Institute of Technology Management and Entrepreneurship

IMPACT OF SUSTAINABLE FACTORS ON CONSTRUCTION PROJECTS IN THE UNITED ARAB EMIRATES

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DECLARATION

I declare that this thesis entitled “Impact of Sustainable Factors on Construction Projects In United Arab Emirates” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : ……

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Date : ……24/8/2024……....

APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Doctor of Philosophy.

Signature : ……..

Supervisor Name : Dr. Mohamad Zahir bin Zainudin

Date : ……18/9/2024……

DEDICATION

I dedicate my dissertation work to my family and many friends. A special feeling of gratitude to my loving parents whose words of encouragement and push for tenacity ring in my ears. My sisters have never left my side and are very special.

ABSTRACT

The construction industry is the largest industrial employer in the world with 111 million employees worldwide. The importance of sustainability in competitive advantage is the fact that the advantage over other firms can be sustained over time. Firms that can sustain their competitive advantage are able to outperform others over time. Although many construction firms throughout the world have successfully embedded sustainability, there is little information on how UAE construction organizations are embedding sustainability strategies for competitive advantage. Therefore, there is a need to identify the factors influencing sustainability of construction projects in the UAE as well as assess the extent to which these factors affect sustainability of construction projects. Furthermore, there is a need to determine the impact of sustainability factors and how these problems of sustainability of construction projects can be addressed. More evidently, there is a need for the systematic analysis of the reasons that influence the sustainability of construction projects and subsequently develop a clear understanding among constructions industries professionals. Therefore, the aim of this study is to identify the impact of sustainable factors in construction projects in the United Arab Emirates. The research used a quantitative research design to administer survey questionnaires to owners, consultants and contractors in UAE construction projects. A multi-staged purposeful random sampling strategy was used to administer questionnaires to a total of 450 construction projects. A total of 309 questionnaires were collected of which 290 responses were found valid and were finally used in the analyses. The quantitative data was analysed using Statistical Package for Social Science (SPSS) and Analysis of Moment Structures Equation Modelling (AMOS-SEM) model were also employed. The research findings strengthen the understanding that the contractors should monitor the quality of activities continuously and set the required quality system in the different activities of the project so as to avoid any mistakes that may lead to rework of activities, and delay in time completion. The technical staff will be more effective if it is involved in a sufficient numbers of engineers, technicians, and foremen. This is essential in order to enjoy the benefits of the division of labour when responsibilities are shared amongst a large number of labours. The findings from the IIFs model indicate that the variables studied had a significant effect on construction sustainability projects and were supported. The implication of this research is that if the model is tenaciously implemented, it is believed to be capable of enhancing construction project sustainability. The identified causative factors can be studied on the risk aspect for formulating a risk assessment tool that can help the construction projects. This can be done by identifying the probability of occurrence for each factor and the severity of the impact of each factor on project failure.

