SICK PROJECT FACTORS AND REHABILITATION OF GOVERNMENT PROJECTS THROUGH EARLY WARNING SYSTEM IN THE SULTANATE OF OMAN

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by

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LIST OF ABBREVIATIONS

BRI	Building Related Illness
DCRP	Distribution Code Review Panel
EPA	Environmental Protection Agency
EWS	Early Warning System
GCC	Gulf Countries Cooperation
IS	Incipient Sickness
NS	Normal State
Oman	Sultanate of Oman
RF	Rehabilitation Factors
SBS	Sick Building Syndrome
SHS	Sick House Syndrome
SPF	Sick Project Factors
TS	Towards Sickness
WHO	World Health Organization

FAKTOR-FAKTOR PROJEK SAKIT DAN PEMULIHAN PROJEK-PROJEK KERAJAAN MELALUI SISTEM AMARAN AWAL DI KESULTANAN OMAN

ABSTRAK

Kesultanan Oman menyaksikan pertumbuhan pesat pembinaan dan perkembangan projek. Walau bagaimanapun, industri pembinaan, pihak berkepentingan dan kerajaan menghadapi pelbagai cabaran untuk memastikan kejayaan sesebuah projek. Terdapat keperluan untuk mengenal pasti faktor-faktor projek sakit, dan bagaimana memulihkan projek-projek sakit melalui sistem amaran awal. Objektif kajian ini adalah: i) untuk mengenal pasti faktor-faktor projek sakit bagi projek-projek kerajaan, ii) menentukan hubungan antara faktor projek sakit dan pemulihan projek, dan iii) membangunkan model untuk hubungan antara faktor projek sakit dan pemulihan projek melalui sistem amaran awal. Responden kajian ini adalah 170 kontraktor yang berdaftar dengan Kementerian Perdagangan dan Industri, Kesultanan Oman; terlibat dalam tinjauan melalui soal selidik yang diedarkan. Kajian ini mengenalpasti empat kategori faktor projek yang sakit, iaitu: i) isu pengetahuan dan teknikal, ii) isu pengurusan, iii) masalah kewangan dan ekonomi, dan iv) isu sosial dan perundangan. Kajian ini mendapati terdapat kesan yang signifikan antara faktor-faktor projek sakit, dan pemulihan projek oleh kontraktor di Oman. Tambahan lagi, sistem amaran awal memediasi kesan faktor projek sakit terhadap pemulihan projek. Kajian ini mencambah pengetahuan dalam bidang pengurusan projek dari segi teori dan praktikal dengan memperkenalkan sistem amaran awal sebagai pemboleh ubah pengantara bagi memastikan kejayaan pemulihan projek sakit. Kajian lanjut

disarankan untuk menilai pemboleh ubah pengantara lain, penggunaan metodologi campuran, dan analisis yang berbeza bagi menentukan kesan mediasi tersebut.

SICK PROJECT FACTORS AND REHABILITATION OF GOVERNMENT PROJECTS THROUGH EARLY WARNING SYSTEM IN THE SULTANATE OF OMAN

ABSTRACT

The Sultanate of Oman is witnessing rapid growth in construction and project developments. However, the construction industry, development stakeholders and the government face many challenges to ensure project success such as projects. There seems to be an urgent need to identify the sick project factors, and how to rehabilitate sick projects through an early warning system. The objectives of this study are: i) to identify sick project factors in government projects, ii) investigate the relationship between sick project factors and rehabilitation of projects, and iii) develop a model for the relationship between sick project factors and rehabilitation of projects through early warning system. The respondents of this study were 170 contractors registered with the Ministry of Commerce and Industry, the Sultanate of Oman; participated in the survey through distributed questionnaires. This study found four categories of sick project factors, namely: i) knowledge and technical issues, ii) management issues, iii) financial and economic problems, and iv) social and legal issues. It was found that there were significant effects between the sick projects factors, and rehabilitation of projects as perceived by contractors in Oman. It was further found that early warning system mediates the effects of sick project factors on the rehabilitation of projects. The study added to the existing project management body knowledge in terms theoretical and practical by introducing early warning system as the mediating variable to ensure successful rehabilitation of projects. Further research is

recommended to assess other mediating variables, adoption of a mixed-methodology, and different analysis to determine the mediating effect.

