope (2013) and Wong and Zhou (2015) the project manager should have the capabilities that would assist the integration of sustainable project management, mainly to have a holistic view of the project and team activities and also extend the sustainability notion as far as possible to reach all the project elements and stakeholders. The project manager should use the project management area of knowledge and integrate and incorporate the sustainability in project management practices and try to use the suitable and available tools and technologies to achieve sustainability (Ahlemann et al., 2015; Økland, 2015).

## 2.5 Performance in sustainable construction

### 2.5.1 Sustainable construction projects performance measurements:

Sustainable projects are not projects whose delivery includes only delivering the scope with the anticipated quality, within budget and on the planned delivery date, but also assist in attaining sustainable development objectives to save the planet and ensure wealth for the future generations (Searcy, 2012). Hence, sustainable projects need to adopt guidelines and actions that are aligned with the finest application of project management in addition to the emerging sustainability applies (Reyes et al., 2014).

Measuring sustainability is hard since there is no clear worldwide definition and it includes many features of our society, economy, and governing institutions as well as our interface with the natural environment (Mwasha, Williams, & Iwaro, 2011). As

advocated by Wiek et al. (2012) sustainable projects' evaluation should take into consideration the project performance from the perception of project sustainability, which is mainly measured by economic, social and environmental indicators. Therefore, project owners should regulate the document templates, workflows, and performance dashboards to have an effective and collaborative atmosphere to choose the correct sustainable projects and provide those projects in correct ways and as per the requirements (De Brucker, Macharis, & Verbeke, 2013).

According to Chardine-Baumann and Botta-Genoulaz (2014) the sustainability performance shall measure the three elements of sustainability: Social aspect (People), Environmental aspect (Planet), and Economical aspect (Profit). The higher the score of the project complying with these three aspects and sustainability objectives, the better the performance of the project towards sustainability. Searcy (2012) stated that it is pretty likely that the valuation of each sustainability aspect will be conducted by a different team member. Therefore, it is extremely endorsed to have a different document form for individual aspect. Furthermore, the evaluator should include the different project documents to sustainance his/her assessment.

### 2.5.2 Indicators and measurements of sustainable construction:

Sustainability indicators are imitative of the potentials people are concerned in measuring. For instance, environmental quality is classically labelled in terms of air and water quality and levels of buildings gas emissions (Efroymsen et al., 2013). Economic health is regularly designated using macro-level meters such as GDP per capita, accompanied by factors like employment vacancies, schooling, and credit, which highlights the role of individual chances (Kubiszewski et al., 2013). Social equity is measured by knowledge percentages, health and life expectation, and criminality rates (Buckley, 2012). Even the indicators that related to more than one aspect of sustainability can be more general; for example, measuring the quality of society's wastewater treatment and its land-use designs can assist exemplify how environmental quality differs between different areas, giving data regarding

socioeconomic circumstances in addition to the environment (Moldan, Janoušková, & Hák, 2012).

Kocmanová and Simberova (2014), Mwashu, Williams and Iwaro (2011), and De Brucker, Macharis and Verbeke (2013) specified the sustainability aspects in seven groups and identified their possible indicators of environmental performance. These indicators shall be quantified and measured by applying and not applying the sustainability processes and comparing with the targeted saving or reduction in each aspect.

Table 7: The environmental aspects and their possible performance indicators of environmental performance:

<b>Sustainability Aspect</b>	<b>Possible indicators of environmental Performance</b>
<b>Materials used</b>	The quantity of materials recycled
<b>Energy</b>	Energy consumed per period or product/activity
<b>Emissions</b>	Quantity of emissions per period or product/activity
<b>Water</b>	Quantity of water consumed per product/activity
<b>Noises</b>	Quantity of heat, light or noise discharged per product/activity
<b>Toxic Material</b>	Quantity of toxic waste created per product/activity
<b>Land used</b>	Area of land used or affected per product/activity

## 2.6 Sustainability effect on construction projects:

The fast expansion of sustainability and market conversion of the construction industry is the outcome of the noticeable benefits recognised by stakeholders due to application of sustainable construction strategies Gan et al. (2015). Such revolution has assisted the valuation tool and emphasised the usage of a smaller amount of energy and water as well as reduction of life-cycle environmental impacts (Moldan, Janoušková, & Hák, 2012). However, present building appraisal systems do not properly deliberate and integrate the multidimensionality of sustainability, as the

enterprise of assessment practices overwhelmingly favours the environmental perception of sustainability instead of helping the drives in being explorative and experimental (Eskerod & Huemann, 2013).

Goyal, Rahman and Kazmi (2013) indicated that as sustainability grows and the stakeholders' requirements expand; sustainability evaluation will have no choice but to move in the direction of triple aspects comprising criteria highlighting the appraisal of the social and economic performance of the projects. Therefore, possible performance indicators are to be distinguished among those known since they differ on the basis of the aim of each project and the importance of each indicator (Hassini, Surti, & Searcy, 2012). Sustainability has many good effects on the project life cycle performance, starting from the initiation phase till the demolishing phase regarding many aspects and components like, which are related to the three base pillars of sustainability (Stark, 2015).

Leckner and Zmeureanu (2011) identify the life cycle cost by calculating the entire costs and profits over the life of a specific product. Bretschger and Smulders (2012) suggested that right investments are mainly recognised through condensed utilities' costs and reserves in operations; the calculation for which is a simple act of deducting the predictable utilities, upkeep and operational charges' reserves over the lifetime of the building from all the expenses associated with the building. According to Reyes et al. (2014) states that meanwhile the charge of energy and water escalates, there are more financial motivations to lessen the utilities' costs during the lifetime of the building. Moreover, sustainability offers maintenance savings by using a better and sustainable design and materials for construction, which results in lower maintenance charges offering lengthier life for the product, which decreases the frequency of replacement and maintenance.

Tseng, Tan and Siriban-Manalang (2013) underlined that the designing is one of the main phases that would emphasise and control the sustainability practices in the construction industry by determining and allocating the site plan including the structure orientation and areas of the building. Azhar et al. (2011) and García-Segura

et al. (2015) studied the sustainable design effect, the long term and short term, on the building's life cycle from many aspects., Table 8 summarises the effects of sustainable design on the buildings.

Table 8: The effects of sustainable design on the buildings.

<b>Sustainable design</b>	<b>Effect of sustainable design</b>
<b>Measured site planning</b>	lessen the footprint and therefore the area and related systems of the building
<b>Efficiency in infrastructure</b>	lessen distance of utility lines, and reserves on areas for pavement, and more.
<b>Economised mechanical and electrical systems</b>	by using daylighting, natural freshening, minor flow plumbing fixtures, etc.
<b>Power generation</b>	photovoltaics or other generation and reduce peak energy use.
<b>Consumption of locally-sourced materials</b>	which improves the local market and decreases associated charges.
<b>Reducing materials</b>	especially for interior finishes, like using artificial cement for ceilings.

According to Yuan et al. (2011) sustainability offers many benefits during the construction process, which effects the entire project economically by saving and reducing the disturbance during site activities, reducing wastes, increasing the use of natural resources, reusing the debris in site work, protecting materials and equipment, and cleaning, and maintaining the site. There are many indications of sustainable construction that have optimistic influence on workers' and staff's productivity and quality of life. Moreover, resident health will be enhanced in a sustainable building and the liability will be reduced because of exclusion of poisonous or injurious elements (Fujii et al., 2013). Moreover, taking decision to construct sustainably and certify the buildings as sustainable shall result in increase of social value of the building in respect to public image and marketability (Taks, 2013).

## 2.7 Sustainability project management areas of impact:

There are many natural differences between the traditional project management and the sustainable development and sustainable project management (Ebbesen & Hope, 2013). Sustainable development and the projects are most probably not natural friends (Silvius & van den Brink, 2014). Lang (2012) and Hwang and Tan (2012) confirmed that there are many points of contrast in the characteristics of traditional project management and sustainable project management. Table 9 exemplifies some of the main variances in the characteristics of sustainable project management and traditional project management.

Table 9: The difference between the concepts of sustainable project management and traditional project management.

<b>Characteristic</b>	<b>Sustainable Project Management</b>	<b>Traditional Project Management</b>
<b>Term</b>	Long term + short term oriented	Short term oriented
<b>Interest Orientation</b>	In the attention to current generation and future generations	In the interest of Sponsors
<b>Deliverable</b>	Life cycle oriented	Deliverable/result oriented
<b>Concerns</b>	People, Planet, Profit	Scope, Time, Budget
<b>Complexity</b>	Increasing complexity	Reduced complexity

Al Takriti (2015) highlighted that the relationship of sustainability and project management can still be considered as an emerging field. In the recent years, many researches have been published regarding sustainable project management, which differ in their methodologies and depth. Gareis, Ruemann, and Martinuzzi (2010) highlighted that sustainable project management affects many areas of the project in different ways and degree of impact. Table 10 shows the areas of impact that sustainable project management effects.

Table 10: The areas of impact that sustainable project management effect on.

Area of impact	The sustainable Impact
<b>Project context</b>	Project management procedures must report questions for example: How do the features of sustainability impact the organisational context of the project? How is this impact related to the project?
<b>Stakeholders</b>	The sustainability aspects including social harmonising, environmental and economic concerns, ‘both short and long term’ and ‘both national and international, will probably grow the number of stakeholders of the project. i.e. environmental defence organisations, human rights associations and non-governmental institutes.
<b>Project content</b>	Integrating the aspect of sustainability effect and defining the outcome, aims, standards, and achievement factors of the project, i.e. the environmental or social features of the project goals and the required result.
<b>Business case</b>	The impact of sustainability on the project content must be mirrored in the project’s explanation. The business case of the project should be extended to comprise the non-financial factors. i.e. social or environmental aspects.
<b>Project success</b>	Associated to the project explanation in the business case, it is anticipated that the sustainability will be reproduced in the definition of the project achievement.
<b>Materials and procurement</b>	The materials and procurement shall provide a consistent prospect to integrate sustainability, i.e. proper conduct in choosing suppliers.
<b>Project reporting</b>	As the project progress reports shall follow the description of scope, aim, business case, etc. Starting at initiation phase and planning phase, reporting procedures for sure should be affected by the sustainability features.
<b>Risk management</b>	Including environmental and social aspects in the project’s scope, the valuation of probable risks will must to develop.
<b>Project team</b>	Project organisation and management of the project teams shall be affected. Particularly from the social features of sustainability, i.e. equal chances and individual improvement.

<b>Organisational learning</b>	The influence of sustainability might extend to the level at which the organisation learns from the project.
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These areas of impact offer the basis for understanding the inferences of integrating sustainability in projects and project management. These consequences will relate to the procedures, practices, and principles of project management. Moreover, these consequences influence the capabilities of the project manager who also influences the way organisations plan and manage their projects (Alvarez-Dionisi, Turner, & Mitra, 2016).

## 2.8 Challenges and barriers towards achieving sustainability in construction:

Generally, environmental matters in construction industry are considered important; it has been researched by many. Akadiri, Chinyio and Olomolaiye (2012) emphasise that the environmental problems should be taken into consideration as contract obligation and specifications connected to application of environmental tools such as environmental impact system or environmental management system exist.

Meryman and Silman (2004), Kubba (2012) and Kibert (2016) argued that the main barrier of implementation of sustainability in the construction industry is the economic factor. There are many other constrains associated with the sustainable construction, which can either be considered as opportunities or challenges. These constrains stem from the requirement of harmonising the sustainability and environment issues with all construction success related factors.

According to Baloi (2003) all stakeholders must understand that the attainment of sustainable construction needs changes from all players and require changes in laws and policies, design, execution, and operation of construction projects. Therefore, the construction industry has to revolutionise the method in which all the construction

activities are carried out, recycling of materials, saving of energy and usage of natural resources.

Issa and Al Abbar (2015), Kibert (2016), Jamil, Ahmad and Jeon (2016), Akadiri, Chinyio and Olomolaiye (2012), and Asif (2016) confirmed that the most recognised issues that the sustainable construction industry faces can be identified as the economic, capacity and professional, societal, and technological challenges.

There are no suspicions that the economic profit of any construction project is the chief purpose of the investors and developers. So, critical attention of the decision makers is required on the application of sustainable construction practices (Zuo & Zhao, 2014). There is a trust that sustainable construction applies will increase the cost of construction projects without gains; a perception that poses an important challenge (Ambec et al., 2013). Most cost analysis researches that have been done on sustainable construction implementation showed increased cost variety from 0–18% (Kats, 2013). The extra cost; known as the ‘green premium’ as per Maguina (2011). The green premium in the UAE has reached 30% in some projects and the explanations for this growth were reported because of the deficiency in equipment availability and green supplies along with the use of very specialised services. Maguina (2011) highlighted another different aspect, which is the construction delays that will regularly upturn the cost of the projects since sustainable construction needs the integration of green tools with other building mechanisms. So, postponements will lead to consequences if this is not measured throughout all project phases.

The lack of knowledge on sustainable construction practices, technologies, and materials is one of the significant issues that hinder the application of sustainable construction; besides the great amount of dependency on the foreign workforce and the lack of essential experience required to enable sustainability in construction (Al-Hajj & Hamani, 2011). An additional challenge to the sustainable construction in the UAE is the green material supply chain. According to Maguina (2011) not all green materials and equipment are presented from the local supply network, as a result, a dependable supply chain cannot be assured, which affects the cost of applying the

sustainable construction practices significantly. As a consequence, doubts and insufficient trust in relationships occurs because of conflict of interests between stakeholders.

Community consciousness of environmental problems is a vital aspect for the achievement of sustainable construction. Biygautane and Al-Yahya (2011) and Schaltegger, Lüdeke-Freund and Hansen (2012) suggested that the majority of clients are conscious of environmental pollution problems, but they usually identify environmental protection a duty of the local government. This results in limited vision of responsibility alongside the incomplete knowledge of the cost and gains of sustainable construction practices. There is a conflict between the diverse parties of the construction industry to adjust the construction practices to more sustainable practices.

The inadequate availability of sustainable materials and equipment in the local market and area is a major challenge faced by the UAE sustainable construction industry; along with the uncertainty between stakeholders in the performance of these materials and technologies and their cost efficiency (Salama & Hana, 2010). Madurwar, Ralegaonkar and Mandavgane (2013) stressed on the significance of sustainable specifications as essential factors for the success of sustainable construction practices. The lack of official structure codes and specifications is also a challenge to the industry.

## 2.9 Initiatives and actions towards sustainability in construction in the UAE

There should be correct equilibrium between environmental and economic performance. The attainment of this equilibrium is not easy and for sure not without price. Tatari and Kucukvar (2011) stated that there have been strong debates between researchers and practitioners on the gained benefits and costs of sustainable construction; and two contrary opinions regarding the challenges and opportunities of sustainability were conquered. However, while sustainability is perceived as a

creation of good business and financial sense by some practitioners, it is seen as an encumbrance by others. According to Fong, Avetisyan and Cui (2014) and Boano, Zetter, and Morris (2012) the battle between protecting the environment and the competency or economic gain is a wrong dichotomy. It comes from a narrow viewpoint of the bases of affluence and fixed viewpoint of competition. Furthermore, environmental regulations and standards should not be considered as barriers to competitive benefit but should rather be considered as innovation and upgrade instead. These regulations can derive the organisations to pollute less and create and produce efficient products. According to this viewpoint, embracing the sustainable practices is not a cost but a motivation for continuous invention and new market chances (Amini & Bienstock, 2014).

According to Meryman and Silman (2004), Kubba (2012), and Kibert (2016) sustainable construction faces several economic challenges, which is why the construction has been declining in the developed world. The construction industry relies on the application of sustainability measures from other industries of the economy like the manufacturers of construction materials.

Boano, Zetter, and Morris (2012) highlighted that many approve that dread, and not self-indulgence, has motivated environmental programs in most of the organisations. Ambec et al. (2013) stated that companies have gone on board with environmental programs in advance of regulation; they do so mostly due to the threat of a legal action. Other than the challenges modelled by costs, construction organisations must deal with matters that describe construction projects, such as different places with precise regulations in terms of environmental management (Gholami et al., 2013).

Estidama – UAE, Abu Dhabi

The UAE and precisely Abu Dhabi have established operative development and application of green building codes. With starting of the Pearl Rating System, monitored by the Abu Dhabi Urban Planning Council, Abu Dhabi issued its own codes for buildings, villas, and communities. Obligatory 1-Pearl certification on

private developments and a 2-Pearl certification on government projects. There are four supports for the foundation of Estidama, specifically the three main pillars of sustainability – environment, economic, and social pillars – plus an additional object: cultural support. The code was established to endorse the effective usage of resources and to replicate the city’ exact needs and accompaniments; Plan 2030, which aims to enhance the urban planning scheme in the city (Abu Dhabi Economic Vision 2030 and Abu Dhabi Urban Planning Vision. 2016).

#### Dubai Green Building,

Dubai’s Emirates has the green building code. The Green Building Regulations were pioneered by the Dubai Municipality in 2011, which was enforced on all governmental projects. Later, the code was extended to the entire private developments as well, which was obligatory to follow, through the release of the Dubai Municipality Circular No.198 of 2014, which has been in operation since March 2014. The codes were established in line with the finest global efficiency standards and modified as per Dubai’s exact requirements and circumstances. The main goal of this code is to enhance the performance of buildings in Dubai by decreasing the consumption of energy, water, and materials, therefore, enhancing the quality of life (Dubai Municipality, 2014).

Moreover, the UAE has established the Emirates Green Building Council (EGBC), which was established in July 2006. It became a member of the World Green Building Council in September 2006; thus, making the UAE one of the leaders of sustainability, it is the eighth country in the world to have established such a council. The main objective of the EGBC is to encourage the green building ideologies and implementations to attain high performance buildings ensuring sustainability in the UAE (EGBC).