KESAN DARIPADA FAKTOR MAMPAN YANG BERPENGARUH DARIPADA PROJEK INDUSTRI PEMBINAAN DI EMIRIAH ARAB BERSATU

ABSTRAK

Industri pembinaan adalah majikan industri terbesar di dunia dengan 111 juta pekerja di seluruh dunia. Kepentingan kemampanan dalam kelebihan daya saing adalah suatu hakikat iaitu kelebihan ke atas perusahaan lain dapat dikekalkan dari semasa ke semasa. Perusahaan yang dapat mengekalkan kelebihan berterusan daya saing mampu mengatasi prestasi pesaing lain. Oleh itu, terdapat keperluan untuk mengenal pasti faktor-faktor kritikal yang mempengaruhi kemampanan projek industri pembinaan di UAE serta menilai sejauh mana faktor-faktor ini mempengaruhi kemampanan industri pembinaan. Tambahan pula, terdapat keperluan untuk menentukan impak faktor-faktor berpengaruh yang kritikal dan bagaimana masalah kemampanan pembinaan ini boleh ditangani. Lebih jelas lagi, terdapat keperluan untuk menganalisis secara sistematik sebab-musabab yang mempengaruhi kemampanan industri pembinaan dan seterusnya membina kefahaman yang jelas dalam kalangan profesional industri pembinaan. Oleh itu, tujuan kajian ini adalah mengenal pasti impak faktor-faktor mampan dalam projek pembinaan di Emiriah Arab Bersatu. Kajian ini menggunakan reka bentuk penyelidikan kuantitatif menggunakan soal selidik tinjauan kepada pemilik, perunding dan kontraktor dalam industri pembinaan UAE. Strategi persampelan rawak bertujuan berbilang peringkat telah digunakan melalui soal selidik kepada 450 projek pembinaan. Sebanyak 309 soal selidik telah dikumpulkan yang mana 290 jawapan didapati sah dan telah digunakan dalam analisis. Data kuantitatif dianalisis menggunakan Statistical Package for Social Science (SPSS) dan model Moment Structures Equation Modelling Analysis (AMOS-SEM) juga digunakan. Dapatan kajian mengukuhkan pemahaman iaitu kontraktor harus memantau kualiti aktiviti secara berterusan dan menetapkan sistem kualiti yang diperlukan dalam pelbagai aktiviti projek bagi mengelakkan sebarang kesilapan yang boleh membawa kepada aktiviti kerja semula dan akhirnya lewat menyiapkan projek. Kakitangan teknikal menjadi lebih berkesan jika melibatkan bilangan jurutera, juruteknik dan penyelia yang mencukupi. Hal ini penting untuk menikmati faedah pembahagian kerja apabila tanggungjawab dikongsi dalam kalangan sebilangan besar pekerja. Dapatan daripada model IIFs menunjukkan bahawa pemboleh ubah yang dikaji mempunyai kesan signifikan terhadap projek kemampanan industri pembinaan dan telah disokong. Implikasi kajian ini ialah jika model tersebut dilaksanakan dengan gigih, ia diyakini mampu meningkatkan kelestarian projek pembinaan. Faktor-faktor penyebab yang dikenal pasti boleh dikaji mengenai risiko untuk merumuskan alat penilaian risiko yang boleh membantu industri pembinaan. Ia boleh dilaksanakan dengan mengenal pasti kebarangkalian kejadian bagi setiap faktor dan keparahan kesan setiap faktor terhadap kegagalan projek.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AMOS	-	Analysis of Moment Structures
BIM	-	Building Information Modelling
BREEAM	-	Building Research Establishment's Environmental Assessment Method
CH_4	-	methane
CSR	-	Corporate Social Responsibility
CO_2	-	Carbon Dioxide
EPD	-	Embedded Project Delivery
GDP	-	Gross Domestic Product
HDI	-	Human Development Index
HFCs	-	Hydrofluorocarbons
MSW	-	Materials, The Urban Solid Waste
MI	-	Modification Indices
N_2O	-	Nitrous Oxide
PFC	-	Perfluorocarbons
SF_6	-	Sulphur Hexafluoride
SC	-	Sustainable Construction
SPSS	-	Statistical Package for the Social Sciences
VIF	-	Variance InflationFactors
UAE	-	United Arab Emirates

LIST OF APPENDICES

LIST OF PUBLICATIONS

The followings are the list of publications related to the work on this thesis:

S. S. Almansoori, M. Z. Zainudun, R Anidah, 2022. Conceptual Framework of the Sustainable Factors towards Construction Industry Projects Sustainability in United Arab Emirates. *Journal of Positive School Psychology.*, vol. 6, no. 3, pp. 4817-4823.

S. S. Almansoori, M. Z. Zainudin, R. Anidah, 2022. Influential Sustaiable Factors towards Construction Industry Projects in United Arab Emirates. *Journal of Positive School Psychology.*, vol. 6, no. 3, pp. 4824-4836.