CHAPTER ONE

INTRODUCTION

1.1 Research Background

This study examines means of rehabilitating sick projects through early warning system as the mediator in the construction industry of the Sultanate of Oman (Oman). The study is based on the perception of construction contractors in Oman. Among all the countries in the Middle East, Oman has a unique, most organized and attractive market for foreign investors (Joshi and Ghosal, 2013). In recent times, Oman is witnessing rapid economic growth due to oil-powered state reserve. A conference entitled "Oman Vision Conference" also known as "Oman 2020" organized in June 1995 provided a proposal for 25 years for exploring and endorsing the vision for Oman's economy. The proposal provides plan for the government to face vital regulations and modification of the economic plan, while re-considering and determining the private sector to play a vital role in rebuilding the economy of Oman. In addition, the vision proposes privatization as the main drive of the Omani economy with the improvement and preparing ample human resources in such a way Oman can compete with the global economy (Alkalbani, 2010).

Despite the fact that, oil and gas generations in Oman is considerably low compared to other Gulf Countries Cooperation (GCC) with higher production cost, both population and economic growth demand for more water and power. In view of this, the Omani government chose to expand their existing practices toward sustainability

to reduce the high demand of water and power, at the same time restraining the environment impacts of rapid development. Also, buildings built with ecological consideration brings benefits, such as lesser operating cost, development and upkeep cost and improved durability. The government of Oman has adopted various proactive approaches to encourage the development of sustainable practices in Oman. As a general term, the annual growth rate of the Omani construction industry has been progressively 9.4% from 2012 to 2016 audit time frame. This was supported by the five-year development plan (2010 – 2015). It is expected that, the Omani construction will continue to expand over a projected period of four year (2017 – 2021). Regardless of the low oil cost, the Omani government is focussing on the improvement of transport sector, energy and utility services as well as affordable housing. Moreover, the Omani government's investment in sea ports, railway lines, airplanes terminals and different economic zones under the Ninth Five-Year Development Plan 2016–2020. The Oman Vision 2020 are meant to initiate development in the indsutry over the projected time frame.

The construction industry has been successfully advancing on an average rate evaluated between 5% to 7% (Saleh and Alalouch, 2015). Within the present period of the five-year design (2011-2015), and until the end of 2017, Omani government put more effort in infrastructure and development projects. Meaning, with add up to yields for the above whole plan anticipated to be around more than US$50b (Saleh and Alalouch, 2015; Lawson, 2018; Alkalbani, Rezgui, Vorakulpipat, and Wilson , 2013). The Tender Board in Oman is an independent administrative body which supervises award of all public tender projects with evaluated capital expenses of more than 250,000 Omani Rails (1 USD = 0.385 Omani Riyal). These tender projects are

developed either through complete payment or re-quantifiable contracts as per the Oman Standard Documents for Building and Civil Engineering Works.

Development of project is a unique production, it contains complicated terms, and the description network is remarkably divided, and the procedure are to some extent extraordinary (El-Maghraby et al., 2011). Therefore, quite a number of project organisations face challenges in meeting the requirement of the clients. In Oman, the government is the biggest procurer of development benefits. A report on the 2011 government spending plan which highlighted five year design (2011 – 2015), it receives an aggregate capital expenditure of USD$ 79 billion to be utilised into extensive development projects all over the country. The main receiver of this investment agenda will be real participating sectors particularly the construction industry (Courtney-Hatcher, 2013).

At present, Oman's strategic critical infrastructure plans comprise the followings: (i) International Railway Project, (ii) Al-Madina A'Zarqa (Blue City), (iii) Muscat International Airport, (iv) The Wave Muscat, (v) Duqm Development Project, (vi) Sohar Industrial Port, (vii) Oman Convention, and (viii) Exhibition Center (Business Monitor International, 2013). The Omani government has further extended spending for the development of 2012 by the 23% over the last figure for the year 2011. The budget for the housing subdivision surged 21.5% from RO266 millions of every 2011 to RO323 million out of 2012, including the distribution of housing units for low earner residents (Albawaba Business, 2012). In Five-Year Plan (2011 – 2015), US$ 6.5 billion a year has been distributed for the following projects: (i) US$ 1.2 billion

for housing, (ii) US$ 4.2 billion for air terminal extension development, (iii) US$ 3.1 billion for a highway project, (v) US$ 1.3 billion for seaports, (vi) US$ 1.2 billion for the utility segment (Alkalbani, Rezgui, Vorakulpipat, and Wilson , 2013).