The development and construction industry is stated to be essential for boosting the economy of the countries. The UAE construction industry has a big share in the country’s economy so it has a direct relation with the economy; becoming green in

construction is a part of achieving the green economy. Recently, green economy has become a trending concept, which has consequently been taken up by numerous countries around the world. In 2012 more than 190 nations, including the UAE, conceded to the green economy at the United Nations Rio+20 Summit; it was presented as one of the imperative tools for the accomplishment of sustainable development (UAE-estate of green economy, 2014). However, green management can still be considered as a new field; there are still some areas yet to be covered, which requires more study and investigation to explore the green project management benefits in the long term for the nation and the world (Kibert, 2016).

A government body has been established in the UAE to research on ways to moderate this hazard. Sheikh Mohammed Bin Rashid is a leader who gives great importance to clean technology, green economy, and energy. Rashid (2012) stated, “We in the UAE, within the Vision 2021, are striving to build a diversified economy based on knowledge and innovation, through which we can provide excellent employment opportunities to our citizens. Through this, we can protect our natural and environmental resources, and strengthen our competitive position in the global markets, especially in the areas of renewable energy products and technologies on the Green Economy. We are serious about the transformation of our development process to reach the first position at the global level. Up to the year 2021 we will launch a range of initiatives and projects in all areas to achieve our goal. I asked everyone to prepare for a new phase in the growth of the UAE” (UAE-estate of green economy, 2014).

It is potential to observe the influence of the sustainability regulations in practice in the UAE. According to the Urban Planning Council of Abu Dhabi “Buildings representing a gross floor area of 1.2 million square meters have already been completed in accordance with the Estidama building rating system”. Dubai’s Chamber of Commerce and Industry’s headquarters was the first standing building in the Middle East to attain LEED (Leadership in Energy and Environmental Design).

## 3.0 Conceptual Model.

### 3.1 Introduction

Miles and Huberman (1994) defined a conceptual framework as a graphic or written product; one that “explains, either graphically or in narrative form, the main things to be studied, the key factors, concepts, or variables and the presumed relationships between them”. Therefore, the conceptual framework would reflect the system of concepts, assumptions, expectations, beliefs, and theories that support your research.

In this part of the research we create a conceptual model demonstrating the main drivers and barriers besides the project management tools that would enable sustainable construction, which would lead to high-performance buildings.

### 3.2 Framework

The literature review led to the development of the conceptual model described below, which illustrates the main dimension. In terms of stages, its first aspect ‘Sustainability Achieving’ theoretically leading to the second main dimension, which is the ‘high performance sustainable’ structure, which is in accordance with the proposed conceptual framework model. The key drivers that encourage sustainable construction and the barriers that hinder sustainable construction and their relationship with the motivations of sustainable construction. If the actions taken towards the sustainable construction, and the sustainable project management practices are all applied in the proper way it will lead to sustainable construction giving high performance sustainable structures. The intention of this conceptual framework is to emphasise the project management practices and their rule of achieving the sustainable construction, which according to the literature review if managed properly after overcoming the barriers would lead to a sustainable building with high performance.

The literature review exposed several drivers and stimulators for sustainability and sustainable construction. There are many drivers stimulating sustainability in the

general term and many drivers stimulating the sustainable construction industry around the world. As per Epstein and Buhovac (2014) all these drivers can be grouped under three main strands and pillars. Social, economic, and environmental pillars are the three main pillars of sustainability. The three pillars of sustainability are the powerful tools used for defining and identifying the complete sustainability concerns. Moreover, the literature review highlighted the researchers who addressed the pillars as drivers for sustainable construction and underlined in particular each pillar in particular, i.e. Dugarova, Utting and Cook (2013) explored the social drivers, Reed (2013) explored the environmental drivers, and Bina (2013) explored the economical drivers.

Likewise, attaining sustainable construction requires motivations that would increase the efficiency of the drivers to stimulate the sustainable construction, as mentioned earlier; Lozano (2015) stressed that it consists of internal and external motivations. The internal leadership on the business case is the most essential internal motivation, whilst the most essential external motivations are reputation, consumer needs and anticipations, and rule and legislation.

The literature review illustrates an agreement between many researchers: Issa and Al Abbar (2015), Kibert (2016), Jamil, Ahmad and Jeon (2016), Akadiri, Chinyio, and Olomolaiye (2012), and Asif (2016) on the fact that the most known barriers that the sustainable construction industry faces can be branded as economic challenges (i.e. increased cost, delays, etc.), capacity and professional challenges (i.e. lack of experiences, supply chain process, etc.), societal challenges (i.e. limited knowledge and vision, responsibility conflicts, etc.), and technological challenges (i.e. lack of local materials, lack of technologies, etc.).

Furthermore, another way of attaining sustainable construction is by actions and regulations that would overcome the barriers of sustainable construction. According to Fong, Avetisyan and Cui (2014), the most important action that needs to be taken is that of issuing the regulations and standards that considered as innovation and upgrade the creation of less polluting and more efficient products, which shall

motivate the invention and offer new market chances. Additionally, Ambec et al. (2013) highlighted that mostly the threat of legal actions is the key solution to emphasise the sustainable construction.

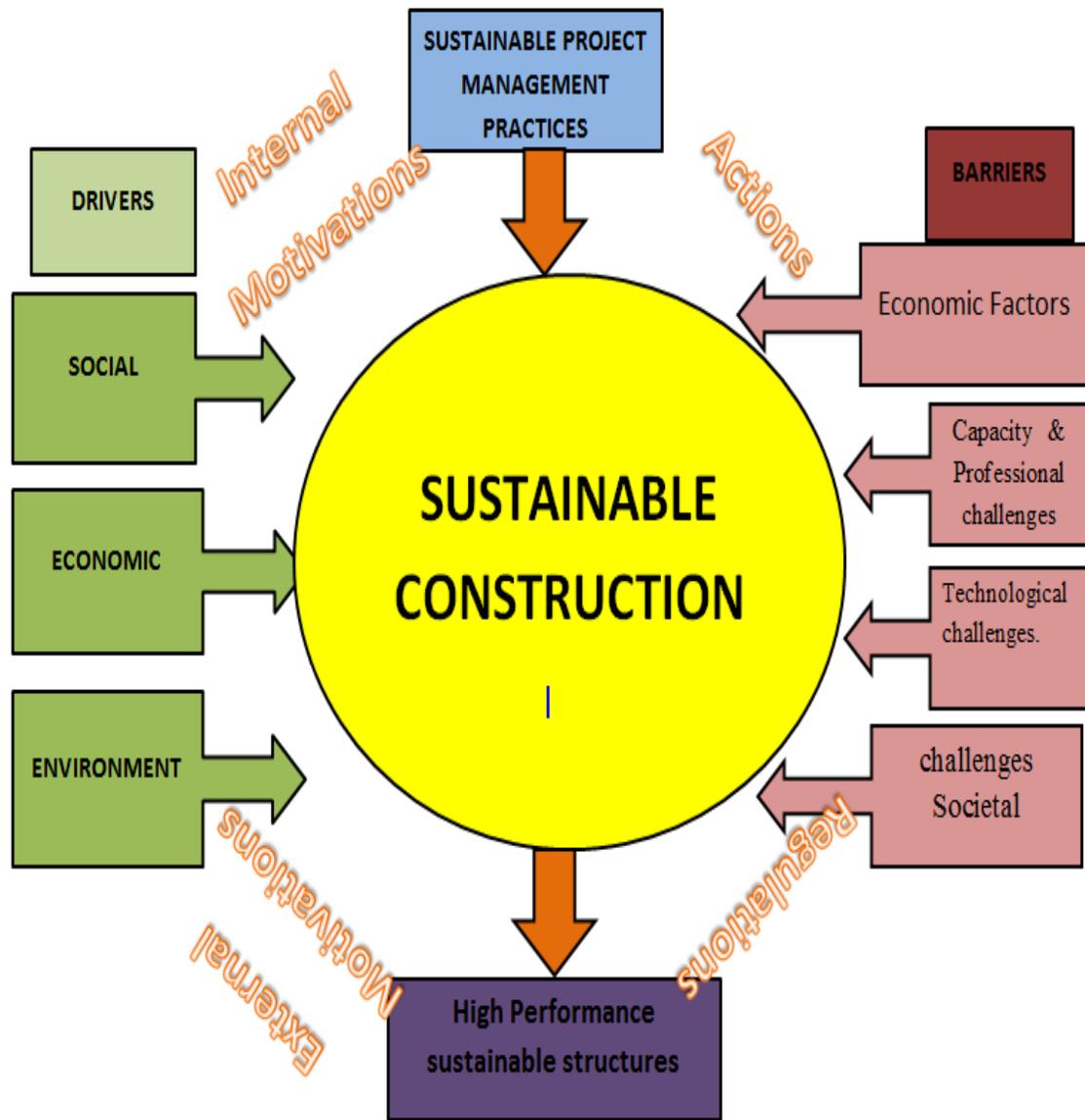


Figure 3: Conceptual Framework Model

### 3.2.1 Process for achievement of sustainability:

The literature review discussed the sustainability achieving requirements and processes and illustrated the key drivers that encourage sustainable construction and the barriers that hinder sustainable construction and their relationship with the motivations of sustainable construction. If all the project management practices are applied and proper actions are taken in the correct ways it will lead to achievement of sustainability.

According to Kibert (2016), Brones, Carvalho, and Senzi Zancul, (2014), and Bal et al. (2013), attaining all requirements of sustainability from the three main aspects and overcoming the barriers that hinder the sustainability while managing under professional competence project management is fundamental for ensuring successful achievement and implementation of sustainability.

### 3.2.2 High performance construction:

The research aim is to examine how integration of sustainability in project management impacts upon the performance of construction projects in the UAE, which can be seen by measuring the performance of the sustainable construction projects and their efficiency and effectiveness compared to the traditional construction projects using the metrics as standard of estimation. Simply put, the degree by which sustainable construction is professed to be better than traditional construction is evaluated. Ebbesen and Hope, (2013), Silvius and van den Brink, (2014). Lang (2012), and Hwang and Tan (2012) confirmed that there are many points of contrast between the characteristics of traditional project management and sustainable project management.

### 3.3 Achieving sustainability:

Management, leadership, motivations, and technology are needed to achieve sustainable construction and to improve and enhance project delivery systems.

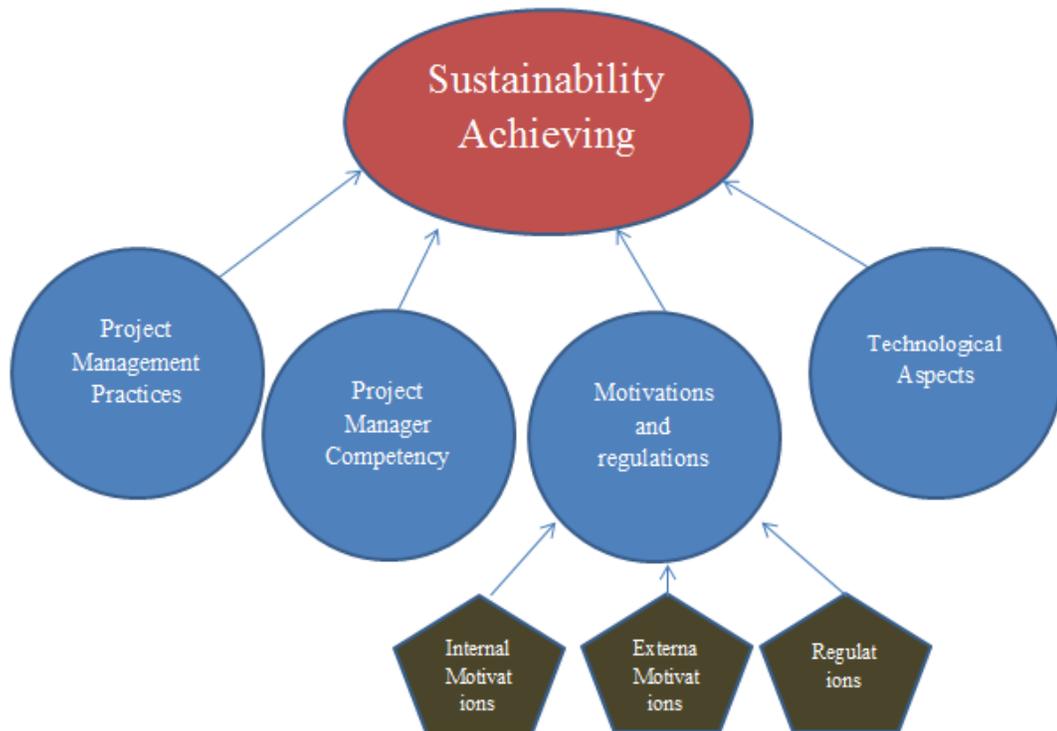


Figure 4: Achieving sustainability requirements

#### 3.3.1 Project management practices:

Project management practices in sustainability are based on a concept that from the beginning aims to incorporate the environmental and sustainable policies into the project management processes (Silvius, 2013; Al Takriti, 2015). Project management practices was identified as one of the most significant factor that would enable sustainability as a practice and aid in achieving it. The literature illustrated adapting the sustainable project management practices as an essential to achieve sustainability in construction projects. (Ahlemann et al., 2015), (Økland, 2015), (Silvius, 2013), (Kibert 2016), (Silvius & van den Brink, 2014). (Lang, 2012), and (Hwang & Tan, 2012).

### 3.3.2 Project manager competency:

Project manager's competency role in achieving sustainability refers to attainment of the requirements that each sustainable project manager should have in order to be qualified enough to integrate the sustainability notion into the project management processes and extend it to the project teams and activities (Brones, Carvalho, & Senzi Zancul, 2014; Bal et al., 2013). The project manager aptitude and the fundamental role of the project managers have been highlighted by Young (2016), Alvarez-Dionisi, Turner, and Mittra (2016), Silvius, Schipper, and Van Den Brink (2012), Ebbesen and Hope (2013), and Wong and Zhou (2015).

### 3.3.3 Motivations and regulations:

The internal and external motivations refer to the motivations that would increase the efficiency of the main drivers of sustainability to stimulate sustainable construction. Motivation such as leadership, which could also be considered as part of the project manager competency and the business case of the project. All projects have these two aspects as internal motivations, whilst the clearest external motivations are reputation, consumer needs, and rules and legislation (Lozano, 2015; Kibert, 2016; Al-Tekreeti, 2015; Goyal, Rahman, & Kazmi, 2013; & UAE-estate of green economy, 2014).

### 3.3.4 Technological aspect:

Technological management in sustainability refers to the required knowledge, tools, and technologies that the project manager would need or assist in managing projects to achieve sustainability. Technological aspect and the actions that should be taken to transfer it from being a barrier that hinders sustainability to an asset tool would contribute to the sustainability notion and help in achieving it (Al-Hajj & Hamani, 2011; Maguina, 2011; Ebbesen & Hope 2013; Wong & Zhou, 2015; Ahlemann et al., 2015; and Økland, 2015).

### 3.4 High performance construction:

High performance construction refers to the degree to which a sustainable project management aspect and sustainable construction is perceived as being better than the traditional project management and traditional construction.

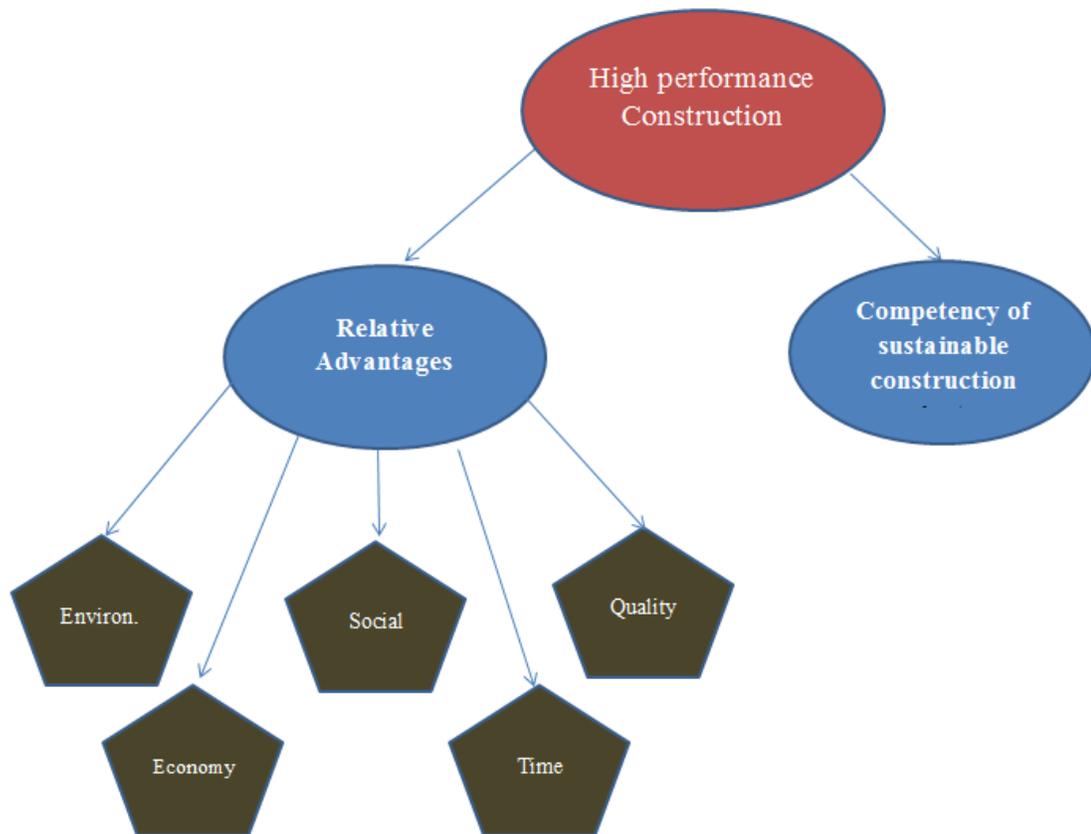


Figure 5: High Performance construction

#### 3.4.1 Relative Advantages:

They are identified as one of the most significant factors driving the adoption and use of sustainability notion in organisations and adapting it in the project management practices (Akadiri, Chinyio, & Olomolaiye, 2012; Asif, 2016; Azhar et al., 2011; Bina, 2013; Brokhaus et al., 2017; García-Segura et al., 2015; Issa & Al Abbar, 2015; Jamil, Ahmad and Jeon, 2016; Kats, 2013; Kibert, 2016; Maguina, 2011; Moldan,

Janoušková, & Hák, 2012; Murphy, 2012; Poerschke & Gampfer, 2013; Wilson, Hargreaves, & Hauxwell-Baldwin, 2015; and Yudelso, 2013).

