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THE INFLUENCE OF ORGANIZATIONAL FACTORS ON CONSTRUCTION RISK AMONG MALAYSIAN CONSTRUCTION INDUSTRIES

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ABSTRACT

Extensive numbers of empirical studies have proven that certain organizational factors do influence construction risk management. In line with the recent substantial attention on risk management in Malaysia, and the demand for Malaysian construction industries to implement risk management in order to confront the challenges they are facing, studies on risk management in Malaysia construction industries are few. The objectives of this study are to assess the extent of construction risk management among construction industries operating in Kuantan Malaysia, and to examine the organizational internal factors influencing their risk management, moderated with organizational culture. A proportionate stratified random sampling was used to choose 107 construction industries acquired through construction industries development board Malaysia (CIDB). A total of 87 valid and completed questionnaires were returned, leading to 81 percent response rate. Descriptive statistics with 5-point Likert scale interpretation and PMBOK's risk management category were used to attained the first objective this research. Extent of risk management among Malaysian construction industries was discovered to be at a high level. Following organisational control theory, this research also investigated the role of organizational culture on the relationship between organizational internal factors and construction risk management. Likewise, the moderating effects of organizational culture opined a positive relationship between organizational internal factors and construction risk management. Similarly, all the direct hypotheses relationship between organizational internal factors and construction risk management were supported. In summary, the findings in this research established that organizational culture can enhance risk management among construction industries operating in Malaysia. To augment risk management among construction industries, project managers should give considerable attention to the organizational internal factors discovered to be influencing their risk management.

Keywords: Construction risk management, Organizational internal factors, Organizational Culture, Malaysian construction industries.

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AMOS	Analysis of Moment Structures
AVOVA	Analysis of Variance
AVE	Average Variance Extracted
CB-SEM	Covariance Based-Structural Equation Modelling
CMV	Common Method Variance
DB	Design-build
f2	Effect Size
GDP	Gross domestic product
GoF	Goodness-of-fit
KSA	Kingdom of Saudi Arabia
MHSWR	Management of Health and Safety at Work Regulations
OCT	Organizational Control Theory
PLS	Partial Least Squares
PLS-SEM	Partial Least Square – Structural Equation Modelling
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
Q2	Construct Crossvalidated Redundancy
R2	R-squared values
RBS	Risk Breakdown Structures
RF	Risk Factors
RM	Risk Management
SEM	Structural Equation Modelling
SPSS	Statistical Package for the Social Science
VIF	Variance Inflated Factor

CHAPTER ONE

INTRODUCTION

1.0. Introduction

This chapter begins with the background to the study from the global view, and narrowed down to the Malaysian perspective. The next part highlighted the problems faced by Malaysian construction industries, followed by the explanation of the research gap to be filled in the present study and presentation of the research questions. Section three presents the research objectives. Section four presents the research scope, followed by the importance of the study.

1.1. Background of the study

Although risk abounds in all spheres of life, the construction industry has the worst record, as it is only surpassed by mining as the most dangerous industry (Ardeshir, Mohajeri & Amiri, 2016; Tembo Silungwe & Khatleli, 2017).

Risks during the construction process have received considerable attention among construction companies because of delay, cost overrun, time overrun and total abandonment that are connected with construction projects (Zou, Zhang & Wang, 2007). The term "risk" has been well-defined in several ways. While some scholars view risk from the perspective of gain and loss (Barrie & Paulson, 1992); others view risk in terms of loss only (Moavenzadeh & Rosow, 1999; Mason, 1973). Lehtiranta (2014) and Bothroyed & Emmett (1998) defined construction-related risk as a condition through which the process of project construction leads to uncertainty in the last cost, time and quality of the project. In this study, construction risk will be defined as “the probability of occurrence of any unexpected or ignored event that can hinder the achievement of project objectives, which may be in the form of management, materials and design risks,” following (Hussain et al., 2018; El-Sayegh, 2008).