The Omani's development and actions are well planned and structured. The levels of Oman's projects development and infrastructure provisions are high as compared to the population of just 2.8 million people (Courtney-Hatcher, 2013). These comprise: (i) Transportation: (especially airplane terminals, sea ports, interstates and, in the more drawn out term, railways), (ii) Tourism: a few upscale option and housing projects are planned or under development across all over Oman, earning by its mountain, desert and seaside view and eco-tourism potential, and (iii) Oil and gas: despite the fact that gaining stable ground towards shifting into all the more downstream-orientated enterprises, for example, petrochemicals, steel, and aluminum, Oman stays on a basic level a hydrocarbon-based economy. It has various world-class exploration and generation projects in progress on, including overwhelming upgraded oil recuperation plans.

Similarly, enormous projects were executed in the power sector, water treatment and distillation, health care sector, housing development and other related sector are either under development or in progress (Courtney-Hatcher, 2013). In precise, the prominent projects development that currently on-going or in advance stages of development, design or planning incorporate are as listed below (Courtney-Hatcher, 2013): (i) Oman Convention and Exhibition Center, (ii) Sohar Airport, (iii) Salalah Port Development, (iv) Oman National Rail, (v) Duqm City, (vi) Ghubrah Independent

Water Project, (vii) Batinah Expressway, (viii) Muscat and Salalah International Airport, and (ix) Salalah Medical City.

Some of the projects development were responsible to legally binding issues of time adjustment and cost conflicts (Alnuaimi et al. 2009; Alkalbani, Rezgui, Vorakulpipat, and Wilson 2013). The issues that hinder hinder projects execution is not limited to Oman, project time and budget cost are general issues in most developing countries (Ahadzie et al. 2008). Alnuaimi and Al Mohsin (2013) recently carried out a study on the delay of development projects in Oman within 2009 and 2010 and found that, the plans were suspended by 42% above project time duration. Besides Oman development practises, a number of limitations and barriers which affect the process to wind up barely more engrossed at a national and worldwide level (Al Harthi, 2005; Al-Khabouri and Amoudi, 2018). It is interesting to pay attention to the difficulties in searching for point to point intends, research findings and record regarding the developing nations and a basically tally up to the lack of evidence about the existing nature of development in Oman (Alkalbani, 2010). Across the Middle East region, critical issues are mainly lack of water and high temperature during summer. Quite a number of assertion posits that these conditions causes strange challenges in joining green components in development projects (Al Saleh and Taleb, 2010; Alnaser and Flanagan, 2007). Middle East countries are among the highest on the poor of leading per capita ecological impression, with Qatar being the most notable at 44 metric tons for each every year (Katkhuda, 2013). These brought increasing residential energy utilization per capita, putting these nations as among the most elevated supporter of CO2 outflow per capita (Nejat, Jomehzadeh, Taheri, Gohari and Majid, 2015). Therefore, the need for awareness on the environmental issues will move the industry

towards achieving sustainability goal. For instance, Al-Badi et al. (2011) posited that the required power demand in Oman to increase from 3613MW out of 2010 to 6043MW by 2016, approximately an average addition of about 8.5% every year. Consequently, Oman has boosted six pilot sustainable power source undertakings in order to effectively tackle the sustainable source of energy assets and reduce dependence of its oil and gas.

1.2 Statement of the Problems

In Oman, the construction industry and the development stakeholders are faced with various challenges in recent times. The Omani's construction constructors in particular are more concerned with the increasing number of sick projects (Saleh and Alalouch, 2015).

Literature shows that, construction projects suffered various aggravating phenomena usually referred to as disasters, crises, and failures (Blackhard, 2006; Loosemore, 1999; Kerzner, 2012). In most situations, these disasters can occur at any stage within the construction development phases possibly because of natural phenomena, socio-political circumstances, technical and complexity reasons, site conditions. The disasters can come in different form for instance hurricane, flood, earthquake, war, political crisis, financial recession, and workers' fault and ground failures. Situations of this nature causes a more disastrous effects on construction projects such as project delay, time overrun, variation accumulation to the initial contract sum, project abandonment, termination of the project, annulment of contract and demolition of the project in some instances. Projects affected by these sorts of disasters are referred to

as sick projects. Consequently, disastrous factors cause project failure which are refer to as sick projects and in most occasions these happen in government projects. In order to restore these projects and to avoid severe financial loss to the clients especially government, there is need to develop unique initiatives.