#### 3.4.1 Competency of sustainable construction projects as compared to traditional construction projects:

Examining the impact of sustainability upon construction projects can be seen clearly by measuring the performance of the sustainable construction projects and their efficiency and effectiveness in comparison to the traditional construction projects using the metrics as the standard of estimation.

## 4.0 Research Methodology

### 4.1 Introduction

This chapter illustrates the methodological considerations that have been done to attain the research intentions by proofed responses. It also comprises of an overview of the research methods and their advantages and disadvantages and justifications for choosing the research method used. Moreover, this chapter will demonstrate the relevance, reliability, and validity of the implemented research method and the data gathering instruments with clarification of how the data was collected, treated, and analysed.

Williams (2011) defined the research process as being “systematic in that defining the objective, managing the data, and communicating the findings occur within established frameworks and in accordance with existing guidelines. The frameworks and guidelines provide researchers with an indication of what to include in the research, how to perform the research, and what types of inferences are probable based on the data collected”. (p. 65).

### 4.2 Research Approach

Saunders (2011) explicated that there are three mutual methods to conduct a research, quantitative, qualitative, and mixed methods. The researcher antedates the type of data needed to answer to the research questions.

#### 4.2.1 Quantitative research:

Quantitative research appeared since 1250 A.D. and it was characterised by investigators who were obsessed with the necessity to quantify data. (Saunders, 2011). “Quantitative researchers seek explanations and predictions that will generate to other persons and places. The intent is to establish, confirm, or validate relationships and develop generalisations that contribute to the theory” (Leedy & Ormrod, 2001, p. 102).

Quantitative research includes gathering of data that can be enumerated and exposed to statistical analysis in order to contradict 'alternate knowledge claims' (Creswell, 2003, p. 153). Bernard (2011) states that the quantitative research emerges in science; the investigator practices mathematical methods for analysing the data. However, there are three main styles concerning to quantitative research, which include research design, test and measurement procedures, and statistical analysis.

Quantitative research also includes data gathering that is identically numeric; the investigator is likely to use mathematical replicas as the methodology of statistics examination. Furthermore, the investigator uses the examination methods to make alliance with statistical data collection (Barratt, Choi, & Li, 2011).

### 4.3 Qualitative research

Qualitative research is a full method that includes detection and detection. It can be also labelled as a clarifying model that happens in a natural setting, which allows the researcher to develop the details due to high involvement in the actual experiences (Barratt, Choi, & Li, 2011). There are diverse kinds of research models that use qualitative research methods to frame the research approach. Consequently, the diverse methods have a huge influence on the research strategies discovered (Williams, 2011).

It may be described as an active model that happens in a natural situation that permits the investigator to develop a level of detail from which, being highly elaborated in real experiences, qualitative research is steered within a poststructuralist model. (Marshall & Rossman, 2014).

There are diverse methods for steering a qualitative research; however, Marshall and Rossman (2014) suggested the following five: case studies, grounded theory, ethnography, content analysis, and phenomenological approach. These methods encounter altered requirements. Such as, case studies and grounded-theory research discover procedures, activities, and occasions whereas ethnographic research analyses

broad cultural-sharing behaviours of persons or groups. Case studies also phenomenology can be used to study people.

#### 4.4 Mixed methods

The mixed methods approach, researchers combine approaches of gathering or evaluating data from both, quantitative and qualitative research methods in one particular research study. The researcher must understand both approaches to practice the mixed method in an effective way. The tools used in qualitative and quantitative researches are incorporated in the research method to deliver a more comprehensive study with improved results in terms of accuracy (Ostlund et al., 2011).

Venkatesh, Brown and Bala (2013) stated that the appearance of this approach was as a reaction to the weaknesses of qualitative and quantitative approaches. However, at present it is measured as an appropriate other approach to the qualitative and quantitative approaches.

#### 4.5 Research Framework and Methodology

Choosing the suitable research methodology is essential to deliver the right responses for the research questions (Saunders, 2011). After investigating the differences between different research methods, keeping in attention the research aim and objectives, in addition to the information attained from the conceptual model, a qualitative approach was selected as a structured interview.

Various sources of data are obtainable for the purpose of data gathering as per Low (2012): interviews (structured, unstructured, and semi-structured), observations (i.e. meetings, plant tour, etc.), and sources that have been archived (i.e. records, documents, statistics, and charts). Many researchers usually use the solitary method for data gathering, while the rest use different sources to ‘triangulate’ the data sources in diverse ways.

Using quantitative research method with questionnaires would not give reliable results. Data can be analysed with a limited number of participants who can provide

actual answers based on their experiences. Therefore, we chose the qualitative research method to get reliable data that can be analysed to build conclusions based on it.

According to Flick (2009) the most important fact considers while selecting a research method is its capacity to response the research questions; following a qualitative method allows open-ended questions that can exemplify the knowledge of the interviewees, rather than straight responses given in a quantitative approach. Low (2012) classifies interviews in three diverse kinds: unstructured, semi-structured, and structured.

Acaps (2012) stated that the key strong point of a qualitative research that it offers are in-depth information regarding the affected public, an indication of specific cultural and social contexts (i.e. human voice tone), enclosure of a diverse and representative sampling of affected individuals, and wide breakdown of the influence of an emergency.

#### 4.5.1 Selected Research Method:

Adapting structured interview as an approach for data collection was chosen specifically due to the limited number of participants that can give actual answers that would assist in highlighting the impact of sustainability integration in project management on the construction industry performance in the UAE. Moreover, the structured interview was selected particularly since it can offer adequate, meaningful, and open-ended questions. With regards to the research method, it is frequently claimed that, when an exploratory study is steered, in-depth interviews are probable to be used (Campbell et al., 2013).

Structured interviews contain a sequence of pre-determined questions that all interviewees respond to in similar order (Flick, 2009). The data analysis in this method typically have a tendency to be more direct, equated to other forms of interviews, since the researcher can compare the alternative responses to the same questions (Acaps, 2012). However, unstructured interviews are generally less reliable

since no questions are arranged before the interview and the interview steers in an informal way. Unstructured interviews can be accompanied with unfairness and contrast of responses checking is difficult due to the alterations in origination of questions (Low, 2012).

#### 4.5.2 Data Collection Method:

According to Ritchie et al. (2013) there are various ways to gather and record the structured interviews' data. However, structured interviews' data collection approaches comprise, but are not limited to, paper-based and self-reported (mail, face-to-face), telephonic, where the interviewer fills in participants' responses, and web-based and self-reported interviews. In this research, one way of structured interviews data collection will be adopted, which is face-to-face interviewing. Face-to-face interviews still persist as the most decent data collection technique (Irvine, Drew, & Sainsbury, 2013).

#### 4.5.3 Sample Selection:

The selected criteria were set to fit experts who have extensive knowledge of project management and are fully aware of sustainability and sustainable construction practices and objectives. Due to the requirement of this study, all experts answering about the impact of sustainability integration in project management on the construction industry performance in the UAE, shall be UAE with some experience in this field.

Existing studies (Wearne, 2004 and Hamilton, 2006) suggest that the role of the project managers is of primary importance for successful implementation of construction and civil engineering projects.

The sample were selected by construction and project management practitioners of minimum 5 years in the profession who had demonstrated experience sufficient to have acquired the professional accreditation of the status of either chartered engineer, project management professional (PMP) awarded by the Project Management

Institute or Chartered Construction Manager (CCM) awarded by the Chartered Institute of Building (CIOB). Moreover, all participants should be accredited as Leadership in Energy and Environmental Design (LEED) professional credential as it is necessary to have sustainability.

#### 4.5.4 Invitation Process:

The criteria stated earlier were taken as guidance in choosing the interviewees. Selected interviewees have been chosen and contacted through email or telephone and briefed regarding the research purpose and the methodology that has been used. Experts who have confirmed their interest, after making sure that their experiences are satisfying the criteria and purpose of interview, were interviewed.

#### 4.5.5 Sampling Size:

Owing to the limited number of the possible individuals that can meet the aforementioned criteria, the selection was done using more than one method to achieve the required number of participants that can contribute to the required purpose of the interviews.

Patton (1990, p. 184) suggested that “There are no rules for sample size in qualitative inquiry. Sample size depends on what you want to know, the purpose of the inquiry, what's at stake, what will be useful, what will have credibility, and what can be done with available time and resources” (cited in Anderson & Arsenault, 1998). As suggested by Fellows and Liu (2008) reasonably small sample numbers can be satisfactory, based on the concept that lesser numbers of interviewees with adequate understanding of the topic are more important than greater numbers of interviewees with inadequate understanding. Hence, a total of 12 participants were interviewed.

However, Holsti (1969) identified around 12 interviews as the appropriate interview sample number that can provide sufficient information for the researcher, if the interviewees were selected properly. Moreover, Lincoln and Guba (1985), emphasised the same number of required interviews, highlighting that increasing the

number of interviews to twenty will for sure give better and more reliable data. “To include as many as twenty interviews will surely reach well beyond the point of redundancy” (p.235).

Accordingly, due to the lesser number of the experts who are meeting the required criteria and the required experience who can give adequate answers to be analysed to have right results and findings, 12 members of the project managers were interviewed who meet the interviewees’ criteria.

#### 4.5.6 Pilot Test:

Arnold et al. (2009) briefly defined the pilot test as a small test for assisting to enterprise more confirmatory test. Further discussion of precisely what a pilot test is has been done by Thabane et al. (2010). He stated that these tests might have many purposes like testing procedures, validating tools, and refining the tools by adding or cancelling a part of it.

Piloting took place for the first interview with the Head of the Sustainability (MSc & PhD) Programs in the British University in Dubai, mainly to test the validity and reliability of the questions by checking if the questions are measuring or identifying what it intended to measure, and also to find out if there are any modifications required to the questions by adding, cancelling or even refining the proposed questions itself. Accordingly, the interview was edited as per the interviewee feedback and suggestions, by rephrasing two of the proposed questions to clarify the exact purpose of the question and adding one more question that would help identifying the purpose of the questions.

#### 4.5.7 Question design and Interview Structure:

Based on the aim of this research and the assumption of the conceptual framework, sustainable construction was achieved by applying the sustainable project management practices after employing the external and internal motivators of sustainability drivers and implementing the actions and regulations to overcome the

barriers and help towards sustainability. Therefore, the focus of the interview questions was on the sustainable project management practices and how these practices impact the performance of construction project in the UAE.

The literature review has revealed that sustainable project management practices affect sustainable construction, emphasising that these project management practices shall lead for high performance sustainable structures in comparison to the traditional project management practices. Traditional structures consider only the cost, time, and quality and ignore the sustainability factors. Therefore, the chosen experts were interviewed to see how this sustainable project management practices affected the performance of the construction industry in the UAE.

A funnel method, Ochieng et al. (2015), was embraced for the structure of the interviews, which intended to start with asking general questions about sustainability to ease engagement of the interviewees, followed by more specific questions, which would lead to the impact of integration sustainability in project management practices and its impact on the UAE construction projects performance.

There are many studies on the subject of sustainability and sustainable project management. But, few studies and empirical work have been done to analyse sustainability's impact upon project performance due to the fact that performance of sustainable construction and sustainable project management still under observation owing that the sustainability is still relatively new. As a result of this, it was challenging to adapt the research questions to fit the aim and objectives of the research. This limitation was overcome by modifying and developing the questions and pilot test with the help of experts of the sustainability notion.

The questions that form a part of the interview protocols were adapted from Spearman, Thapa and Hunter (2014) and Doherty (2013), which were modified to fit the study aim and objectives of our study.

The integration of sustainability in project management and its impact on the UAE construction projects performance – List of questions posed in the interview process:

- 1- What are the impacts of incorporating sustainability in project management practices at the corporate level?
- 2- Does project manager competence play a role in incorporating sustainable project management practices?
- 3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?
- 4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?
- 5- What are the benefits of applying sustainable project management as a practice on projects performance?
- 6- What do you think is the future of sustainable project management in projects?
- 7- How much the sustainable project management practices play role in achieving sustainability?
- 8- What are the sustainable construction competencies in comparison to the traditional construction?
- 9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

#### 4.5.8 Reliability and validity

In order to attain greater credibility of a study, there are two principles that should be considered upon: reliability and validity. Reliability means to examine which material gives steady and reliable responses, which means that if others conduct the same study then they should get the same outcomes. The reliability of the results is subject to how thorough it is and how the interviews are conducted (Eliasson, 2006). To improve the results in this research, all interviews were conducted by me following the same sequence for all the interviewees by detecting the body moves and gestures of the interviewees. Some of the interviews were recorded by voice and the rest were written down. Besides that, immediately after each interview, the records were transcribed to keep the responding fresh in mind.

Validity means to figure if what was intended to be explored or examined is what was actually investigated as per Eriksson and Wiedersheim (2006). It is significant to look at two altered features: internal validity and external validity. External validity is mainly to examine if the study can be accepted and generalised beyond the interview sample. (Eriksson & Wiedersheim, 2006) Due to the fact that the UAE is considered as one of the leaders in the field of sustainability, a sample of experts who had different experiences of sustainability from different organisational background in UAE was chosen. Thus, this study gains an external validity that can be generalised in the UAE.

Internal validity is mainly to examine if the results actually imitate what they claim to reflect, and if the evidences examined are precise. (Eriksson & Wiedersheim, 2006), It was done by interviewing people from different fields and organisational background because the interviewees' interaction with sustainability was through different roles and from practical and academic aspects as well.

#### 4.5.9 Criticism of literature

While studying the extensive literature on sustainability, sustainable project management, and topics associated with saving energy in the construction industry, I got the sense that while literatures focusing on each part as separate from the other exist, no studies have demonstrated the impact of the integration, the sustainability, or what is called the 'sustainable project management' on the performance of construction projects.

## 5.0 Analysis of Data

### 5.1 Data Analysis – Coding

All interviews, the recorded ones and the ones which the interviewees did not confirm to record, were transcribed manually in MSWord documents to enable the coding. The transliterated files were then imported to NVIVO 11 to analyse. The transcribed interviews were then analysed using the coding processes.

In respect to the data analysis, keeping in mind the comparatively long answers to the questions and the percentage of similarity in the answers to some of those questions with almost related answers to every other question, since all the questions were mainly about sustainability integration in project management practices and its impact on the performance of the construction industry in the UAE; the interviewees explained further and connected the answers with each other because the questions were of open ended nature. Thus, using sophisticated analysis software was believed to be necessary to get the best outcome of the study. Hence, the resulting data was analysed using NVIVO 11 by classifying the likenesses and variances of the interviewee's replies.

The coding method plays a fundamental role in the process of data analysis in qualitative content analysis. The 'coding system' refers to a group of instructions on how to systematically detect and record content from text (Neuman, 2006). According to David and Sutton (2004), coding is the solitary supreme important action in the progression of qualitative analysis of any text. Coding gives identification of the themes in the gathered data.

Coding of documents throughout this research was done by following the three main steps; i.e. coding, axial coding, and main themes coding. These steps of coding and how they were carried out are explained in detail in the following sections.

### 5.1.1 First Review of Documents – Coding:

Coding is the noticeable initial act of the researcher in abbreviating the gathered data into groups, by discovering themes and conveying initial codes, throughout the process. According to Neuman (2016) the themes produced from coding assist three main purposes:

- They assist the researcher to realise the emerging themes at a scan.
- They motivate the researcher to catch themes in upcoming coding.
- The themes can be used to shape a general aspect of all the themes in the study, which can be restructured, rejected, extended, and joint during additional analysis.

Some researchers propose that coding procedure should start with a list of ideas i.e. deductive approach (Basit, 2003). This was used as it was appropriate for this research due to which, the questions were categorised under certain themes. Thus, the deductive approach has been used for this study by identifying nine themes in the first step of reviewing.



Figure 6: Word frequency from the interviews

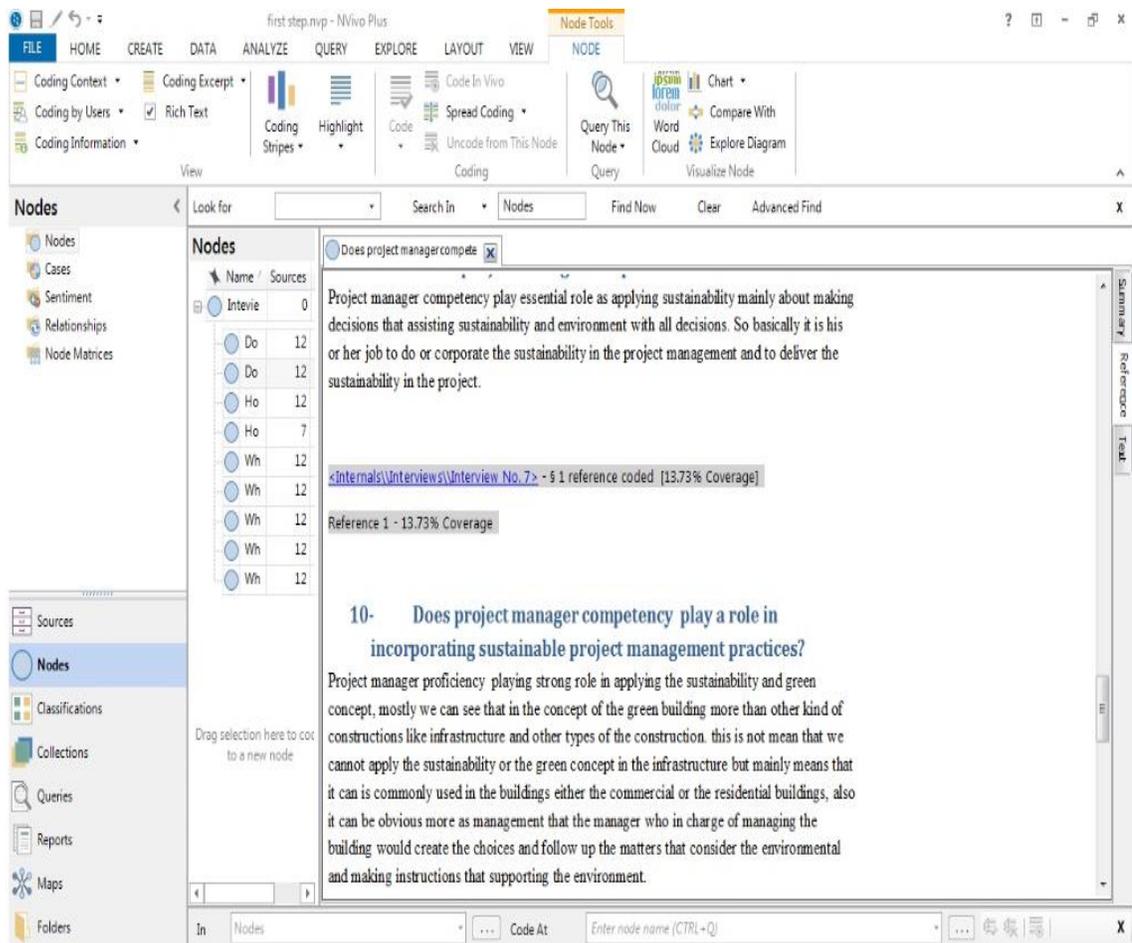


Figure 7: An example of coding documents using NVivo software

### 5.1.2 Subsequent Review of Documents – Axial Coding

The axial coding is an attentive method to create connection between the themes or to elaborate the thoughts that developed out of those themes. In axial coding, the research moves in the direction of unifying and classifying the ideas or themes and detecting the alliance of the main notions in analysis (Neuman, 2006). Miles and Huberman (1994) also emphasise the significance of having some conceptual order to the codes that the codes should link to one another in coherence, and that they should be part of a main configuration. However, the chief attention was on assessment and inspection of the initial codes. The axial coding process and the linking reduced the

main themes from nine themes to seven themes, which were produced in the first step of reviewing.