CHAPTER 1

INTRODUCTION

1.1 Overview

This chapter is the gateway to this research's entire endeavour as it captures what really aroused the researcher to conduct this research. It first presents a deep reflective excursion into the observed phenomenon that necessitated this study through a general research overview and background, as well as articulating the challenges that brought about the curiosity of the researcher into the research problem statements. Furthermore, it provides the research questions, objectives, and hypotheses as well as clarifies interrelationships between contributing variables, which are the independent and dependent components of this research. Also, the study significance, operational term definitions, and parts of the research methodology are discussed in this chapter.

1.2 Research Background

The fast change that modern cultures endure is a sign of their modernity. Significant social changes touch or characterise every area of society; they shape all of society's major sectors (economics, politics, education, family, religion, and so on) (Inglehart, 2020). In a nutshell they have an impact on our way of life and are causing increasing confusion in people's daily lives (Van Opstal and Hugé, 2013; and Lefebvre, 2017). Scientific methodologies are being relied upon to intervene in order to provide feasible solutions to conceptions of continuous sustainability. Environmental challenges such as climate change, social issues such as poverty and welfare, and economic features such as viable investment

should all be included in target scenarios (Nordhaus, 2019; Rahman et al., 2022; and Li et al., 2020).

Sustainability terminology/definitions have demonstrated a wide range. Yet, it is widely assumed that all definitions should contain environmental, human-centered, and economic factors (Kopnina, 2020; Butowski, 2021). Considering its widespread acceptance (Coca-Vila, 2018; Dagilit et al., 2018; Jaca et al., 2018; Thürer et al., 2018; Saunila et al., 2018; Beumer et al., 2018; Khanna and Kaur, 2019), sustainability does not have a single definition. Under the scope of economic analysts, it is described as either the conservation and protection of natural ecosystems or the improvement of living standards (Cairns and Martinet, 2014). Sustainability, as defined by Dick et al. (2018) and Ramcilovic-Suominen and Pülzl (2018), is the interaction of people with the environment and, more broadly, with other humans in order to achieve environmental, social, and economic advantages. According to Towe et al. (2016), effectively leveraging partnerships and resources to continue programs, services and or strategic activities that result in improvements in the health and wellbeing of the environment and society. Tomislav, (2018), defines sustainability as conserving the environment, using resources efficiently, promoting social progress, achieving steady economic growth, and eliminating poverty. Currently, Human civilization can achieve its requirements without compromising future generations' potential to do the same on Earth. Sustainable building strives to minimise negative environmental impacts and promote social and economic advantages (De Vasconcelos et al., 2020). Adopting sustainable building has benefited many countries, particularly industrialised nations, albeit facing certain hurdles.

Sustainable construction initiatives are being encouraged all across the world. Sustainable construction is becoming more popular due to rising costs for traditional building materials and energy, as well as government incentives (Robichaud and

Anantatmula, 2011). According to El-Sayegh and Mansour (2015), the UAE construction industry witnessed a boom from 1996 to 2007, peaking just before the 2008 financial crisis. Environment activists and the government are encouraging and enforcing the change to sustainability, which will soon become a requirement. The Estidama programme, created by the Abu Dhabi Urban Planning Council, serves as an example. This effort attempts to promote more sustainable communities by creating their own Pearl Rating System. Construction projects are rated based on the number of credits obtained, each representing a sustainable objective. Estidama (2010) and Tatari and Kucukvar, (2011), states that all projects must meet a minimum amount of obligatory credits, promoting sustainable building. Dubai's municipality is promoting sustainable development through the green building project, with regulations tailored to the UAE's unique needs. Since 2014, the Dubai Municipality has implemented this programme on all new structures. A research by Yacob, et al. (2019), indicated increased interest and awareness in green construction initiatives and sustainability. As the number of construction projects in the UAE increases and sustainability is enforced, it's important to understand the unique hazards associated with sustainable construction projects. However, sustainability that includes the human development approach and the importance of human capital without supplanting that perspective to the environmental and economic dimensions is doomed to fail (Gemeda, 2023; De Villiers and Sharma, 2020). According to the notion of sustainable development (SD), three dimensions interact with each other: economic, social, and environmental, often known as the Triple Bottom Line (TBL) paradigm (Major et al., 2017; Coca-Vila, 2018).