According to Kerzner (2017), there are basically four distinct principal elements needed for effective rehabilitation of sick projects specifically to government projects. These are: i) knowledge and technical issues, ii) management issues, iii) financial and economic problems, and iv) social and legal issues. Similarly, Abassi, et al. (2014) suggested that a thorough experimental survey and analysis of the rehabilitation factors or elements will significantly restore sick projects and enhanced recovery. It is important to note that, the basic elements of these sick projects are the believe to be the main factors that affects rehabilitation of governments projects in most developing countries such as Oman. In view of that, there is an urgent need to device means of overcoming the effects of sick projects factors on rehabilitation of government projects. Findings from the previous research indicated that, rehabilitation of sick projects is directly link with project abandonment, poor delivery of construction projects, cost and time overrun, and substandard quality of projects in most developing countries such as Oman. Accordingly, it was recommended that prompt precaution and early warning system seem necessary to push the effort to rehabilitate sick projects.

The studies of Saleh and Alalouch, (2015); and Abassi et. al, (2014), indicated a research gap for the knowledge of the relationship between sick projects factors and

rehabilitation process by the Omani government. Therefore, there is a need to examine the relationship between sick project factors and recovery from the view of the contractors in Oman for a comprehensive understanding of the situation. Larson and Gray (2015) investigated nine priority areas of knowledge in project management that affect project performance. These include: i) Project integration management, ii) Project scope management, iii) Project time management, iv) Project cost management, v) Project quality management, vi) Project human resource management, vii) Project communication management, viii) Project risk management, and ix) Project procurement management. The assessment were based on four distinct criteria. The first assessment criterion is whether the performance of project has an effect on environment. Then, it assesses the effect on project team, i.e. designers, contractors, and professionals. The third factor is the effect on stakeholders, and finally the effect on project materials and resources. The assessments were intended to ensure that projects are constructed to meet its purpose in terms of project specifications, project duration, project budget and compliance to health and safety requirements. It was found that project management team needs to carefully and reasonably plan the project activities, execute activities, properly allocate resources, implement effective project schedules, and monitor project cost effectively to ensure project success. It was further deduced from the research that failing to adhere to those project indicators led to poor project performance.

On the other hand, Locatelli, Invernizzi and Brookes (2017) suggested that poor project performance can be predicted at various phases of project execution. In many instances, the prediction acts as an early warning to provide signal to project players on the propensity of poor performance. Muriana and Vizzini (2017) and Maylor and Turner (2017) argued the attributes and characteristics of early warning systems to

predict poor performance are multifaceted. It is apparent that early warning system is closely related to all nine project management areas identified by Larson and Gray (2015). It was further found that early warning system has been regarded as an important tool to mediate the relationship of sick project, performance and its rehabilitation. Moreover, the findings of Muriana and Vizzini (2017), Maylor and Turner (2017), and Larson and Gray (2015) seem to suggest that there is a gap in the existing knowledge on how early warning system helps to mediate the effect of the relationships between sick projects factors and rehabilitation of projects. Therefore, the need to examine the mediation effects early warning system to sick project factors and rehabilitation in Oman is timely.

1.3 Research Questions

The research questions for this study are:

i. What are the sick project factors in the Omani government projects?

ii. What are the main factors of the sick project and its severity effects on the rehabilitation of government projects in Oman?

iii. Is there any relationship between sick project factors and the rehabilitation of government projects in Oman?

iv. Will early warning system mediates/intervene the relationship between sick project factors and the rehabilitation of public projects in Oman?

1.4 Research Aim and Objectives

1.4.1 Aim of the Study

This study seeks to develop a model of sick project factors and its rehabilitation through early warning system in government projects in Oman.

1.4.2 Objectives of the Study

There are three are objectives of this study as follows:

i. To identify sick project factors to the rehabilitation of government projects in the Sultanate Oman.

ii. To investigate the relationship between sick project factors and the rehabilitation of government projects in the Sultanate Oman.

iii. To develop a model for the relationship between sick project factors and rehabilitation of public projects through early warning system in the Sultanate Oman.

1.5 Scope/Limitations of the Study

This study examined the mediation effects of early warning system between sick projects factors and rehabilitation of government projects in the Sultanate Oman based on the perception of Omani's construction contractors. A well-structured survey questionnaire was used in collecting data from construction contractors in Oman. The study respondents were selected via simple random sampling technique. This study covers the perceptions of the contractors in the rehabilitation of government projects

that were chosen from all eleven governorates in Oman, and all contractors were registered with the Ministry of Commerce and Industry. The study was limited to the real insight of sick projects based on the perception of the Omani's construction contractors only, data from the Ministry of Commerce and Industry were not assessible because of classification and national security reason. The same number of project awards are grouped under the Oman-UNESCO World Heritage Centre.