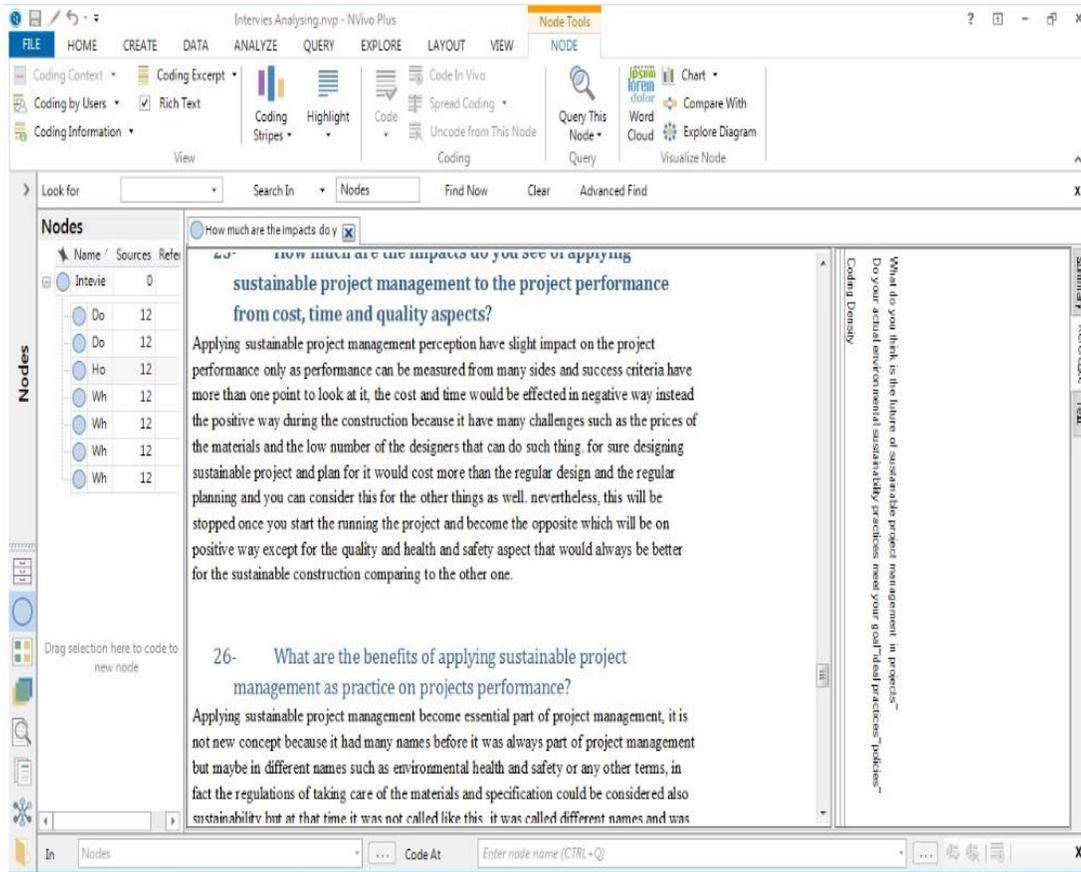


Figure 8: Axial coding—emerging the themes.

### 5.1.3 Emerging Themes

After careful reading and reviewing through the data and carrying on both procedures of coding and axial coding. Rethinking of adapting the main themes was conducted as it was guided by the set of main dimensions that were extracted from the literature review and the assumption of the conceptual framework, keeping in mind the research aim and the objectives of the research. We were able to adapt this ‘emergent themes’ method as all questions were open-ended questions and the questions nature require explaining for each part, which gave the interviewees the freedom of answering and give all their inputs regarding each matter. Subsequently, collected

data results were grouped into a number of main themes and sub-themes as required, in order to facilitate the analysis.

## 6.0 Discussion of Results:

### 6.1 Introduction:

The purpose of this chapter is to present the chief findings of sustainable project management from the interviews. Like stated previously, the data was collected in qualitative method by conducting structured interviews with respondents' project managers. Thus, the analysis in this chapter revolves about the answers that were provided by the respondents. It starts with a brief description of the profile of the interviewees. This is followed by exploring interviews done with the participants with regard to the integration of sustainability in project management and its impact on the UAE construction projects performance.

### 6.2 Interviewees profile:

This section illustrates the interviewees' profiles including their positions and their organisational background, which shows a variety of the organisations the interviewees have been a part of and their leadership roles. Some participants preferred anonymity for their personal information such as contacts and names, also for the names of their organisations.

Table 11: Demographic profiles of the interviewees.

	<b>Interviewee Name/ID</b>	<b>Designation</b>	<b>Organisation</b>
1	Proff. Bassam Abu-Hijleh	Head of the Sustainability MSc & PhD Programmes	The British University in Dubai
2	Dr. Halim Boussabaine	Professor of Project Management	The British University in Dubai
3	Eng. Jihad Jiblawi	Senior Manager– Projects   Property Development	Al Fahim Group, Client Organisation
4	N/A	Project Manager	Engineering Group
5	N/A	Principal–sustainability Consultant	Consultancy Organisation

6	Eng. Alaa Saber	Sustainability Manager	Government Entity
7	N/A	Projects Manager	Contractor Organisation
8	Eng. Mutaz Mohammad	Projects Managers–Projects   Property Development	Al Fahim Group, Client Organisation
9	N/A	Head of Planning Department	Government Entity
10	Eng. Moayyad Massad	Project Manager	Contractor organisation
11	N/A	Director of Engineering	Five stars hotel
12	N/A	General Service Manager	Government Entity

### 6.3 Main Themes of Interviews:

This section focuses on the main themes that have been highlighted in the interviews after using the aforementioned three stages, coding system, axial coding, and categorisation/merging themes using the literature review and the conceptual model as the guide, which generated the main themes that the questions and the responses have revealed.

A set of themes were identified and categorised under two main dimensions or stages. Its first aspect is ‘Sustainability Achieving’ theoretically leading to the second aspect, which is the ‘high performance construction’, which is in accordance with the proposed conceptual framework model. The results of each dimension will be presented and discussed in the following sub-sections.

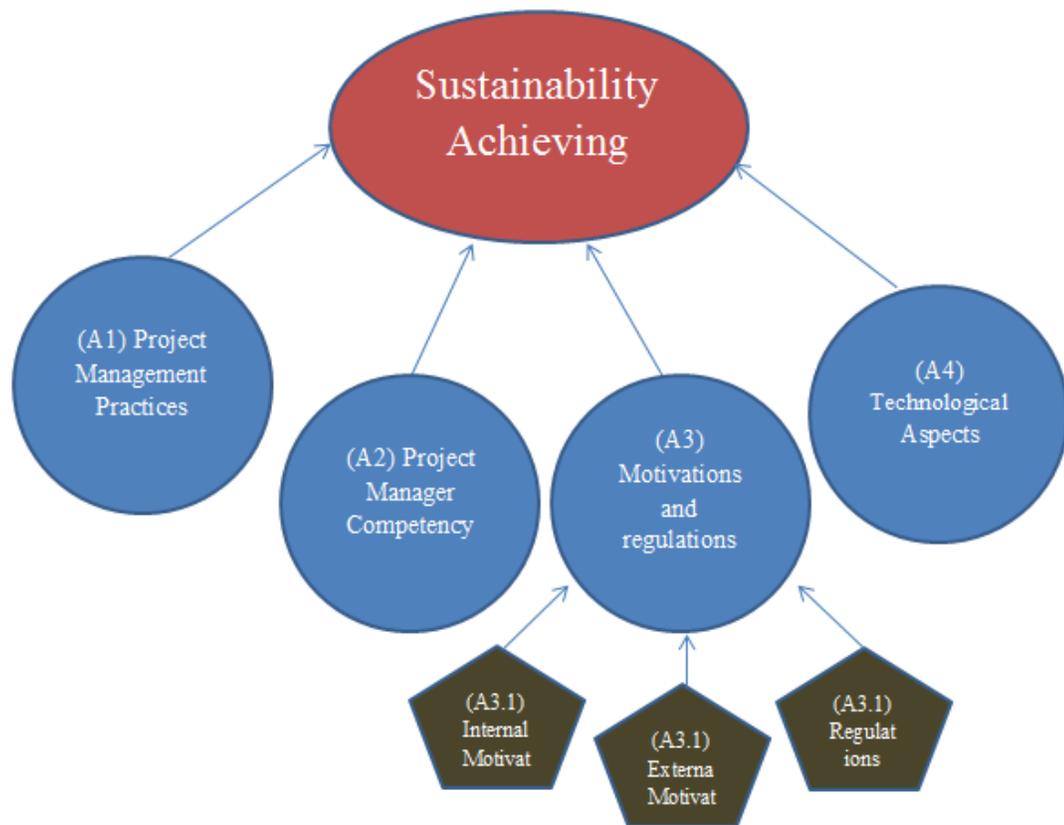


Figure 9: Sustainability – main dimensions and sub-dimensions

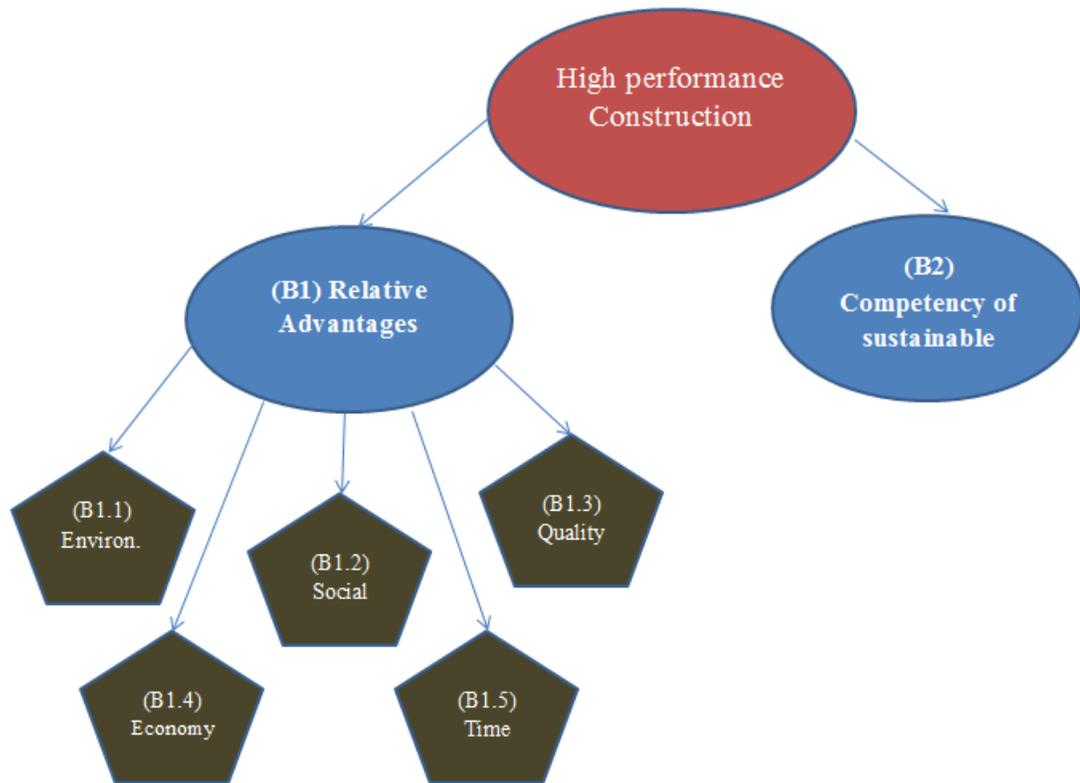


Figure 10: High Performance structures – main dimensions and sub-dimensions

Table 12: Summarises the main constructs and the underlying main dimensions used to guide data collection and analysis.

Main Construct	Main Dimensions	Sub-dimension
Sustainability Achieving	(A1) Project Management Practices (A2) Project Manager Competency (A3) Motivations and regulations (A4) Technological Aspects	(A3.1) Internal Motivations (A3.2) External Motivation (A3.3) Regulations
High Performance Structures	(B1) Relative Advantages (B2) Competency of sustainable construction	(B1.1) Environmental (B1.2) Social (B1.3) Quality (B1.4) Economy (B1.5) Time

### 6.3.1 Sustainability Achieving:

#### 6.3.1.1 Project management practices (A1):

All the respondents agreed with the fact that integration of sustainability in project management practices is essential for achieving the sustainability in projects. Hence, it is the most important aspect that needs to be there to integrate the sustainability notion in all the project phases. The project management practices would underline the notion of sustainability benefits for the projects and deal with each activity considering the environmental and sustainability notion by keeping the environmental feature in mind while making decisions and not ignoring it. Considering the fact that managing a project is something that requires consumption of resources, it definitely has a greater future and need to re-map the thinking of the project management from process to product. These findings are in correspondence with the highlights made by a few researchers (Brones, Carvalho, & Senzi Zancul, 2014; Hwang & Tan, 2012; Kibert, 2016; Lang, 2012; Silvius & van den Brink, 2014; and Tseng, Tan, & Siriban-Manalang, 2013).

Moreover, the respondents highlighted the role of project management practices for integration of sustainability inside the corporates, which is led in most of the corporates to change and look over their policies and regulations, to comply with sustainability, as it is a mandatory aspect that has been forced by the UAE government in compliance to the leadership vision of the future. The responses confirmed that neglecting or not fulfilling the sustainability requirement shall lead to reduction of the corporate's chances of success in the market and would not enable the corporate to have any future jobs, which will in the end cease the corporate. These results are harmonised with the results stated by Gareis, Ruemann, and Martinuzzi (2010) and Alvarez-Dionisi, Turner, and Mittra (2016). The consequences of sustainability influence the capabilities of the project manager and the way the organisations plan and manage their projects.

In summary, the main emerging themes from the ‘project management practices’ aspect are presented in Figure 11.

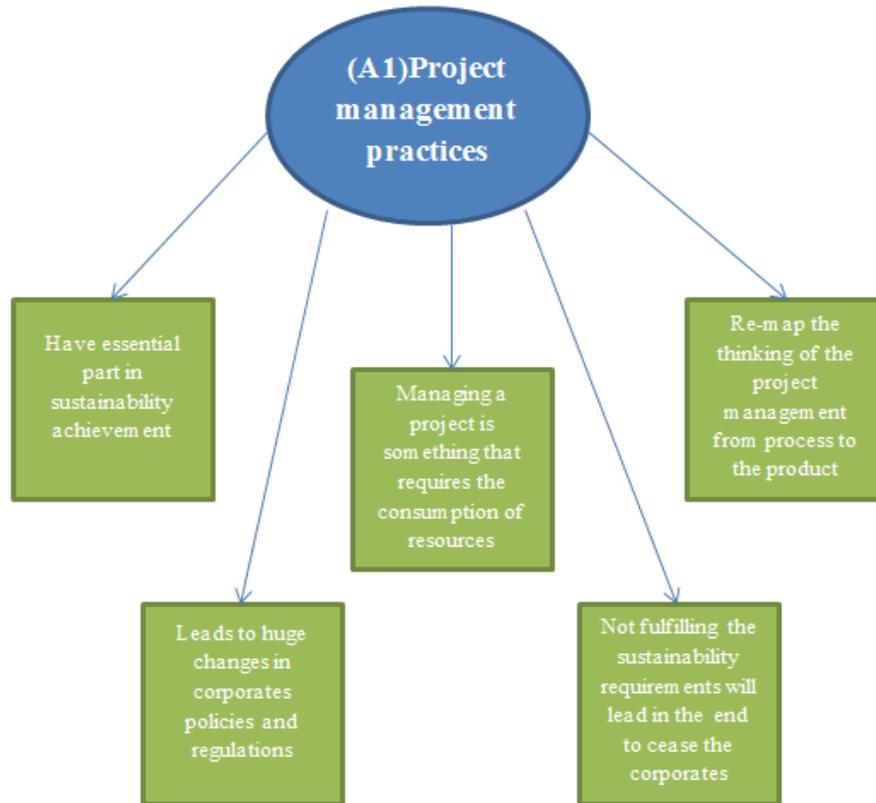


Figure 11: Project management practices – emerging themes

### 6.3.1.2 Project Manager Competency Role (A2):

In response to the questions related to this dimension, all respondents confirmed that project managers’ competency and their understanding of the sustainability notion plays a huge role in incorporating sustainability in the project management practices. Hence, it is considered as one of the most important keys that need to be there to incorporate the sustainability notion in the project management practices. The competence of project manager would emphasise the notion of sustainability and have it as one of the major rules in the integration required to achieve sustainability, but still the requirement of all the teams to be oriented into the notion of

sustainability is required for achieving sustainability goals. These competences for the project manager are essential due to the required extra focus in the sustainable building of the main pillars and the need for orienting all teams and members to the sustainability notion and what is required for sustainable construction. Whereas, minimisation of resource depletion, environmental deprivation, and formation a healthy environment are some of the principles that should be taken into consideration while managing the sustainable building. All the he responses agreed with the emphasis made by (Alvarez-Dionisi, Turner, & Mitra, 2016; Ebbesen & Hope, 2013; Silvius, Schipper, & Van Den Brink, 2012; and Young, 2016). Accordingly, the project manager should have the capabilities that would assist integration of sustainable project management, mainly to have a holistic view of the project and team activities and also to extend the sustainability notion as far as possible to reach all the project elements and stakeholders.