The economic dimension is concerned with increasing profits, decreasing costs, and generating income. These are some of the most commonly used business techniques (de Lange, 2017; Coca-Vila, 2018; Khanna and Kaur, 2019). The most important accomplishment of a society is the creation of wealth for its shareholders. Based on Silvius

(2017b)'s examination of integrating sustainability in the projects environment, the economic dimension is very important among the TBL since it protects the shareholders' capital. Profits are reinvested in the community (organisation) to ensure its long-term economic viability. The project's critical features are examined in terms of several economic factors included within the TBL of sustainability (Coca-Vila, 2018; Khanna and Kaur, 2019; Caradonna, 2022). Stakeholders may interpret financial worth, economic advantages, and wealth production differently. Each component appears dissimilar in the project and throughout the product's life cycle, challenging the project's objectives (Kivilä et al., 2017; Khanna and Kaur, 2019).

The social dimension refers to communities coexisting in societies. Organisations and other micro-communities interact to produce a larger social group (Wohn, 2019; Virani, 2020; and Nyholt, 2022). The results in this dimension are produced by inhabitants and other hypo-societies that cohabit in one or more habitats. They should be rewarded by the social system. The outcomes of societal work are determined by how communities support the organisations. The balance adopted by the concept of the social dimension is the use of communities and residents for societal prosperity without manipulation. According to Dempsey et al. (2012), and Nyholt (2022) organisations must "protect" the individual communities in which they operate. They must incorporate a new sustainable style of thinking into their project management procedures in order for society to embrace their practises (Silvius, 2017; Wohn, 2019; and Virani, 2020). Anything that has a negative impact on the community in which the organisation operates may cause challenges and harm its reputation. Organisations that emphasise the social component frequently exercise socially responsible leadership, which enhances the quality of life in communities. Sierra et al. (2018) and Tang et al. (2019) define social sustainability as the analysis and regulation of positive and negative impacts on individuals.

The environmental dimension is concerned with the natural ecosystem in which people live (Ludwig, 1993). According to the literature, numerous human activities have had a harmful impact on the earth's ecosystems (Sha et al., 2017; He and Chen, 2021). Natural habitats provide the primary source of resources, and so their survival is critical to ensuring that natural processes continue. Environmental conservation and humanity's failure to conserve natural wealth are inextricably related to sustainability (Ferguson, 2016; Virani, 2020; Azam, Khan, and Ali, 2023). Natural resources are the primary reason society and organisations work properly. As these resources are depleted, society plans struggle to continue their activities and thus survive. Environmental non-sustainability has a significant impact on people's lives and has a negative impact on the other two dimensions. As resources become more difficult to obtain, social discontent and expenses rise (Nawaz and Koç, 2018; Ali, 2021).

The fact that this research is focusing on sustainable construction projects stems from the significant social impact that these new technologies provide (Chen et al., 2018; Parida, Sjödin, and Reim, 2019). Although the majority of indicators are applicable to all construction projects seeking sustainability features, the social element that these aspects must be familiarised in order to favour sustainable projects. The first issue in gaining societal acceptance for sustainable building projects is thus to locate a project in a place that can capitalise on the project's potential benefits. Such projects have the potential to be a significant source of revenue and employment for the rural decline. They can, however, compete with other industries such as tourism, food, and other agricultural or timber enterprises (Živojinović et al., 2020). In the early stages of a project, defining and listening to expectations can assist modify the project to context and better convey the project's benefits and dangers to the project manager (van der Horst, 2007, Sauter and Watson, 2007, Wüstenhagen et al., 2007; Raven et al., 2009; Parida et al., 2019).