1.6 Organization of the Study

This thesis is structured and divided into six (6) major chapters. Chapter One is the introductory chapter which presents background of the study, the problem statement and highlighted the research gap as well. The chapter also includes the research questions and objectives, scope and limitations. Chapter Two presents the literature reviews for the primary variable, i.e. factors of the sick project (independent variable). This chapter reviews and analyzes the concepts as well as empirical evidence on factors of sick projects. Chapter Three presents the literature review on the dependent variable and mediating variables, i.e. rehabilitation of sick project, conceptual framework, and research hypothesis, and early warning system (mediating variable). Chapter Four presents the research methodology of this study that consists of research design, research strategies, sampling procedure, sample size, pilot and reliability tests, measurement and instrumentation, a method of data collection and method of data analysis. Chapter Five presents the analysis and discussions findings. Lastly, Chapter Six concludes this study with the overview of the study, conclusions, significant contributions of the research and recommendations for future study.

CHAPTER TWO

SICK PROJECTS FACTORS

2.1 Introduction

This chapter presents one of the main variables of the study. It begins with discussions on performance-based project management. This is important in determining the relationship of sick project factors and rehabilitation of projects in Oman. This chapter mainly contains the review of related literature on sick projects factors. This chapter provides the definition of sick project including the stages of industrial sickness. The review of previous empirical evidences was also presented here in explaining the attributes of sick project. The attributes of sick project contains four elements, i.e. knowledge and technical issues, management issues, financial and economic issues, and social and legal issues. The discussions on the reviews of the literature in this chapter become the basis of the conceptualization of the independent variable of the study. Chapter summary is also presented at the end of this chapter.

2.2 Performance-Based Project Management

This study examines sick project factors as one of the main variables, i.e. independent variable. Sick project is commonly associated with bad performing project. Therefore, this section generally reviews the overview of project management knowledge areas and its associations in determining the importance of sick project factors in projects. PMI (1996) provides the outline of project management knowledge areas and project management processes. The knowledge areas include nine specific areas, namely: a) project integration management, b) project scope management, c) project time

management, d) project cost management, e) project quality management, f) project human resource management, g) project communication management, h) project risk management, and i) project procurement management.

According to Kerzner (2017), these nine areas of project management are crucial issues that all construction organizations need to translate into actions in ensuring project success. It was claimed that there are many reasons of project failure such as delay in project delivery, cost overrun, difficulty in performing project's tasks and activities, and variations in scope of project. It was further suggested that the implementation of Performance Based Project Management provides various advantages in ensuring completion of project and success. The technique covers a more comprehensive methodology that no longer put emphasize on traditional concept, i.e. operational activities and technical requirements; it focusses on value of each measureable activities in projects that are more specific to these nine areas of knowledge areas. Harrison and Look (2017) reviewed the origin of Performance Based Project Management, and found that this concept has been adapted by aerospace industry in the implementation of projects of any size, industry and project. It seems clear that this concept is very useful in construction and development projects due to the complexities, uniqueness and size. More importantly, the performance of deliverables in projects are measureable.

Other scholars such as Nicholas and Steyn (2017) believed that there is an urgent need for construction industry to develop a model that outlines construction processes and activities, common practices among project players, and principles in projects that can

be replicated. Thus, this initiative is believed to have clear measurable indicators leading to project success. On the same note, Smith (2017) suggested that all project stakeholders need to define the projects' purpose clearly at the inception of any development. This includes the methodology of construction projects, well-defined project procurement, and clearly outlined communication line. It was claimed that the project performance indicators need to be clearly defined, outlined, and measured in ensuring project success. Turner (2017) and Muller (2017) agreed that project success refers to customer satisfaction with project outcomes and deliverables. It suggests that project success reflects the ability of project players to perform and complete activities within the planned project period, budget, fulfilled all specifications and quality in terms of operational and technical, and comply with all project requirements.