In summary, the main emerging themes from the ‘project manager competency’ aspect are presented in Figure 12.



Figure 12: Project manager competency – emerging themes

### 6.3.1.3 Motivations and Regulations (A3)

All interviewees confirmed that motivation of sustainability is the reason that increases the efficiency of the main drivers of sustainability and it is one of the main stimulations that would enable the main drivers of sustainability and overcome the main challenges and barriers of achieving the sustainable constructions, this concept can be clearly seen when we are asked for the future of sustainable project management as all respondents confirmed the bright future sustainable project management has and the significant influence. ,since sustainability is on the rise and sustainable practices are being emphasised. Furthermore, the main motivations of sustainable project management are the regulations and policies that are forced by the regulator or the government, the sustainable project management has been already integrated and made to be a part of the regulations for associations, such as Estidama and LEED, which are parts of the regulators in the UAE. Confirmatory studies by Kibert (2016), Al-Tekreeti (2015), Goyal, Rahman, and Kazmi (2013), and UAE-estate of green economy (2014), confirmed that sustainable project management is on the rise. Sustainable project management is expected to become mandatory for project managers over the world, as for now, we can already see that some organisations and companies are making, having knowledge and certification in sustainability from LEED, as conditions while recruiting their teams. However, some interviewees have confirmed many other motivators beside the main business case and the normal motivators for any projects such as the real estate value and reputation of the projects as a result of applying the sustainability notion on project management practices.

In summary, the main emerging themes from the ‘Motivation and regulations’ aspect are presented in Figure 13.

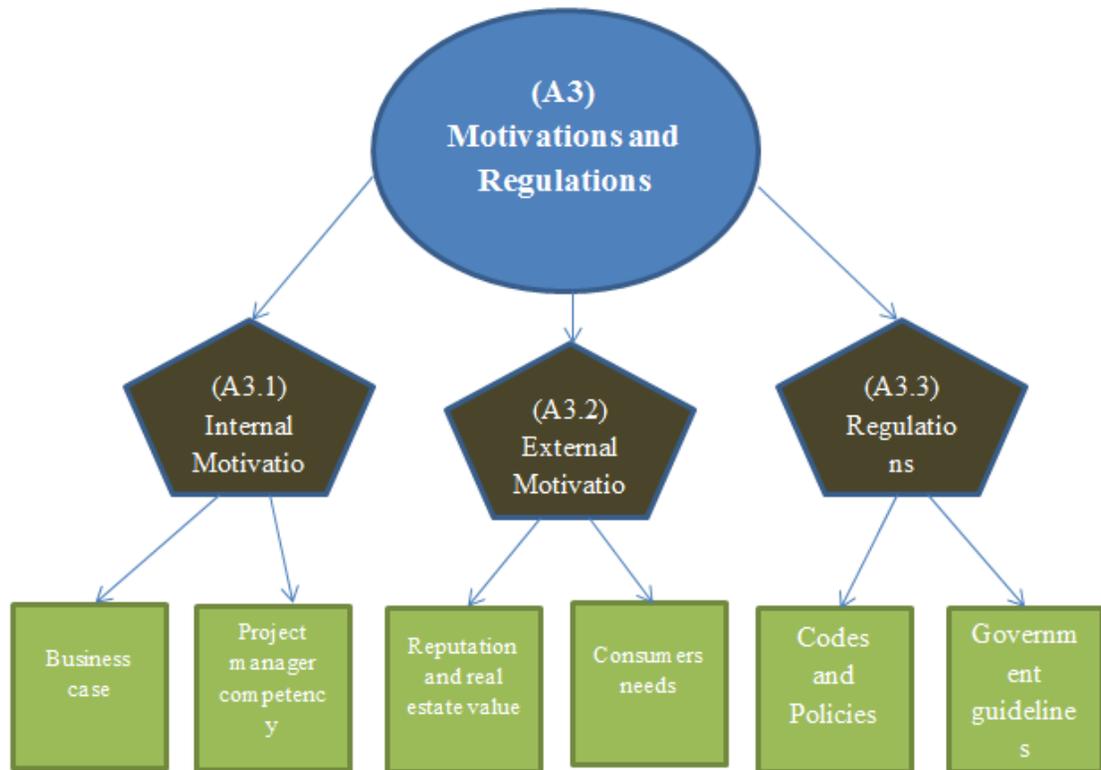


Figure 13: Motivations and regulations – emerging themes

#### 6.3.1.4 Technological aspects (A4):

In response to the questions related to this dimension, all respondents suggested that the project manager should have the knowledge and the competency that is required to integrate sustainability into project management and deliver sustainable projects. This is necessary to be able to integrate all parts and the team projects during all phases and activities, as the project managers usually have the basic capabilities in terms of education and the required technical background, since they need to be extensively experienced before starting to manage a project. However, two respondents added that extra techniques and strategies such as using the building integration modelling (BIM) programs, which allow to integrate all the elements

together to have an overview on all elements and see the interaction between them. This confirms the highlights that were made by Al-Hajj and Hamani (2011), Maguina (2011), Ebbesen and Hope (2013), Wong and Zhou (2015), Ahlemann et al. (2015), and Økland (2015) that the project manager competency role is to integrate and incorporate the sustainability in project management practices and try to use the suitable and available tools and technologies for achieving sustainability.

In summary, the main emerging themes from the ‘Technological’ aspect are presented in Figure 14.

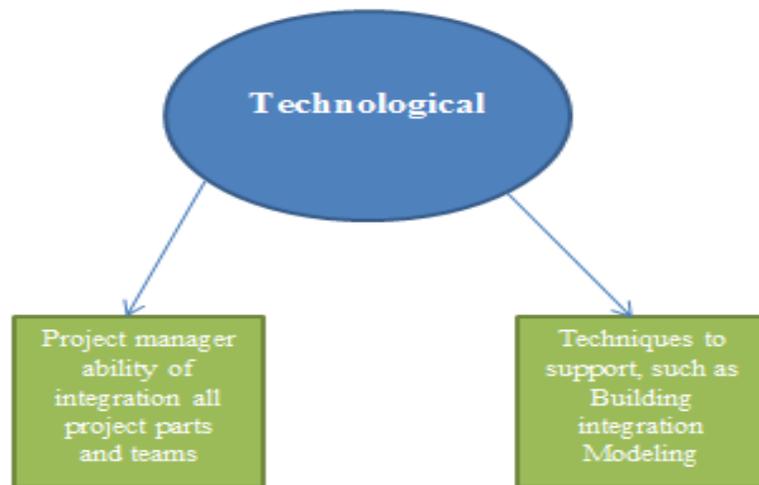


Figure 14: Technological emerging themes

### 6.3.2 High Performance Construction

High performance structures refer to the degree to which a sustainable project management aspect and sustainable construction is perceived as being better than the traditional project management and traditional construction. It was identified as one of the most significant factors driving the adoption and use of sustainability notion in organisations.

### 6.3.2.1 Relative Advantages (B1):

In response to the questions related to this dimension, all interviewees confirmed that applying sustainable project management have an overall, big and positive, impact on the performance of the construction projects. Since project management is the main guide of implementing the sustainability and have the biggest role in coordination between all teams and individuals who are part of the project.

However, the difference in the responses was clearly noticeable from the areas and phases, which have an effect on the performance in a positive or a negative way. Analysis shows two main phases to measure the impact of the sustainable project management practices on performance, which are the project life time including the performance during the operation till the demolition phase and the other is the project life time till the closing or handing over of the project (before the operation and maintenance starts). Four respondents suggested that applying the sustainable project management should lead to enhance the performance in general, through all phases and activities as it have various potential benefits on the project classical performance aspects of cost, time, and quality, were against what literature suggesting that the sustainability still not overcome the challenges that facing during the construction as it is increase the cost and the time of the project, the respondents claims the following aspects as per their experience in the sustainability field:

- Cost: the positive impact that can be seen from applying sustainability during construction as it reduces the cost of the projects if it is calculated starting from the initiation of the project till the closing and handing over of the project. However, it is seen that some areas such as façade item have higher costs than those of traditional construction, but overall, the costs are less without even the need to include the performance enhancement during the operation of the project, which without doubt has multiple areas of enhancement till the demolition phase.
- Time: The sustainable projects tend to have longer duration during the lead time at the beginning of the project; nevertheless, sustainability projects usually have a shorter execution period. Overall, the sustainable projects execution, in case they are

applied properly, require shorter times than traditional projects and traditional project management.

This is supported by the suggestions made by Poerschke and Gampfer, (2013), Yudelson (2013), Wilson, Hargreaves and Hauxwell-Baldwin (2015), and Brokhaus et al. (2017), which state that the concept of sustainable construction as a method has greater competency compared to the traditional project management through all phases.

On the other hand, eight respondents deny that sustainable project management performs better than traditional projects and project management practices through the execution of the project till the handing over from the cost and time aspect, as the costs and time are associated with the increase, which due to many factors and barriers have still not yet been overcome properly in the region. Nevertheless, the performance of sustainability and sustainable project management is much better than those of traditional projects during the operation and the demolition phase of the project, as any saving, even if small, during the long period of operation ensures excellence of the sustainability notion over the traditional one. This is in accordance with the views of Issa and Al Abbar (2015), Kibert (2016), Jamil, Ahmad, and Jeon (2016), Akadiri, Chinyio, and Olomolaiye (2012), Kats (2013), Murphy (2012), Maguina (2011), and Asif (2016) mentioned in the literature review.

All respondents confirmed that the quality of sustainable construction triumphs over that of traditional construction. Thus, it is certain that the sustainability notion delivers better quality construction, even during the execution of the project, with added benefits considering the environmental concerns such as consumption of resources, selection of raw materials, preservation of resources, effectiveness of energy, lessening of emissions, protection of the biodiversity and nature, and effluence of water and air, also the social aspects such as enhancement of the workers' standards, health and safety, public and human rights, fairness, and religious understandings, which are an integral part of sustainability. This has been confirmed

by Azhar et al. (2011), Bina (2013), Moldan, Janoušková, and Hák (2012) and García-Segura et al. (2015) in the literature review.

In summary, the main emerging themes from the ‘Relative’ aspect are presented in Figure 15.