According to Project Management Institute (2017), project risk was defined as an uncertain event that, if it occurs, will at least have a positive or negative outcome on project objectives like; scope, cost, time, and quality. Barber (2005) also viewed risk as threats to project success which are likely to occur when there is no proper management. In this research, risk management will be delimited as a process of identifying and analysing risk elements, which may occur as a result of management, material, design, finance, labour and equipment risk and solving them in order to attain the project aims.

Management of risk in the construction project has a broad perspective and is a systematic way of identifying, analyzing and responding to risk in achieving the project goals. The benefits of the risk management process include identifying and analyzing risk and improvement of construction project management processes with effective use of the resources (Bahamid & Doh, 2017).

However, improper risk management has been found to be the cause of time and cost overrun in construction projects (Andi, 2006). According to Wang, Dulaimi & Aguria (2004), it is not possible to remove all risks in construction projects. Thus, there is need for a proper risk management process to manage various types of risks.

Furthermore, immense attention has been focused on the issues of risk factors affecting construction companies such as material, management, design, equipment and labour risks, which in the long run lead to abandonment, delay, cost and time overruns which will definitely have substantial effect on the project (El-Sayegh, 2008). Thuyet, Ogunala & Dey (2007) also argued that in the construction company, improper risk management is usually the cause of cost and time overruns on projects because of lack of competency of the project managers to manage the risk effectively, thus delaying the estimated scheduled plan or exceeding the estimated budget of projects.

Quite a number of researchers have discussed construction risk management in various countries such as; Indonesia (Andi, 2006), USA (Kangari, 1995), UK (Odeyinka, Lowe and Kaka (2008), Kuwait (Kartam & Kartam, 2001), Hong Kong (Ahmed *et al.*, 1999), China (Fang *et al.*, 2004), India (Ling & Hoi, 2006), Malaysia (Sambasivan and Soon, 2007), Taiwan (Wang & Chou, 2003), and in Nigeria (Aibinu & Jagboro; 2002). However, construction risk management is highly varied, and depends on each country's cultural, economic, and political conditions. The risk management is mainly influenced by the individuality of the construction company in a particular country (Andi, 2006).

Despite the importance and diversity of the construction companies with their underlying risks, risk management has only been useful and practiced for the past few years (Rounds & Segner, 2010), however its popularity when compared to other companies is pretty weak (Wong & Lee, 2015).

This is due to the fact that risk from the construction industries emanate majorly from projects that are complex in nature, since it could lead to total abandonment, scope creep, cost and time overruns, all as a result of ineffective risk management (Chapman, 2001). Over a decade ago and presently, there have been serious focus over the globe on construction risk and its management (Santoso *et al.*, 2003; Zou *et al.*, 2007). Effective construction risk management is a serious issue because it involves many construction parties, which include risk from the management, shortage of materials, finance, poor design and lack of labour as the major risks to construction industries in Malaysia (Yatim, 2010). However, various parties with different skills and experience commonly have different interests and expectations, which naturally develop into confusion and problems for even the most experienced contractors and project managers.

In the same vein, risk management is important from the early stage of a project, where effective decisions such as arrangement and selection of construction approaches might be influenced, if necessary. The advantages of the risk management process include identifying and analysing risks, and improvement of construction project management processes (Kampmann & Veicherts, 2004). Conversely, the purpose of the risk management process should not merely be the successful project completion but also to increase the expectations of project goals and objectives (Mills, 2001).

According to Asgari et al., (2016), very little about the antecedent's factors of risk management is known, which operates under different conditions in an organization. Additionally, idiosyncratic properties are associated with RM, which make it unmovable from one organization to another (Leopoulos, Kirytopoulos & Malandrakis, 2006). Furthermore, due to the immense discussion of literatures on construction risk management, (Verbano & Venturini, 2013) suggested the assessment of the extent of construction risk management, which considerable attention is yet to be given to.

Given the aforementioned, the present study seeks to assess the extent of construction risk management and to examine the organizational factors influencing construction industries in Malaysia with moderating potentiality of organizational culture.

1.2. Problem statement

Construction projects remain the backbone of the whole nation. The population of the people that need basic amenities such as education, food and health care keeps increasing and without construction companies that can successfully manage the projects, these projects will never meet the requirements of the population.