Turner (2017) further provided a framework of project success based on Performance Based Project Management model. This model consists of drivers, principles, practices, governing processes, execution of work based on project management principles, application of principles and practices to ensure project success, and the measurement of project success based on the deliverables. Accordingly, Performance Based Project Management has three levels based on the stage and implementation level of practices and processes in the project activities, i.e. Level 1 (Minimal), Level 2 (Moderate), and Level 3 (Major).

i. Level 1 is applicable to small projects when the deliverables are known and clearly identified. All stakeholders are clearly defined and outcomes of the projects can be measured and agreed on. The project has low risk level in terms

of processes, technology, and methodology. The project can be completed within the stipulated period and allocated cost.

ii. Level 2 has moderate risks in term of technicality of the project. This refers to projects that implement new technical and operational applications within projects. The project players are professionals in their respective fields, however, the project teams are newly formed. Therefore, this scenario has the tendency of conflicts, issues and arguments leading to project risks.

iii. Level 3 requires comprehensive implementation of processes and practices of project management due to complexity, size, and risks factors.

Based on the review of literature, it seems clear to suggest that Performance Based Project Management should be implemented and applied accordingly by project players based on the levels of practices and processes. Scholars in project management such as Oppong, Chan and Dansoh (2017), Nicholas and Styen (2017), Smith (2017), and Turner (2017) claimed that in any given circumstances, the appropriateness of project management principles' application is important in ensuring project success. In other words, the application of project management helps to avoid project failures. These scholars claimed that project failures as sick projects, and the reasons for failures are numbered such as poor preparation of project, poor leadership qualities in projects, poor documentations and tracking system, failure to provide clear definition of project and implementation, incapability of project players, cost overrun, communication problem, unethical practices, and other technical and management problems. Therefore, this study needs to define, conceptualize and operationalize the term sick project in determining the association and relationship with rehabilitation of sick project in Oman.

2.3 Sick Projects

There are many related term associated with project sickness. There seems to be voluminous of studies on industrial sickness, project sickness, and building sickness. From the economic perspective, sick industries provide bad consequences to the nation, instability and unresolved problems. Abdul-Wahab (2011) provided in-depth analysis of work in determining the bad effect of industrial sickness. It was found the study that sick industries lead to draining the capital assets of any nation, be it less developed or developing nations because the process of formation capital is affected. Therefore, the capital assets of the nation are under-utilized. Sick industries impact the entrepreneurs and businesses in a negative manner because work force and capital are considered the production factors in an industry. Hence, industrial sickness does not encourage entrepreneurs and businesses to grow in a nation's economic. Industrial sickness leads to less productive use of capital due to the decrease of confidence among investors in the industry or project. Furthermore, this study found that sick industry leads to the instability of industrial, reduces employment and retrenchment of employees by many business setups. Industrial sickness provides bad investment portfolios for many financial institutions, as the invested funds are not profitable due to interrupted profits.

Abdul-Wahab (2011) provided almost decisive reasons for all financial institutions, project clients, governments and industry players to impede the occurrence of industrial sickness or sick projects. A number of studies (e.g. Huat, 2014; Hussin and Omran, 2011; Chowdary, 2012) found that there are few signals and warnings prior to industrial or project sickness, i.e. certain early symptoms leading to sickness. This issue has grown in important in light of recent findings suggesting that prompt

corrective measures before these symptoms become harmful. These symptoms are: huge income reduction, uncontrolled inventories, continuous drop of profit and sales, increase of financial loans, loss of cash, default loan and borrowing's installment, over-used of over draft facilities, increase of staff turnover, change in procedures in financial and accounting practices, and delay to finalize company's accounting.

In an earlier study by AlMomani and Ali (2008) in their investigation to define sickness in a project, syndrome of sick building were defined as illness caused by the elements of design in a building such as poor control of building materials, bad ventilation and circulation design, and contaminated building materials. This research further found other terms to describe illness in project such as building sickness, tight building syndrome, and building related illness. However, prior to AlMomami and Ali's (2008) introduction to define illness related to buildings, Ishibashi (2007) conducted a study on sick house syndrome in Japan. However, Chirico, Ferrari, Taino, Oddone, Giorgi, and Imbriani (2017) accepted the term sick-building syndrome to explain the circumstances related to building or project's sicknesses and illnesses.

It seems clear now that there are many terms associated with nature to illness, sickness, loss and problems to explain sick syndrome phenomenon or of similar nature in businesses, projects and industries. One of the characteristics of sick building syndromes is that the symptoms are revived upon exiting the building premises, hence suggesting that sick building syndrome is related to medical conditions that people experience such illness, unwell inside the building (AlMomani and Ali, 2008). Burg (2004) claimed that such symptoms and signs provide considerable disturbances to efficiency of people, work performance, and even human relationship to building

occupants. Therefore, AlMomami and Ali (2008) reviewed the building related illness occurring due to contact with contaminated material leading to medical sickness and illness. They found that the characteristic of illness related to building is highly dependent on the level of contamination's presence in the building. Therefore, there is a need to formulate strategies to lessen the effect of contamination within the building. It was suggested from their study that the process to identify the causes of sick building syndrome and building related illness could be complicated and comprehensive due to the uniqueness of the nature of sicknesses.