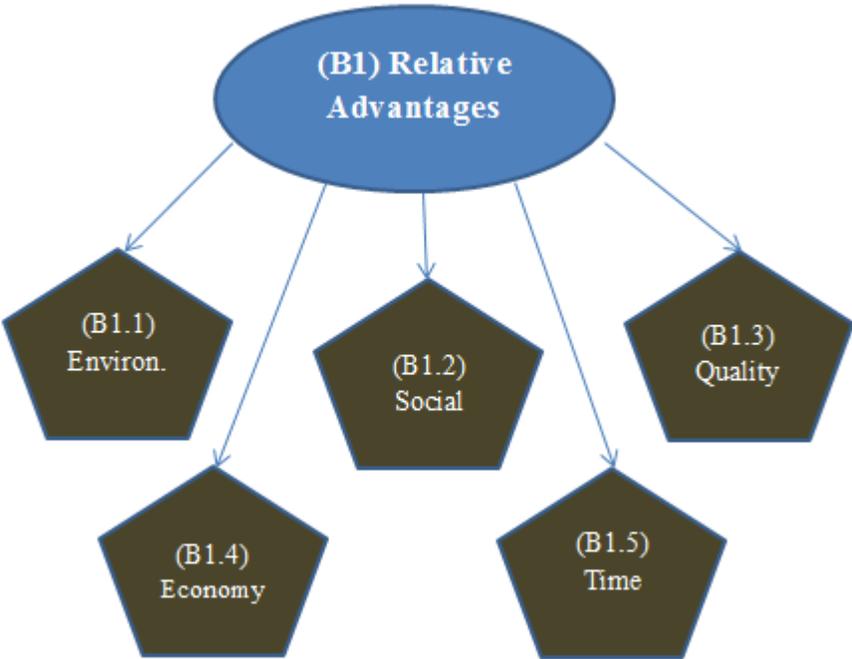


Figure 15: Relative advantages – dimensions

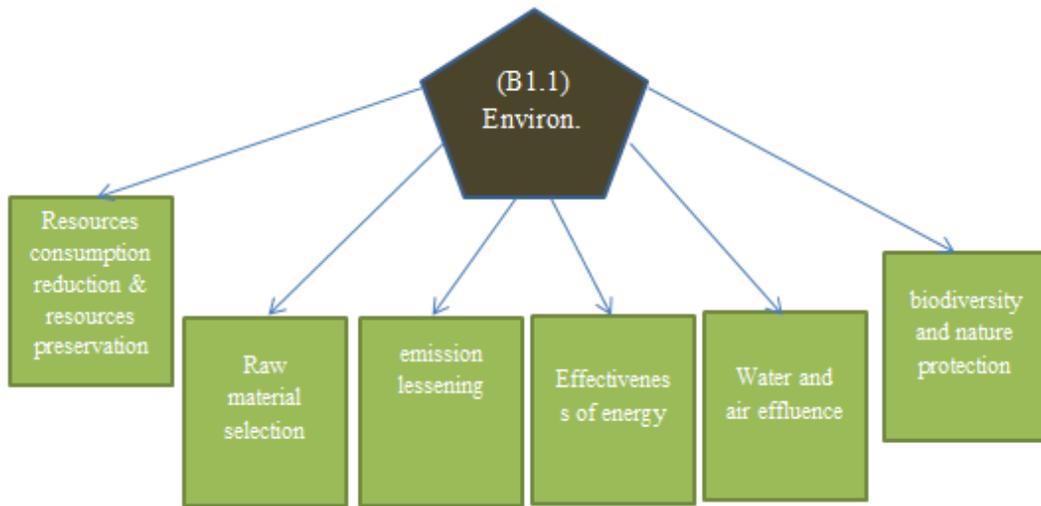


Figure 16: Environmental emerging themes

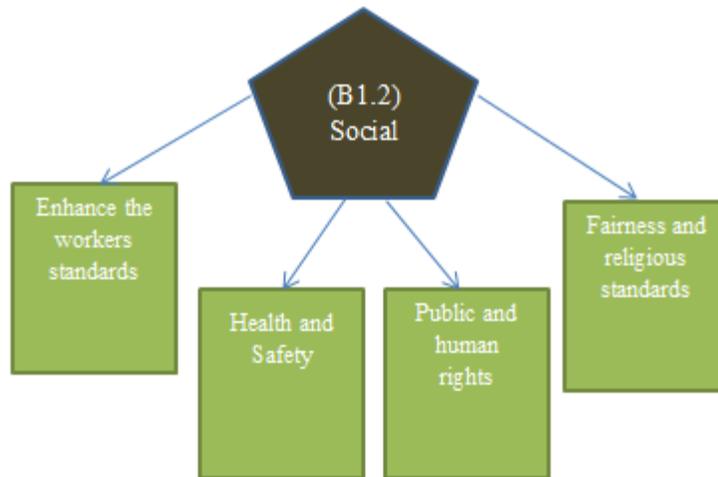


Figure 17: Social emerging themes

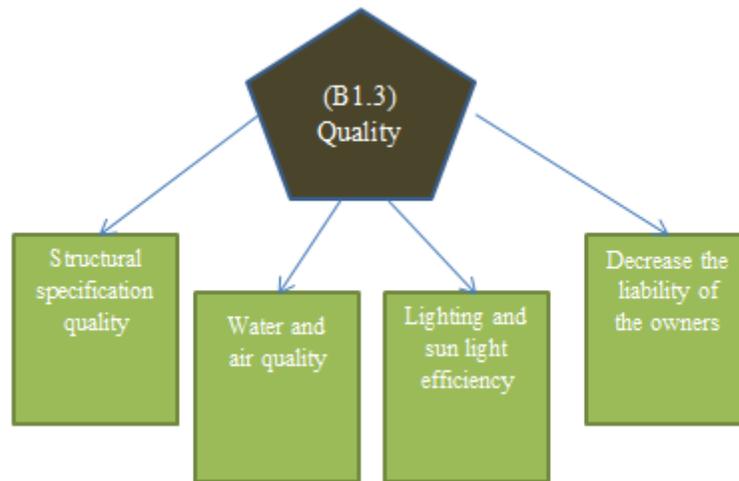


Figure 18: Quality emerging themes

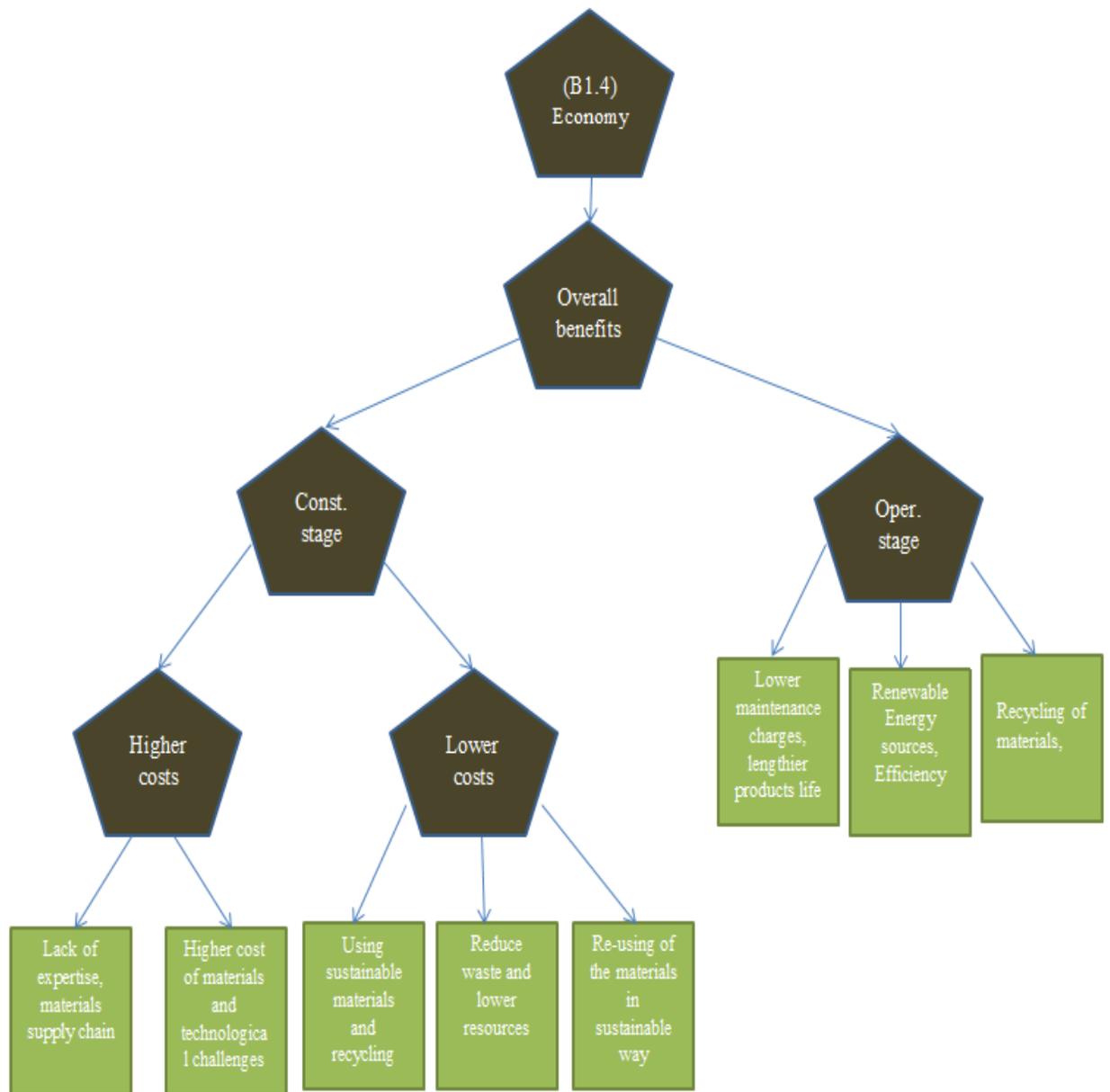


Figure 19: Economy emerging themes

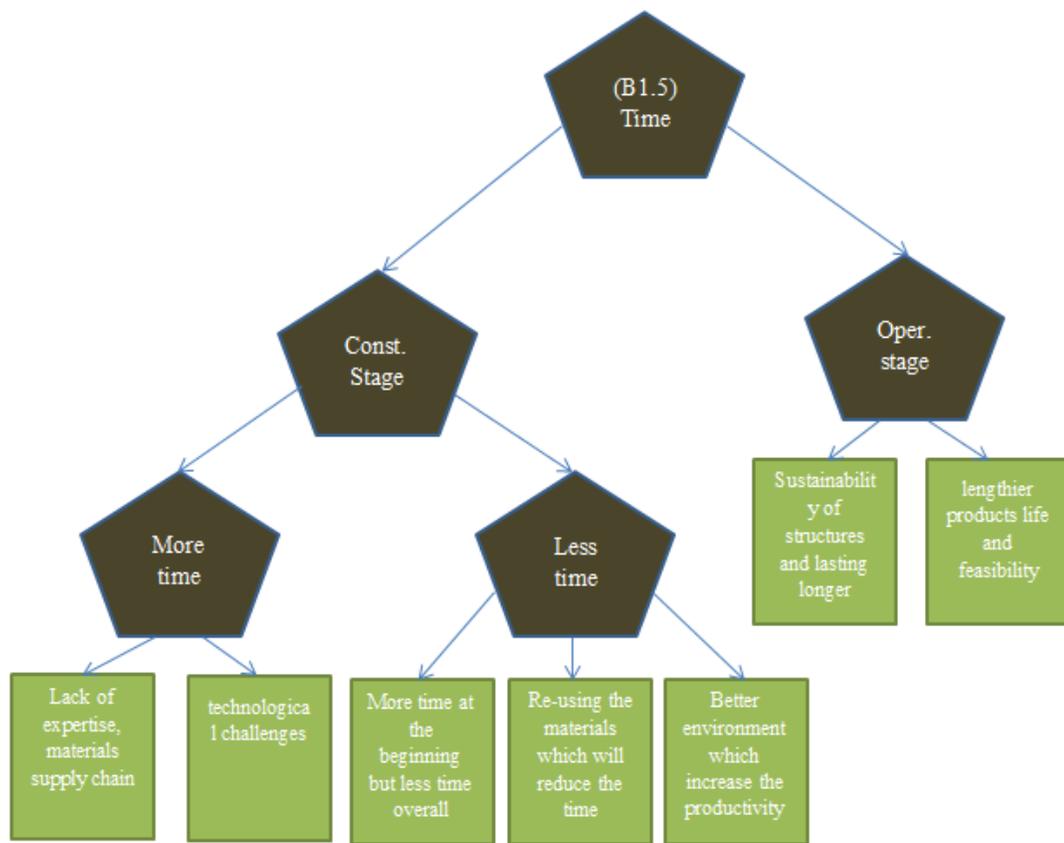


Figure 20: Time emerging themes

### 6.3.2.2 Competency of sustainable construction projects as compared to traditional construction projects (B2)

In response to the questions related to this dimension, all respondents confirmed that competency and excellence of the sustainable construction projects among the traditional construction projects, mainly in the operation and demolition phases, would increase as sustainability is incorporated in the construction. Hence, sustainable construction projects have proved their competency among the normal by having lengthier life time of systems, which reduce maintenance cost and effort for the long-term, better and easier operational procedures, high air and water quality, easier and recyclable demolitions, higher real estate values, and huge savings that can be achieved in regards of water and energy consumptions, which make huge difference on the long-term aspect of the project life including the operations and

demolition phases. Nowadays, a new trend has emerged which is called the net-zero design, or the passive design that the building has dual function which contribute to generating the energy from the building itself. The competency does not come only from the energy and water saving, but also extends to the increase in real estate value of the sustainable construction, which is categorised as high-performance construction compared to the other. This is in accordance with the studies conducted by Reyes et al. (2014), Stark, 2015), Azhar et al. (2011), and García-Segura et al. (2015).

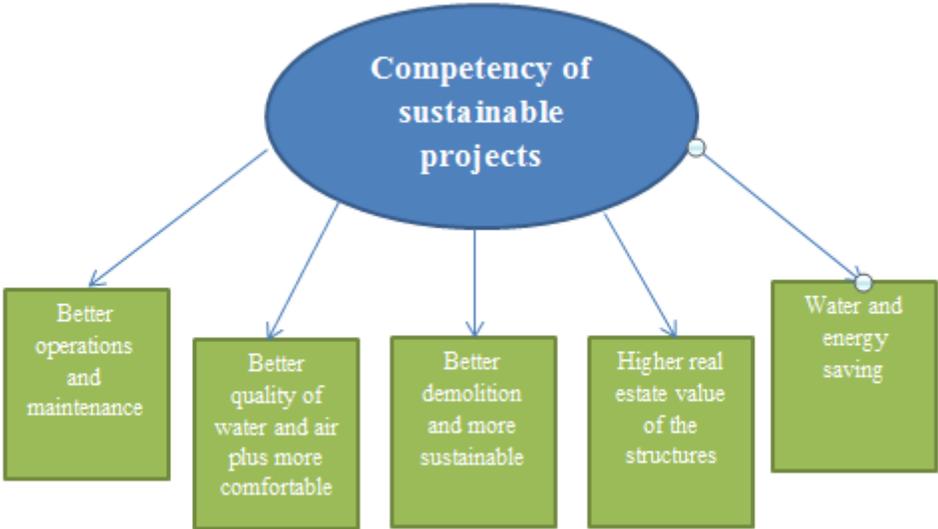


Figure 21: Competency of sustainable projects emerging themes

## 7.0 Conclusions:

### 7.1 Research Process

The concept of sustainable project management has been adopted by many organisations with noteworthy benefits achieved. This has been reported by many authors and researchers in the field of sustainability. Many of these researchers investigated the application of sustainability integration on projects.

Therefore, the aim of this research was to examine how integration of sustainability in project management impacts upon the performance of construction projects in the UAE. Following steps have been conducted in order to achieve the aforementioned aim.

- 1) Review the concept of sustainability and explore its core pillars and drivers.
- 2) Analytically explore the integration of sustainability notion in project management practices.
- 3) Discover the applications of sustainability and sustainable project management in the construction industry.
- 4) Identify the priorities, barriers, and success factors for the implementation of sustainability notion in the construction industry.
- 5) Evaluate existing models and frameworks associated with the adoption, implementation, and monitoring of sustainable construction.
- 7) Identify the relative advantages and the competency of the sustainable construction.
- 6) Develop a conceptual framework to assess the implementation effort of sustainable project management approach in construction
- 7) Test and validate the developed framework with domain experts

## 7.2 Why this topic is important:

In considering the relatively high applicability of the sustainability fundamentals found in the literature review and scrutinised in the interviews, our study highlights various research opportunities which have not yet been adequately addressed. As mentioned earlier, the sustainability as a general aspect, and particularly the integration of sustainable project management are still relatively new areas that require further studies to investigate all the potential benefits and gains that can be introduced to the construction industry. It is hard to measure the impact of the integration of sustainability in project management practices, or what is called the 'sustainable project management' on the construction project from the performance aspect. This topic has critical value, and has importance for the UAE, since sustainability and the environmental aspects became mandatory conditions that the construction industry should follow as part of the regulations and policies in UAE.

This study contributes at two main levels. First, at the scholarly level, the research is multi-layered in that it embarks on an attempt to recognise the interactions which interconnect project management development, sustainability, drivers that impel the progress of sustainable project management, internal and external motivations, barriers, challenges, and actions that help one to achieve sustainable construction, along with introducing the impact of sustainability on construction project performance, by using the interview data from UAE professionals. This research will help to enlarge the system limitations of the traditional projects and project management by making sustainable project management practices familiar. Moreover, the examination of the combined interrelationships among sustainability and project management practices along with the performance concepts lead to the maturation of a more holistic theory.

Second, at a practical level, this research will aid to bring about a rich understanding into the sustainable project management practices in UAE by discovering the feasibility of integrating sustainability with project management practices by investigating the impact of this integration on the performance of the construction

industry. There is high awareness in UAE that the country should not rely on oil reserves for its economic future. Attentions were paid to alternative customs of economic activity that is not totally reliant on consuming the resources on all kinds. This study will be able to illustrate and confirm the benefits and impact of sustainable project management practices on the performance of construction industry in UAE by exploring the concept of sustainability and its integration with project management.

### 7.3 Conclusions:

While the opportunity of integrating sustainability in project management practices has been ‘theoretically’ anticipated in studies, it has not yet been extensively put into practice in UAE as it ideally should be. The realism of this notion has been examined within the context of UAE, which has been a leader in the world by dint of implementing sustainable considerations in its construction industry.

The core results emerged from the research investigative work on integration of sustainability in project management practices in the UAE construction industry and data analysis, which were detailed in chapter 5 and chapter 6. As illustrated earlier the main emerging results can be categorised into two core areas related to this research, the process of achieving sustainability and its result by achieving high performance construction.

#### 7.3.1 Project management practices:

The sustainability constraints added to the project success criteria and the successful implementation of project management, along with the traditional factors of time, cost, and quality, that is to say, the economic, social and environmental pillars of sustainability become vital constraints and indicators that should be taken into consideration while evaluating the project success or failure. The study exposed that there is a necessity to continuously integrate sustainability into all the different functions of projects and project management

Keeping this in mind, a promised future of sustainability integration in the project management practices and processes would rise and would become a mandatory requirement that each corporation would need to adopt the notion of sustainability; failing in adapting of integration of sustainability will lead to the organisation not being able to have any future jobs, which will clue to the end of the corporation itself. However, the sustainability goals and ideal practices and policies have still not been met or addressed properly and translated into some activities despite the great and fast enhancement that has been achieved in the last decade.

### 7.3.2 Project manager competency

This study indicates that project managers should meet some competences in order to integrate the concept of sustainability with the project management practices and processes, and also with the project itself. These competences are required owing to the extra focus on sustainable building and the need for orienting all teams and members to the sustainability notion and what is required for sustainable construction, whereas minimisation of resource depletion, environmental deprivation, and the formation of a healthy construction environment are principles that should be taken into consideration for managing sustainable building.

The results of this study revealed important findings that shed light on the state of sustainable project management's main strategies and techniques that should be taken into account while managing a sustainable project, which requires one to have a holistic overview of the project and the ability to integrate all parts and teams during all activities.

### 7.3.3 Motivations and regulations:

The UAE regulations related to sustainability had motivated and forced the corporations to adopt the sustainability notion in their organisations, which has direct benefits that help to integrate sustainability from all aspects.

There remain some challenges to comprehend adoption and to move from the incremental to the transformational phase that would include all stakeholders to be

more self-indulgent than coming from the dread of the policies and regulations that are forced by the regulator or the government, which is considered as the main motivation for sustainability. Furthermore, the motivation of sustainability is the reason that increases the efficiency of the main drivers of sustainability. As one of main stimulator that would enable the main drivers of sustainability to overcome the main challenges and barriers of achieving the sustainable constructions.

#### 7.3.4 Technological Aspects

The development revealed many techniques and programs that assist and ease the project management and offer good instruments. The project managers usually have the basic capabilities in terms of education and required technical background, since they need to be extensively experienced before starting to manage a project. Techniques and programs such as the building integration modelling (BIM) program would assist in achieving sustainability and managing the sustainable project, which allows one to integrate all elements and view the interaction between them.

#### 7.3.5 Relative Advantages

The study presents numerous contributions to sustainability as a notion, and the benefits of sustainability integration on project management practices for the construction industry and the performance of the sustainable projects. Despite the debates between the experts regarding the cost and time saving that comes from applying sustainability and sustainable project management among the construction project and its stages, still all agreed on the huge gains that the sustainability offers to the construction industry not only from the main constraints' aspects, cost, time, and quality, which has had great benefits in the long-term and from the holistic view of the lifecycle of the building, but also the main pillars of sustainability and aspects have become part of the evaluation and have had numerous advantages and enhancements specially from the environmental and social parts.

### 7.3.6 Competency of sustainable construction

The study stressing on the sustainable construction project competency, compared to that of traditional construction projects from all aspects and through all phases of construction, beginning from the initiation till the demolition phase, the competency of the sustainable construction projects, and the huge impact on performance can be chiefly seen during the operation and demolition phases of the project.

From this, the following conclusions can be drawn based on the results of this study:

- 1- Environmental, social, and economic drivers are the main drivers of sustainability and are its pillars.
- 2- Integration of sustainability in project management practices play an essential part in achievement of sustainability.
- 3- Integration of sustainability in project management practices requires to re-map the thinking of project management from process to product, considering that it is something that requires consumption of resources.
- 4- Integration of sustainability in project management practices leads to huge changes in corporates and not fulfilling its requirements will lead to cease the corporates.
- 5- A promised future of sustainability integration in the project management practices and processes would rise and it would become a mandatory requirement for every corporation to adopt the notion of sustainability.
- 6- Project managers competency play a vital role in incorporating sustainability and in emphasising on the sustainability notion.
- 7- Motivations and regulations are the main stimulations that would enable the main drivers of sustainability and overcome the barriers.
- 8- Technological aspects are one of the main challenges and overcoming these challenges shall assist the integration of sustainability in project management practices.

9- There are numerous advantages that can be gained from achievement of sustainability in terms of the environment, society, economy, quality, and time.

10- Sustainability achievements in terms of construction projects would lead to high performance construction in comparison to the traditional construction ways from all aspects, especially from the maintenance and operations aspects.

#### 7.4 Study Limitations

Despite offering rich data and motivating perceptions, the research was able to produce decent outcomes and great learning as well. Overall the research looks pleasing, but it has few limitations that need to be taken into consideration. The research is conducted on the construction industry, and it is limited to the same industry; hereafter, it can't be imposed on any other industry.

This research regrets a limited ability to take a broad view of the findings to the whole the world, or the countries near the GCC region, since these interviews were conducted with project managers in UAE; so, the superiority of the UAE in the sustainability notion, as it was one of the leading countries to apply sustainability in the area, would limit the usage of study for other countries.

Furthermore, there are many studies on the subject of sustainability and sustainable project management. But few studies and empirical work have been done in the aspect of sustainability impact upon project performance due to the fact that performance of sustainable construction and sustainable project management are still under observation owing to the fact that sustainability is a still relatively new concept and not all its impacts are seen and measured enough to recommend the performance in general, i.e., the demolition impact has still not yet been examined enough, so most of the figures are expectations made based on design and calculations.

Quantitative research could then be done to take some of this research conclusions and examine them on a bigger and more illustrative sample to help present the level

of awareness about sustainable project management. After all, sustainability is not only about preserving and maintaining the natural resources for upcoming generations, but also definitely improves both the long- and short-term value of the built environment.