The construction industries also play a critical role in Malaysian's economy even the GDP over the years has remained poor when compared to other neighbouring countries and is a significant contributor to economic growth (CIDB Malaysia, 2012; Windapo and Cattell 2013). Ofori (2007) and UNIDO (2009) view the construction industries as that critical sector of the economy that produces building and civil engineering structures and determines the extent to which investment efforts in a resource-rich country are translated into investment outcomes. Kelly (1984) observe that the construction industry is not a single industry but rather a complex cluster of industries, including banking, materials and equipment manufacturers, contracting organisations and so forth.

Turin (1973), Wells (1986), Hillebrandt (2000), Mlinga and Wells (2002), Ofori (2007), and Giang and Pheng (2011), also affirmed that the construction industries plays an important role in the socio-economic development of every nation. Construction makes a significant contribution to the national economy, it creates employment (especially for the least skilled members of society), it plays a role in the development and transfer of technology, it creates many opportunities for enterprises, and it contributes directly to improving the quality of life of the users of its outputs.

However, a few top leading risk factors have been identified as confronting and influencing the output and development of the Malaysian and other developing countries construction industries such as management risk, material risk, design risk, finance risk with labour and equipment risk (Adeleke et al. 2016; CIDB Malaysia, 2016; van Wyk, 2004; Lewis, 2007; Tomlinson, 2010; Aibinu & Odeyinka, 2006).

The economic reports of year 2010-2015 from the ministry of finance, bank Negara shows that the Malaysian construction industry has consistently been the smallest contributing sector to the economy, contributing on average 3% to the total GDP (CIDB Malaysia, 2015). Even after been equated to other nearby neighbouring countries, the contribution of the Malaysian construction industry to the nation's GDP is much lower as depicted in Table 1.1

Table 1.1: Countries Construction Industries Contribution to GDP

Countries	GDP in percentage (%)					
Year	2010	2011	2012	2013	2014	2015
Malaysia	0.2	0.1	0.6	0.4	0.5	0.4
Singapore	4.7	4.5	4.8	5	5.2	5.2
China	5.2	7.3	8.7	8.5	7.0	8.0
Korea	7.2	7.3	7.0	7.4	7.2	4.3
Indian	4.9	4.8	4.9	5.3	3.0	7.0
Australia	5.3	5.7	6.4	6.5	6.0	6.0
New Zealand	3.7	3.7	3.9	4.1	4.3	4.0

Source: Ministry of finance, Bank Negara Annual Economic Reports

The annual report from the Table 1.1 shows that among the seven (7) countries, Malaysia construction industries has the lowest contribution to GDP and this is not surprising because it has been affirmed by previous literatures (Department of Statistics Singapore, 2016; CIDB Malaysia, 2015; Fernandez, 2016). As a result of certain risk factors dampening the Malaysian construction industries outputs. The evidence further proved in Table 1.2, as it shows the Malaysia construction industries contribution to GDP from 2006-2015.

Table 1.2 Construction Industries Share of GDP against Malaysia's GDP (2006-2015)

Year	Change (%)	Share of GDP (%)	Contribution to GDP Growth (%)
2015	10.7	4.2	0.4
2014	12.7	4.0	0.5
2013	10.9	3.8	0.4
2012	18.1	3.5	0.6
2011	4.6	3.0	0.1
2010	5.1	3.3	0.2
2009	5.8	3.3	0.3
2008	2.1	3.0	0.1
2007	4.6	3.0	0.1
2006	-0.5	3.1	0.0

Source: Ministry of finance, Bank Negara Annual Economic Reports

From Table 1.2, it is clearly shown that the GDP contributed from the construction industries to Malaysia economy still remain poor and inconsistent, for example 0.5 in 2014 and dropped down to 0.4GDP in 2015 which this has been attributed to the influence of certain risk factors in the construction industries which this study tends to deeply investigated.