Bielsa et al. (2011) in their recent study found that due to high reliance on artificial products and too much indoor-environment activities, many health issues and illness develop in many countries. These also include the urban sprawl issues that lead the migration of people to experience urbanization, introduction of many recreational indoor activities, and the increase use of transportations for travelling. The increase of indoor recreational activities provides an alarm to the designers to review and update their processes in their design activities that include aesthetics, functional, practicality, comfort, safe and secure. If the space is not carefully design, the use of space will generate sickness and illness symptoms. Although the study is a little old, but AlMomami and Ali (2008) posited a very useful knowledge on the importance of health in the built environment industry. It was suggested that all parties in the industry to play an active role to ensure sustainable building and project environment that include the elements of building design, selection of building materials, adoption of project procurement method, evaluation and assessment of risk including evaluation of whole-life cycle costing, and maintenance of buildings and projects.

In seems clear to suggest at this point that the term sick syndrome is multifaceted and has been widely used by many disciplines to describe an unwell circumstances or phenomenon. It covers the area of health care, manufacturing, and other industries including the build environment and construction industry. The term sick in the construction industry in the literatures cover a wide area of studies including human resource, design, maintenance as well as project. The main aim of this study is to examine the relationship of sick project factors and rehabilitation of government project in Oman with early warning system as the mediating variable. Therefore, the term sick syndrome in this study refers to sick projects, sick buildings and sick construction industry.

2.4 Definition of Sick Projects

A considerable amount of literature has been published on sick projects and its characteristics. For example, Chai et al. (2015) claimed that there are many criteria of sick project, i.e. main criteria and sub-criteria. Chai et al. (2015) further added that the principal measure of sick project is project delay. Almost all parties in the building contract, including the client, government, and professional bodies had contributed their expertise in ensuring that projects are completed within the stipulated construction period. In many circumstances, contractors are awarded with extension of time to ensure that the projects are completed accordingly. However, according to Chai (2012), there seems to be a rising trend on the occurrence of project delay and sick projects based on the statistics of Ministry of Housing and Local Government's report. It was claimed that the main contribution of project delay and sick project are

inadequate financial support, wastages, little emphasize on quality management system, and physical project's progress delay.

Hussin and Omran (2011) classified an objective measurement of sick projects based on the physical performance of project on site using the Malaysian experience in handling sick projects. The classifications were grouped into three stages: i) project delay refers to inability of the contractor to deliver project on time by 10%, ii) sick project refers to inability of the contractor to deliver project on time within 10 to 30 % delay, and iii) abandoned project refers to no physical activities on site for more than six months. It seems clear to deduce now that in most circumstances in the construction industry, the term sick project refers to the inability of the contractor to deliver projects to client on the agreed contract period. Previous studies have reported that the factors contributing to project delay or sick projects are varies, and these factors involve all parties in the construction project. However, it seems clear to deduce that in the construction industry, in many circumstances, the term sick project explains project delay.

2.5 Sick Project Factors

This study focuses the sick project factors and rehabilitation of government project in Oman. Most studies in sick project or project delay have only been carried out to investigate and examine the causes of project delay and methods to overcome the issue. There seems to be limited studies that classify the stages or processes of becoming sick projects and delay in the construction industry's context. However, Chowdary (2012) reported that there are classification of stages of sickness has been classified in the financial institution and business practices based on the Reserve Bank

of India classification. It seems clear that the understanding of the classification ensures that business organizations can act promptly should the characteristic of sickness exists. The classification stages are: i) normal unit, ii) tending towards sickness, and iii) incipient sickness. However, the classification on the characteristic of sickness is mainly referring to the financial standing of the business organization. Unlike the construction project, the financial aspect alone does not reflect the general view of the state of project's health. It seems that construction projects require more characteristics in determining the classification of project sickness, for example, Hussin and Omran (2011) that used physical progress as the main classification of project sickness.