## 8.0 Recommendations.

To this end, it is clear that the UAE, as a country has achieved many accomplishments in sustainability as notion and sustainability integration in project management practices, specifically in the construction industry. However, still a lot is to be done not only in the UAE but also around the world, hence, the relatively new subject of sustainability, the extraordinary applicability of it, and fundamentals gains of the sustainability that cannot be evaluated or measured by cost or any other measurements, as it considers as unimaginable. All things considered, there are mutual responsibilities on the government and the organisations to make extra effort that would enable the sustainability notion on general term and sustainability on project management practices specifically which would lead to better construction and performance. Accordingly, the following recommendations are offered:

- 1- To include sustainability to the training program of all project managers in the construction industry.
- 2- Eliminating barriers that would bar sustainability and encourage the sustainability notion.
- 3- Keep improving the guidelines for sustainable construction to spread consciousness and to reorganise sustainable initiative in the construction.
- 4- Stricter government legislation, improved education, and communication are required to make sure of compliance by all parties. Obligating stakeholders and corporations, especially, to the welfares of sustainability. If sustainability was the stakeholders and the corporation primacies, for sure project managers would be accommodated to deliberate it and work in the direction of attaining it.
- 5- A requirement to correcting the existing attention of project management applies in the UAE. For instance, there are requirements to be a change from an importance on short-term cost decrease to longer-term value improvement.
- 6- Sustainability should not be noticed as a separate plan, and must always be deliberated at the beginning phase of the project and thoroughly managed during all project management practices.

- 7- Keep highlighting and addressing the sustainability impact upon performance and the potential performance impacts.
- 8- Develop the current project management procedures and highlight the accurate strategies and techniques that would help achieving the sustainability.

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## APPENDICES

### Appendix A (interviews):

#### Interview No. 1 (Used as Pilot Test) Proff. Bassam Head of the Sustainability MSc & PhD Programmes in BUID:

- 1- What are the impacts of incorporating sustainability in project management practices at the corporate level?

On the corporate level, if the sustainability didn't integrated and incorporated in the corporation then there will be no future chances for the corporation to take any more projects in the due to the fact that all policies and regulations attends now to toward the sustainability and not following the new demands shall exclude the corporation from any further projects.

- 2- Does project manager competence play a role in incorporating sustainable project management practices?

Sure it is, project manager competency and understanding of the sustainability notion playing huge role in incorporating the sustainability in project management practices, however, the project manager would emphasise the sustainability but still this not enough to deliver the sustainability since it require that the whole team are oriented and playing their roles as well.

- 3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

The sustainable practices are not meeting yet the ideal goals and policies but maybe in the future, the market and stakeholders are not yet fully oriented to the sustainability and the practices are not meeting the goals in ideal way.

- 4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

It is have big impact since the sustainable project management is the main guide for implementing the sustainability and coordination between all teams, however, this also should be led by all other teams and individuals.

- 5- What are the benefits of applying sustainable project management as a practice on projects performance?

It should lead to enhance the performance on general if it applied properly, there are also various potential benefits on the project itself, i.e. sustainability impacts on cost, time and the quality.

- Cost: the impact can be positive or negative impact depending mainly on the team who have carried out the sustainable project works, hence, if the team did the work on proper way this shall have good impact on the project and the operation lifetime later on with reducing cost.
- Time: the sustainable projects attend to have longer duration during the lead time at the beginning of the project, nevertheless, sustainability projects usually have shorter time during the execution of the project. Overall, the sustainable projects in case it's applied properly shall have shorter time than the other.
- Quality: for sure the sustainability notion would deliver better quality of the building.

- 6- What do you think is the future of sustainable project management in projects?

Definitely will increase, since sustainability on the rise and sustainable practices are being emphasized. One of the thing that been emphasized is the integrated design projects which required management of the all the elements of sustainability and all the players in the team.

It is already being integrated in Estidama and LEED and it will be integrated in more and more building regulation systems as well in the future.

- 7- How much the sustainable project management practices play role in achieving sustainability?

If it is done right, it will be very important since you can put the sustainability goals, sustainable materials, sustainable design, sustainable facility management, but if these elements are not integrated with each other then will not work and deliver sustainability. As example you can make sustainable design but the material does not matching the design then sustainability will fail, as well as, adding equipment that cannot be maintained or operated in sustainable way also will not deliver sustainability.

So the integration process which is the project manager role to make sure that all elements are integrated and fit together that the expectations and the requirements of each of those teams are actually in line with the what expected by the others. If there is no integration for sure there will be waste and sustainability breakdown and that is the rule of the project management will be.

- 8- What are the sustainable construction competency in comparison to the traditional construction?

It can be big difference, usually sustainable buildings are designed to save 5% to 10% of energy and most probably in the water as well, depending on how sustainability

you are incorporating in the building and it can be reach almost zero. Nowadays, they start to design net-zero energy building that do not need on average external energy.

- 9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

Most probably sustainable project managers that would have knowledge about the building integration modelling (BIM) since it is now the new way of managing the projects for sustainability were all elements are integrated together in such a way that the components, the financing, the design, the material, etc... are integrated, so potentially the sustainable project manager he is manager knows BIM.

#### Interview No. 2:

- 1- What are the impacts of incorporating sustainability in project management practices at the corporate level?

On the corporate level, sustainability have no impact on corporate level since project management have depending on project management practices more that sustainability practices, the project management it is worldwide notion that can be applied everywhere.

- 2- Does project manager competence play a role in incorporating sustainable project management practices?

The project manager competency play role in general way either if it for sustainability or any other project delivery, so basically the project manager competence play big role in make it success and so on with the sustainability.

It is universal skills that you can apply to all aspects and depend on what required either if it sustainable or any other project delivery required. So as successful project

manager you would be able to reach the goal of the project using the skills and the knowledge of areas of project management.

- 3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

No the sustainable practices are not meeting the ideal goals and policies, sustainability should be meshing our purposes as human with the purpose of the universe, if we mesh those then we will arrive to the sustainable think.

On the other hand, if we talk about sustainability as reducing the carbon and reserve the energy then it talk about mitigation strategy not sustainability.

The environmental and human should live in harmony which is now they don't, so sustainability it always there and always will be there by god. We need to think about the environmental from different perspective.

- 4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

During the execution the it have small impact if we looking to the performance as classical performance (time, cost, delivery), however, if you looking from environment point of view then for sure it have impact and have difference.

During the operation, it have huge impact, usually execution just small like one or two years period comparing to the operation period that might extended to more than hundred year. So even 0.5% saving in any kind of energy, water, ...etc. would have huge difference.

- 5- What are the benefits of applying sustainable project management as a practice on projects performance?

It is really depend on the project manager competence mainly not as sustainable project management, that the manager can manage project with theme that have sustainable and environmentally friendly.

6- What do you think is the future of sustainable project management in projects?

It have future, here we can presume new theories if we consider that the project management that it something consume resources then you can bring it to sustainable. So if it consider as specifying the resources then for sure it will have future and big influence on the projects.

So need to re-map the thinking of project management from process to product.

7- How much the sustainable project management practices play role in achieving sustainability?

Project Management play big role in achieving sustainability as long as it is done in proper way that would integrate all parts of projects and teams to do their roles in the way that it should be.

8- What are the sustainable construction competency in comparison to the traditional construction?

This depends on many other factors as well not only sustainability, but sure the sustainable construction have better environmental good performance, like water saving, reducing energy, solar energy use,...etc.

New trending coming of design called passive design that the building have dual function that making the cooling and heating, lighting from the building itself.

The main difference coming on the capital cost, operational cost, and real estate value. The sustainable construction have bigger capital cost, lower operational cost, and better real estate value so for sure it is considered as high performance building comparing to the other.

- 9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

This is goes in terms of education, project manager before managing project needs to have technical background about the project, since project manager have to go through so many experiences before managing project, but once you reach to such position this means you have the skills that allow you to manage the project

### Interview No. 3:

- 1- What are the impacts of incorporating sustainability in project management practices at the corporate and level?

Sustainability have for sure impact on the corporate and it became part of the process and procedures of the corporate and their team at work, as example, in our company the projects team had to enrol on the sustainability programs and training such as LEED and Green Buildings design.

- 2- Does project manager competence play a role in incorporating sustainable project management practices?

Project manager competence play a big role in integrating the sustainability in the project management practices and mainly in the part that would encourage the sustainability as notion in making every decision, if the project manager not convinced in the sustainability as notion then definitely will not be able to enrol and enable the sustainability in the project management practices and wouldn't deliver at the end sustainable projects in the best cases.

- 3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

The sustainable practices are not meeting the ideal and policies as of now in its best way, goals of sustainability can be extended way further than what the roles even says, but for sure keep enhancing this field would for sure reach this point at the end specially that we can see that it is trending aspect either in local market or as world concern that all notions tries to follow and comply with.

- 4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

It is have great influence because the integration of sustainability in project management is the key leader for applying the sustainability. The impact can be seen

in its better view when you applying this notion on sustainable project but in case the regular projects applying sustainable project management cannot be seen in clear way on the performance as the measurement would not effectively identify the impact and the improvement that sustainable project management added to the project.

- 5- What are the benefits of applying sustainable project management as a practice on projects performance?

If the sustainable project management applied properly then it would for sure enhance the performance on general from all aspects, mainly the environmental aspect, and also from the three main aspects of the project and construction project which mainly are the time to be reduced, cost reduction that can be seen in the operation period after the construction since sustainability applying have direct impact that would overrun the cost during the construction, and the quality that will meet the goals and objective of the project in case if it sustainable and if it not sustainable for sure the deliverable quality would be better after applying the sustainability measurement.

looking to the projects that recently delivered in our company, seeing that quality of sustainable materials was not always meeting what the owners and the stakeholders expectations but in the same time it is perfectly fit and meet the quality requirement of the sustainability.

- 6- What do you think is the future of sustainable project management in projects?

for sure the sustainable project management will become more integrated in the future and it is actually started already to be integrated in the local and international codes and associations.

- 7- How much the sustainable project management practices play role in achieving sustainability?

The project management practices plays a crucial role for achieving sustainability as much as it is play role in achieving the goals and objectives for any projects mainly because it is the managing part that lead all teams and integrating them together.

- 8- What are the sustainable construction competency in comparison to the traditional construction?

There Are noticeable big competences between both the sustainable and the tradition constructions from many features but you can see it mainly in the energy and the water consumption of the buildings at during the operation and maybe in the demolishing phase which as I believe still not yet clear area since the sustainability notion still new in general.

- 9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

Strategies and techniques that would relate on how to integrate all teams and activities together in way that all serve the main purpose of the sustainability in the projects. There might be no precise technique as it is directly as mentioned before to the project manager competence and what the project manager can achieve.

Interview No. 4:

- 1- What are the impacts of incorporating sustainability in project management practices at the corporate level?

The impact of sustainability on the corporate level have not that big impact inside the corporate as maybe when we talking about the procedures but when it is from their policies and regulations they should participate it will be something important to act and to be combined otherwise they will lose the chance to get of some jobs and further project because the sustainability matters became a mandatory to be followed in many places and many projects specially the big projects and effective one.

- 2- Does project manager competency play a role in incorporating sustainable project management practices?

Definitely, the project manager perception and his ability and smartness that would enable him to integrate of the sustainability plays massive part in integrating the sustainability in project management practices and to be able to understand all element and requirements of the sustainability, also it's must to know that the sustainability depends on teams work rather on individuals which is would be also part of his work to share and spread the awareness of these practices along with all other teams.

- 3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

Frankly speaking when we are talking about the sustainability goals there will be one clear understanding for the exact goals as it is very wide and open subject that can be going further than what can be measured, as of now the sustainability not yet meeting the ideal of what it should be as goals and objectives, this is one of the objective we're aiming for in the future and the improvements keeps coming day by day to reach the goals and policies requirements

- 4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

Applying sustainability have huge impact , using both project management techniques and sustainability will enhance projects performance and help in achieving project success criteria not only the cost time and quality but for sure all others aspects that related to the environmental. Still if we are talking here and measure the sustainability effect only on this three measurement, I mean the cost and time and quality then there will be suspect that the time and cost will be effected in good way from the point of view of the regular project management because for sure the cost of building or a sustainable building or structure will be more costly than the other structures.

5- What are the benefits of applying sustainable project management as a practice on projects performance?

Sustainability applying will for sure give better performance from the social and environmental aspects of the project and as fact will enhance project success criteria. Projects will be completed on schedule , within budget and as per required quality and safety standards as long as it is led in adequate way and managed within the limits and policies that drawn by the professionals who draw the map for the project and follow the project management practice and health and safety regulations.

6- What do you think is the future of sustainable project management in projects?

In UAE , the leadership of the country considering the concept of sustainability, so in the near future we will notice increased attention to this concept as it is related to sustainability so all other related matters such as project management, design, planning should integrate and the future of all will increase in very fast way. It is already we seen how it is become more and more in all and started with the government entities maybe more like waste management and using the electronics instead of using the paper for the internal and external letters and communications.

7- How much the sustainable project management practices play role in achieving sustainability?

All parts and aspects of project management must be sustainable , we can't apply this concept on one practice and ignore the others, this means if you have all material and design in good sustainable way but implementing these elements was not done in good way then for sure achieving the sustainability will have no sense and will not be achieved as expected.

Project management practices either in regular or sustainable project almost have the same effect with slight bigger effect for the sustainable project since it is need more overview and follow plus the fact that it is new aspect that need more effort to make it.

8- What is the sustainable construction competency in comparison to the traditional construction?

Mostly the energy and water saving that coming during the construction and during the life time of the building during the operation, another things might be interesting that the machines itself if it considered sustainable then for sure it will enhance during the maintenance. Furthermore, enhance the economy of the country in the future would also be effected in case you have sustainable constructions.

9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

As I know there are no specific main techniques or strategies that should be followed

as manual or as steps that the sustainability need it. Maybe we can talk here about using the BIM in managing and building the projects also if the sustainability adapted in the whole organization this for sure would help the sustainability and develop strategy that can be followed.

### Interview No. 5:

- 1- What are the impacts of incorporating sustainability in project management practices at both the corporate level?

The influence of incorporating sustainability for any operate we will be big on corporate level because if we see applying even smaller things or smaller effective matters would have big effect on any company, the management decision usually making differences for all starting from the higher manager till the smaller part of the company, the sustainability will for sure have big influence as this will directly affect the policies of the company and then their actions

- 2- Does project manager competency play a role in incorporating sustainable project management practices?

Project manager competency plays the most important role not only for the sustainability but also for the success of the project, in this case we are talking about one of the most important elements that required for the project success. What the capability the project manager has would help in project management it will also help in the sustainability.

- 3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

The sustainable practices meets part of the ideal or goals of what aiming for, but its keep increasing on general by time as all universe heading to this notion. also if we

talking about sustainability idealistic, I don't think that will be even achieved in one day as there is no clear ideal and as much as you can make there is for sure more to do but keep up following this notion will sure at least achieve the goals.

- 4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

Applying sustainable project management notion have not big impact to the performance from project management characteristic, because the project management is global thing that have solid base going from and not effected easily by anything the project management been applied since long time and it is able to accumulate and adapt the sustainability or whatever it was the concept to achieve and success of the project, but for the sustainable project management sure have big impact from the sustainable aspect only but again not from the project management itself.

- 5- What are the benefits of applying sustainable project management as a practice on projects performance?

If we are talking here about proper and suitable applying sustainable project management then it will help to meet the goal of the projects that related to sustainability and all related element plus it will enhancing the performance of sustainability of the projects as general.

- 6- What do you think is the future of sustainable project management in projects?

The sustainable project management became an essential matter in many countries because it is required to go through the sustainability concept that growing up and it is still growing till it will be part that cannot practice the project management unless the manager have this notion as part of his practices and study. In our company now we had to take the LEED GA certificate to comply with the requirements of our projects and to be able to understand all the matters that related to the company.

7- How much the sustainable project management practices play role in achieving sustainability?

All parts and aspects of project management need be sustainable and looking after the environmental and health and safety, and all elements and other matters also should be sustainable as well, we can't apply this concept on one practice and ignore the others because at the end it all related to each other and effected by each other in point or another, like having just management but keep all other matters without integrating the sustainability

8- What are the sustainable construction competency in comparison to the traditional construction?

Rather than some studies which showing or let's say claiming that that green projects and green buildings have better results from the time, cost and quality comparing to the traditional construction but it is not seen or at least I didn't managed or followed any project made better results from the time and cost during the construction of the project, but for sure on the operation period have big impact saving resources and sustains in better way, we saw this also in the maintenance wise and profitability wise after operating some our projects.

9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

It can be vary a lot and if you dig on this field maybe you will find many techniques and strategies even programs and software's that help on that matter, but mainly what

we need is new management systems which allows project manager to track and follow up the activities by showing how much activities are integrated and how it is cooperated between each other than yes we can see that.

#### Interview No. 6:

1- What are the impacts of incorporating sustainability in project management practices at the corporate level?

The impact of incorporating the sustainability in project management on corporate level is big and it for sure changing many things depending on how much the sustainability is incorporating, let us say it like if it incorporating on just one project or if it adopted as concept for all project never mind if the project or the product required sustainability principle or not. This why you will find that even in the corporation some departments are integrated more in that notion due to the requirements that the sustainability need.

2- Does project manager competency play a role in incorporating sustainable project

management practices?

Project manager competency play essential role as applying sustainability mainly about making decisions that assisting sustainability and environment with all decisions. So basically it is his or her job to do or incorporate the sustainability in the project management and to deliver the sustainability in the project.

3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

Sustainability practices meeting the goals from only few items, still need more focusing and more motivation and forcing for it is till now it is not yet become achieved or reached because there are many challenges facing applying the ideal sustainable practices to the project management.

4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

Applying sustainable project management concept have impact on the project performance depending on what are the measurement that used to confirm the impact, if we are talking here only about time, quality and cost then it will have advantage or positive impact only during the operation or after the construction work finish while the building or the project is occupied and running, because for sure the sustainability application will increase the cost and time that required during the construction time and will take extra effort for almost everything, maybe because it is still new and the contractors still not used on this to perform fast or it can be coming from the suppliers who supply the materials that couldn't supply the required quality and specifications

of the material, on the other hand, the regular performance indicators are not directly measuring the sustainable performance and its needs its own performance measurements.