In this same vein, there were various seminars, workshops and conferences that were organized, and the meetings took place differently among various bodies which are PETRONAS annual report (2014), Construction Industry Development Board (CIDB), Malaysian Institute of Risk Management (MIRM) and the Institute of Enterprise Risk Management (IERP) in 2017. The primary aim of discussion in those meetings was on how to strengthen and buffer risk management implementation and to reduce the level of risk occurrence in Malaysian projects, specifically in construction projects, because of its importance to the economy as a whole, which have become the major issues of discussion.

Abada, d'Aertrycke and Smeers (2015), perceived risks construction projects often lead to schedule overruns, cost overruns and lack of quality due to certain risk factors which this study tends to investigate. Many projects have been delayed or exceeded their planned budgets, as project managers could not manage risk effectively. On the long run results to total abandonment, dispute and litigation. These problems seem to happen more frequently these days, because of the emerging nature of the economy. Projects today are exposed to considerably more risks and uncertainties because of factors such as poor management, deficit material, design complexity, insufficient finance, labour experience, low technology and equipment, social concern, political statutory regulation, as well as weather conditions to be the leading risk factors to most countries oil and gas construction projects (Mani, 2017; Thuyet, Ogunlana and Dey, 2007).

Khan & Rashid (2012) examined the risk factors affecting Malaysia construction projects. In their study, the authors discovered that construction risks are significantly influenced by organizational culture, in line with the study of Fang, Chen & Wong (2006) which discovered that the price of affordable houses in China are significantly influenced by organizational culture, that is, if industries cultures are flexible on how importation of construction materials, equipment and labors are handed, therefore, the probability of risk reduction in construction industries is high. Thus, the moderating potentiality of organizational culture on the relationship between organizational internal factors and construction risk management is possible in this study as also suggested by (Baron & Kenny, 1986).

Therefore, this study will not be exhaustive enough without investigating the extent of risk in Malaysian construction industries. More so, previous literatures have given less attention to risk factors in Malaysian construction industries, combining organizational culture on the relationship between organizational internal factors and construction risk management which means previous findings have not been generalized to the Malaysian point of view due to contextual and culture differences.

1.3. Research questions

1. What is the extent of construction risk management among construction industries operating in Kuantan Malaysia?

2. What is the influence of organizational internal factors and construction risk management among construction industries operating in Kuantan Malaysia?

3. What is the moderating effect of organizational culture on the relationship between organizational factors on construction risk management among construction industries operating in Kuantan Malaysia?

1.4. Research objectives

1. To assess the extent of construction risk management among construction industries operating in Kuantan Malaysia.

2. To examine the significant relationship between the organizational internal factors and construction risk management among construction industries operating in Kuantan Malaysia.

3. To examine the moderating effect of organizational culture on the relationship between organizational internal factors on construction risk management among construction industries operating in Kuantan Malaysia.

4) To develop a risk management framework for the Kuantan Malaysian construction industries.

1.5. Scope of the study

This study proposes to determine the extent of construction risk management among construction industries operating in Kuantan Malaysia and to determine the influence of organizational internal factors with its relationship to construction risk management, with the moderating effect of organizational culture and subsequently, this study will focus on construction industries. The construction industries have been chosen in this research because "virtually everyone can identify its outputs and its tenure" (Hällgren & Wilson, 2008). More so, this study focuses on the risk assessment stage only because it is based more on quantifying known risk with the use of statistical analysis (Lockyer & Gordon, 1996).

This study focused on the G7 contractors operating in Kuantan construction industries that specialise in building construction. Kuantan district comprises of six (6) sub-districts which are Sungai Karang, Ulu Kuantan, Ulu Lepar, Kuala Kuantan, Beserah and Penor.

Kuantan was considered for this research because the recent National Physical Plan of 2005 identified Kuantan as one of the future growth centres and a hub for tourism, trade, transportation and commerce. Kuantan is also considered as the social, economic and commercial hub for the East Coast of Peninsular Malaysia due to its strategic location and also faces the South China Sea. Therefore, rapid development has transformed and modernized Kuantan which calls for more buildings in the future (Romal et al., 2013).