According to Luu et al., (2008), most of studies in the developing countries and construction industry in the world, including Oman focused on the aspect of management of projects. It was claimed that there seems to be little focus on sick project, especially in Oman. Therefore, there seems to be an urgent need to examine the sick project factors leading to rehabilitation of government projects in Oman. According to Mishra (2011), there has been remarkable improvement in the economic performance of Oman in the last two decades due to geo-political reason recently. Therefore, there are many development of projects take place in the Sultanate nowadays. According to Nguyen and Chileshe (2013), Oman deserves particular attention in term of examining and revisiting previous studies in other countries research findings on construction project failures and construction management issues.

Nguyen et al. (2007) confirmed that there are relationships between bad control among management and project failures especially in mega projects due to delays, poor workmanship, poor control and management of budget, as well as unwanted disasters. Ling et al. (2009) further added that there seems to be lack of capable and qualified project managers within the construction industry in Oman. Therefore, it could be one of the reasons of project delay in most of the projects in Oman (Nguyen and Chileshe, 2013). However, in most international companies, the employees undergo special training, especially for the new staff. This ensures better understanding of construction project management processes, increased efficiency, and enhance construction project management competency. Ling et al. (2009) pointed out several weaknesses of construction companies in Oman. It was found that most of the project managers are lagging in terms of management capability. Furthermore, due to the less intensity of the projects in Oman, most of the project managers have less experience in complex projects, advanced technique of design and method of construction, and communication skills. The research also found that the regulatory processes and systems are two main obstacles in projects in Oman. Therefore, these challenges could be one of the reasons and factors for sick projects in Oman.

Jain (2014) stated that sickness or problems could occur at any stage of projects, and further classifies these sicknesses into two: i) internal source of sicknesses, and ii) external sources of sicknesses. Internal source of sicknesses are those within the control of the business organization, while the external source of sicknesses are beyond the business organization's control such as disaster, economic turmoil and regulatory requirements. Therefore, it was suggested that the business organizations to properly act promptly in strategizing their business operations to handle internal

and external sources of sicknesses. Jain (2014) further prescribed business organizations to focus on the areas such as formulating new projects, effective implementation of projects, efficient production of goods and services, robust marketing activities, effective and efficient financial management and control, and human resource development. Therefore, it seems clear now that in most of the business organization practices, the understanding of organizational knowledge is remarkably important. Shepherd and Patzelt (2011) suggested that business organization nowadays should focus on body of knowledge that comprises of organizational learning theory, evolutionary economics, knowledge-based theory of firm, and organizational theory.

Concerns have been raised by many several scholars in handling the sickness in project on the important of organizational knowledge (Daft and Weick, 1984; Madsen and Desai, 2010; Shepherd and Parzelt, 2011) that business or project organizations should emphasize on acquiring knowledge to understand the importance of operational activities as well as the cause and effect linkages. Shepherd and Patzelt (2011), added that business organizations need to emphasize on the understanding the basic organizational nature and knowledge in facing unwanted events, crisis and disaster, especially the construction companies. It was claimed that most of project failures are the results of inability of business organizations to understand the dynamism of the industry, the complexity of construction activities and entity, and the existing environment of the industry.

In contrast to Hussin and Omran (2011), Shepherd and Patzelt (2011) pointed that sick project is viewed as project failure. The term sick project or project failure in their

context refers to termination of contract. However, both views are evident that sick project refers to the inability to pursue the completion of the project or delivery of project to the client. In supports to this view, Weick and Sutcliffe (2007) claimed that more importantly all players in the construction project or business entity to continually learning from the project failure. It was suggested that all business entities to move forward and learn from the experiences and knowledge of project failure. Therefore, it seems clear to suggest now that this study is very timely in addressing the sick project factors and rehabilitation of government projects in Oman through early warning systems. Hussin and Omran (2011) in their investigation to identify the factors of project abandonment found that financial issues, poor strategies in sales and marketing, problems related to technicalities in projects, and external problems. Their study further found that strikes, rework, poor organization, shortage building materials, failure of equipment, variations of orders, and disasters contributed to project failures.

At this juncture, it is seems clear to deduce that the term sick projects, project failure, abandonment of project, and project delay are the common terms used by scholars in the construction industry to explain the sickness characteristics in a project. Therefore, in reference to Shepherd and Patzelt (2011), Kerzner (2013), Luu et al. (2008), Mishra (2011), Nguyen and Chileshe (2013), Nguyen et al. (2007), Ling et al. (2009), Jain (2014) and Hussin and Omran (2011), this study contextualizes the term sick project factors into four main characteristics: i) knowledge and technical issues, ii) management issues, iii) financial and economic issues, and social and legal issues.