5- What are the benefits of applying sustainable project management as a practice on projects performance?

Applying sustainable project management would upturn the sustainability of the construction and increase the chances of saving the resources and increase the environmental characteristic and health and safety on the long term of the project and the short terms.

6- What do you think is the future of sustainable project management in projects?

The Sustainable project management would grow more and more and become something vital of practicing the project management in most of the countries, especially the countries which are compiled and complying with the environmental and sustainable aspects.

7- How much the sustainable project management practices play role in achieving sustainability?

The sustainable project management playing one of the most important roles and have great influence on the project itself and the sustainability part hence it is the part which controlling and handling all parts and supervising all parts that would reach at the end to achieve the sustainability in successful way.

8- What are the sustainable construction competency in comparison to the traditional construction?

The competency of sustainable project comparing to the traditional construction can be extended to all parts specially the parts which are related to the operations, on other words it is not only about talking recycling or generating the energy from the wind or heating the water from the sun but also go beyond this for other things like the materials we use in the ducting or the real estate values that gaining from the sustainability. In our projects we found that the green buildings and sustainable buildings have bigger real estate values than the normal buildings.

9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

Strategies and techniques project manager should use is the something to participate all project teams together and working on same orientation and ways to achieve the main goal of sustainability, it is the most important thing you need to know when you manage sustainable projects, in LEED training they always repeat that not only the material or the design or planning or whatever is the important, it's should be something that all parts and members are looking to achieve specially on the managerial level and supervisory level .

**Interview No. 7:**

1- What are the impacts of incorporating sustainability in project management practices at the corporate level?

The impact of incorporating the sustainability in project management on corporate level shall change many things in the company specially from the policies and

regulation sides maybe the action of the employees will not be changed that much but still the policies will force them to integrate with the sustainability at least inside the company, otherwise, the corporation will lose the opportunities for new projects or lose share of the market which is now related to the sustainability or deliver sustainable construction or products.

2- Does project manager competency play a role in incorporating sustainable project management practices?

Project manager proficiency playing strong role in applying the sustainability and green concept, mostly we can see that in the concept of the green building more than other kind of constructions like infrastructure and other types of the construction. this is not mean that we cannot apply the sustainability or the green concept in the infrastructure but mainly means that it can is commonly used in the buildings either the commercial or the residential buildings, also it can be obvious more as management that the manager who in charge of managing the building would create the choices and follow up the matters that consider the environmental and making instructions that supporting the environment.

3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

Sustainability practices meeting the goals and ideal practices from the general aspect, and, it should be enhanced and improved which is we can say that this enhancing is happening now and have good impact.

4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

Applying sustainable project management perception have slight impact on the project performance only as performance can be measured from many sides and success criteria have more than one point to look at it, the cost and time would be effected in negative way instead the positive way during the construction because it have many challenges such as the prices of the materials and the low number of the designers that can do such thing. for sure designing sustainable project and plan for it would cost more than the regular design and the regular planning and you can consider this for the other things as well. nevertheless, this will be stopped once you start the running the project and become the opposite which will be on positive way except for the quality and health and safety aspect that would always be better for the sustainable construction comparing of the other one.

5- What are the benefits of applying sustainable project management as a practice on projects performance?

Applying sustainable project management become essential part of project management, it is not new concept because it had many names before it was always part of project management but maybe in different names such as environmental health and safety or any other terms, in fact the regulations of taking care of the materials and specification could be considered also sustainability but at that time it was not called like this, it was called different names and was pushed and forced by the need of reducing the costs also by designing.

Now we can see that the sustainability become more trendy and now it can effect to reduce the cost and time maybe for some projects because companies and products made the suppliers to be innovative from this part, we can see that some electrical company suppliers are showing off that their electrical panels reducing the energy consumption and any company saying their product is green or helping the sustainability would have advantage on the other companies on sales and most of

contractor taking into the consideration the sustainability and the green.

6- What do you think is the future of sustainable project management in projects?

The Sustainable project management future is promised as it would become more and more integrated in all projects, soon we will find that it would become mandatory for all project managers. People who applying for jobs are highlighting that they can manage sustainability or they know the techniques for that and for saving energy also human resources for company would give extra points for that if they have it. As mentioned earlier that same like the companies highlighting that their products are green the people highlights their capability from that side also.

7- How much the sustainable project management practices play role in achieving sustainability?

The sustainable project management is one of the parts that should be there to achieve the sustainability and the lack of proper management would affect radically in achieving the aim of sustainability in any project.

8- What is the sustainable construction competency in comparison to the traditional construction?

The competency of sustainable project comparing to the normal construction can be seen clearly specially from the environmental side plus the other two sides which related to social and economic side. Even the small apply of sustainability would enhance the chances of the sustainability against the regular construction due to the life time of the buildings which reach to more than 50 years, so any saving will be seen always as advantage.

9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

Regularly there is no right technique that the project manager need to follow for sustainability, mainly its depending on his/her competency, so talking about the special techniques might be not accurate but saying that the project manager competency and smartness of the management it is what required and needed.

## Interview No. 8:

1- What are the impacts of incorporating sustainability in project management practices at the corporate level?

The impact of incorporating the sustainability in project management on corporate level have direct relationship with all organization operations and activities since sustainability practices would be extended to each process that the organization adapting. Many of bidding that we announce about now in our entity have the sustainability notion on their terms or in the bill of quantity of the scope of work that have some special specifications that are in parallel with the sustainability concept and policies.

2- Does project manager competency play a role in incorporating sustainable project management practices?

Project manager competency have critical role in applying sustainability mainly by creating choices that supporting the environment and mostly as key aspect required to success of any project either if it sustainable or not.

3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

Sustainability practices not meeting the goals as it should be met or act on it, it is only part of what we can call it the ideal case of sustainability due to many challenges facing applying and achieving the sustainability. Also the sustainability ideal case

4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

applying sustainable project management awareness have great influence on the project performance form the sustainable thinking comparing to regular project, as in traditional projects the sustainable influence will not be seen since its indicators are not part of the performance measurement system that the project would follow.

5- What are the benefits of applying sustainable project management as a practice on projects performance?

applying sustainable project management become essential part of project management, it was always part of project management but maybe in different names such as environmental aspect

6- What do you think is the future of sustainable project management in projects?

The Sustainable project management future is promised as it would become more and more integrated in all projects and managing delivery of the products, shortly we will find that it would become needed for all project managers to have the sustainability concept or to be integrated in that concept because it is something forced by the law and the law will generate step by step the regulations to make it more, usually when it start applying anything you starting in applying on law level and become up once by one.

7- How much the sustainable project management practices play role in achieving sustainability?

The sustainable project management is one of the parts that should be there to achieve the sustainability and any lack of proper management would affect radically in achieving the aim of sustainability in any project, we can measure that considering the same with improper applying of project management practices in the regular project but with high effect in case of sustainability maybe more.

8- What is the sustainable construction competency in comparison to the traditional construction?

The competency of sustainable project comparing to the normal construction can be seen clearly specially from the environmental side plus the other two sides which related to social and economic side. If we took an example for project that have been done let's say 8<sup>th</sup> floor residential building and one is sustainable and the other is not. first of all we would find that the sustainable one for sure have way better efficiency than the other in the first the environmental, social, and economic side for over all plus many other things that effecting the community and the material wise during the construction. After the construction and during the life time of the operation of the building then the sustainable building effects would be seen way more and also the lifetime of the sustainable buildings in general is more than the traditional buildings.

9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

There is many researches and papers also training given on this but this not mean that if you don't took these trainings or followed this procedure then you cannot manage sustainable projects. It is mainly depending on the project manager and his

proficiency on such matter but sure the techniques and strategies made to ease our goals and make it easier.

### Interview No. 9:

1- What are the impacts of incorporating sustainability in project management practices at the corporate level?

The impact of incorporating the sustainability in project management on corporate level influencing the company or the organization, almost from all aspects and sides.

2- Does project manager competency play a role in incorporating sustainable project management practices?

Project manager competency have big part in implementing sustainability, implementing sustainability is all the teams effort and the project manager is the focal point and key person to make sure that all are integrated and working together.

3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

Sustainability applications still need more while and more support with efforts till it reach to the real objective of sustainability and still need extra time also to meet not the ideal cases of environmentally because the ideal cases always will never be met whatever we did, not only for the green methods but also for anything that we do in our management. I idealistic is something cannot be achieved and never matter who

said that there is management ideal it will not be accurate or true, maybe from his or her point of view only but not from all point of views.

4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

Applying sustainable project management has impact not only on sustainable projects performance during the construction, but also it will have impacts on all type of projects even if the final product or goal was not sustainable product. Time and cost and quality considered now as the old triangle that most of the owners looking at but on the same time underneath each aspect there are many other aspects specially the quality side. most of the sustainable aspects considered as quality matter which in the case of applying the sustainability concept will be higher and have more impacts on speed ways and good manners. Almost 90% of the sustainable constructions considered as high quality projects and considered as premium because have many sides that doing better than the other projects considering the same conditions but with the change that it is using sustainable materials and sustainable design.

5- What are the benefits of applying sustainable project management as a practice on projects performance?

Applying sustainable project management would enhance and improve the project starting from the initiation of the project till the demolishing phase, performance measurement tools would be used in different way to see how much the benefits and the impact of the sustainability on the project.

6- What do you think is the future of sustainable project management in projects?

The Sustainable project management future is something that we can see and still seeing that its growing and trending around the world, most of countries and nations are heading toward the sustainability, accordingly for sure sustainable project management would also grow.

7- How much the sustainable project management practices play role in achieving sustainability?

The sustainable project management is playing the coordination role between all items and make sure the integration of all parts is there, the project management in general playing essential part in achieving projects goals so for sure the sustainable project management would have the same role to achieve the sustainability.

8- What is the sustainable construction competency in comparison to the traditional construction?

Studies showing that sustainable projects specially the building projects performance is better from the traditional construction from all aspects, either during the construction phase or the operation phase except for the cost which is can be better during the operation that covers the cost paid during the construction phase, however, the benefits that sustainable projects have can't be measured in money wise if we look to the other benefits that can be achieved from the sustainable projects. As mentioned before, almost 90% of the sustainable constructions considered as high quality projects and considered as premium because have many sides that

9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

Project managers who managing the sustainability usually would use techniques helping them to integrating the environmental matters concerns in the project itself, recently many software types developed for the following the activities like using software or programs like IBM which allow them to integrate and track all part of the projects.

#### Interview No. 10:

What are the impacts of incorporating sustainability in project management practices at the corporate level?

The impact of incorporating the sustainability in project management on corporate level have a lot of effects, the companies applying new strategies and most of the cases that new departments are just created to follow up and to adopt sustainability notion also changes in body of many other departments like the engineering or the planning department to follow this concept and methods.

2- Does project manager competency play a role in incorporating sustainable project management practices?

Project manager competency for sure plays strong part in incorporating the sustainable project management practices

3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

Sustainability practices meeting the ideal and rules in some few cases only due to many factors, but on general it become way better and keep improving.

4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

Applying sustainable project management definitely affects the project management processes and the project performance in any project that integrated on it and this effect most of the time not considered as positive from the owner side or the contractor side due to the high cost of the material and construction of the buildings that having this method.

5- What are the benefits of applying sustainable project management as a practice on projects performance?

applying sustainable project management benefits are not countable easily as it is still new notion applied to the project, but forecast and what already have been done shows dramatic benefits from all sides specially the environmental side.

6- What do you think is the future of sustainable project management in projects?

The Sustainable project management future has promised future as its gradually rising and the existing and traditional project managers who cannot follow this might losing the opportunity of hiring or working in the projects, now the project managers

should to participate on sustainability and green otherwise they will not find opportunities in the future for work. Now most of the universities and educational institutions applying the sustainability and have new departments learning the sustainability to the students who wants to be socialized in this field. The European and western countries have this in their universities before our areas and UAE is one of the most of the countries who started this and follow it as per the leaders instructions to reserve the resources and find always new ways that reduce counting on the oil and find new resources like using the sun heat and the wind speed of generating the energy which also part of the green method.

7- How much the sustainable project management practices play role in achieving sustainability?

The sustainable project management is playing big part to achieve sustainability, but for sure it is not enough as all project elements shall be sustainable in order to achieve the sustainability, mainly the design and material can be considered the biggest parts between all.

8- What is the sustainable construction competency in comparison to the traditional construction?

Form the traditional success criteria there might be no competency for the sustainable projects among the traditional construction, but from the sustainable and performance criteria for sure the sustainable projects have way more competency comparing to the traditional construction. I think for this you can consider also the sun heat and the wind that the sustainable construction will use and re-use it in way that generate the energy for the building or whatever you mean here by the construction.

9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

Mostly the capability of the individuals and the project manager is the foremost requirement for applying the sustainability, any other techniques would be only added value or something extra that helping to achieve it only, for example, planner should be able to make his or her job easier or assist but will not do the job instead of the planner or follow what is accomplished or not.

Interview No. 11:

1- What are the impacts of incorporating sustainability in project management practices at the corporate level?

The impact of incorporating the sustainability in project management on corporate level have several effects which can be shown in the new tactics that the corporates are following and the changes in the actions and dealing with the new requirements of sustainability.

2- Does project manager competence play a role in incorporating sustainable project management practices?

Unquestionable it is, project manager competency and sympathetic of the sustainability concept playing massive role in incorporating the sustainability in project management practices,

3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

The sustainable practices are not meeting yet the ideal policies in accurate way but maybe in the near future. The problem that stakeholders are not fully concerned with the sustainability and their practices are not meeting the goals, it can be only working as the minimum requirements just to follow the rules.

4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

Applying sustainability has big impact since the sustainable project management is the key leader for executing the sustainability and direction between all sides,

5- What are the benefits of applying sustainable project management as a practice on projects performance?

In case it is applied properly then, it should lead to enhance the performance on, there are also many potential benefits on the project itself, i.e. sustainability impacts on cost, time and the quality.

Cost: if the team did the work on proper way this shall have good impact on the project and the operation lifetime later on with reducing cost.

Time: the sustainable projects in case it's applied properly shall have shorter time than the other.

Quality: for sure the sustainability concept will deliver better quality of the building.

6- What do you think is the future of sustainable project management in projects?

Sure the sustainable project management will increase, since sustainability on the growth and sustainable practices are being emphasized. Also the integrated design projects which required management of the all the elements of sustainability and all the players in the team is emphasized recently.

In UAE it is already integrated through Estidama and LEED and it will be integrated in more building regulation systems as well in the future.

7- How much the sustainable project management practices play role in achieving sustainability?

So the integration of sustainability process which is the project manager duty to guarantee that all elements are integrated and fit together that the prospects and the requirements of each of those elements are in line with what predictable by the others.

If there is no incorporation for sure there will be waste and sustainability will not be achieved.

8- What is the sustainable construction competency in comparison to the traditional construction?

It can be big variance, usually sustainable buildings are designed to save 10% of energy and water. Also started to design and build what is called a net-zero energy building external energy or require just small amount but mainly depending on itself by generating the energy.

9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

Sustainable project manager should be aware and adapting strategies that would integrate all teams and element in line with each other to make sure that integrated properly and done accuracy

Interview No. 12:

1- What are the impacts of incorporating sustainability in project management practices at the corporate level?

The impact of incorporating sustainability on corporate level would have for sure big influences that effect the frame of the companies and corporations and would extend also to the employees them self if it applied properly, as I can see that people here in our organization after we push them to adapt the recycling for the papers, cartoons, etc... then it became habit that the follow it and I am extending this to my family by if there is something that can be recycled then I would take and put it in the recycling. I am bringing the papers from home instead of through them to put them in the recycling bins at work to be recycled. this not have any rewards from the organization but it became habit that I follow and pushing my family to do the same.

2- Does project manager competency play a role in incorporating sustainable project management practices?

Project manager proficiency has important and big part in the integration of the sustainability itself since it is usually the connection and the link that would integrate and corporate the sustainability notion in the activities of the construction projects and any other projects.

3- Do your actual environmental sustainability practices meet your goal/ideal practices/policies?

I would say hat for sure the sustainable practices meets the goals of the project in case its applied in proper way, specially this can be done and already achieved in the government projects and the iconic projects of the government, due to the circumstances and the fact that government and public projects looking to the project success in different ways than the stakeholders in the private sector, we look at it from the social and other terms like what it can add to the society and the people who living in the country and visiting the country. Also these projects represents the ideal

cases that should be followed for the other projects so they make sure it is specifically addressing the main theme of sustainability and addressing the main aspect of the sustainability.

4- What impacts do you see of applying sustainable project management to the project performance in terms of cost, time and quality aspects?

Applying sustainable project management idea has great effect to the performance from project management aspect as practices which reflect on the project performance.

5- What are the benefits of applying sustainable project management as a practice on projects performance?

Applying sustainable project management will help to enhancing the performance of the project from the all aspects.

6- What do you think is the future of sustainable project management in projects?

It has bright future as it will be a mandatory requirement for each project manager to be certified in order to practice the project management role in the near future. It already started in some projects and companies started to make it as part of the skills required for the jobs.

7- How much the sustainable project management practices play role in achieving sustainability?

Sustainable projects and sustainability cannot be achieved unless the sustainable project management practices applied on proper way, otherwise it will lead for big

waste and the success criteria would be effected not only from the sustainable part but also form the cost, time and quality part as well.

8- What is the sustainable construction competency in comparison to the traditional construction?

The sustainable construction have better results or we can say should have better one, generally from the quality that the sustainability bring and add to the project comparing to the traditional construction, this not means that only the quality of the materials it also consider the quality of life that is not something you can measure or you can feel it because it is depending on the human feelings which are not measurable, also it is showing excellency from all other aspects as well considering the lifetime cycle of the project starting from design, planning, construction, etc.. till the demolishing of the project

9- What are the strategies and techniques that the sustainable project manager needs to follow for sustainability?

There might be no one typical strategy that can be followed for sustainability, but the project manager capability is the most important thing that required for sustainability, so I don't know if there is strategies but I would say that the project manager who can apply it and make it.