1.6. Significance of the study

The importance of risk management research has continuously been emphasised by both academics and practitioners, especially the need to have a better understanding of construction risk management from organisational and individual perspectives. This study contributed to the growing body of knowledge practically, theoretically and methodologically. For practice, this research might guide the Malaysian construction industry stakeholders on how to buffer risk management within the construction industries. Similarly, investigating the level of construction risk management in Malaysian construction industries might be the cornerstone towards major performance benchmarking. Hence, the current framework may serve as the accurate motivation of change towards risks in Malaysian construction projects.

The significance of this study will further be grouped into three sub sections such as: policy makers, industry practice and academics. The contributions to the academics will further be separated into three: risk factors in this study from the perspective of construction industries, the proposed model in this study, and lengthening of the organizational control theory to accommodate the construction industries. Likewise, the majority of the risk managers and researchers have not given much attention to associating organizational resources based on the revealed literatures such as effective communication, team competency and skill and active leadership, with moderating potentiality of organizational culture, the gap between which this research tries to fill.

Also, the outcome of this research might provide contractors; sub-contractors; project managers and policy makers with a tool to assess how construction organizational internal factors with organizational culture as the moderator to construction risk management might improve risk management within the construction industries.

In the same vein, the model proposed in this study is to empirically investigate the relationship between organizational internal factors and construction risk management as affirmed to influence in construction projects with organizational culture. Also, all the factors are integrated together to develop the hypotheses built on theoretical and narrative reasoning.

Theoretically, the moderating effect of organizational culture on the relationship between organizational internal factors on construction risk management could be explained from the theoretical view of organizational control theory (Flamholtz et al., 1985; Jaworski, 1988; Ouchi, 1979; Snell, 1992).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review chapter is divided into three parts. The first part is Malaysian introductory overview, overview of the Malaysian economy and overview of the Malaysian construction industries.

The second part depicts an overview of risk management as one of the ten knowledge areas in project management processes. It also shows the construction projects lifecycles phases, types of construction projects, and construction parties. The third part is further divided into two sections. The first section shows the relevant literature of construction risk management, related studies on identification and assessment of risk. The second section shows the relevant studies on causes of delays as a result of ineffective risk management on project completion in addition to risk allocation in developed and developing countries. Finally, the last section opined the studies on the exogenous, endogenous and the moderating variables.

2.2 Malaysian Introductory Overview

Malaysia is located in Southeast Asia, just north of the Equator, and is bordered by Thailand, Singapore, Indonesia and Brunei, and shares maritime boundaries with Vietnam and the Philippines.

The Federation of Malaysia includes Peninsular Malaysia, and the states of Sabah and Sarawak (on the island of Borneo) in East Malaysia. Malaysia is divided into 13 states and three federal territories, which are separated by the South China Sea. The Peninsula has 11 states and two federal territories (Kuala Lumpur and Putrajaya), while East Malaysia has two states and one federal territory (Labuan).

The South China Sea separates Malaysia from Sabah and Sarawak on the island of Borneo. Both the Peninsula of Malaysia and East Malaysia share a similar landscape, with coastal plains and mountains. The coastal regions of East Malaysia are divided by hills and valleys, as is the Peninsula where the heavily forested Titiwangsa Mountains divide the east and west coasts. The tallest mountain is Mount Kinabalu, which is part of the protected Kinabalu National Park. Many islands lie around the Peninsula and East Malaysia, the largest of which is Labuan (Angloinfo, 2018).

The independent state of Malaysia was created on 16 September 1963 as a federation of Malaya, Singapore, Sabah and Sarawak. However, in 1965 Singapore withdrew from the federation to become a separate nation. The 11 states of former Malaya are known as West Malaysia, Sabah and Sarawak, and East Malaysia.

The first settlers migrated to the area between 2500 and 1500 BC. Hinduism was replaced by Islam around the fifteenth century. During the 1800s, British and Dutch influence in the region grew as a consequence of trade and colonialism. During World War Two, Japan occupied Malaya, Sabah, Sarawak, and Singapore. After the War, the Allied Forces tried to unite the administration of Malaya in the Malayan Union, which was met by opposition so it quickly dissolved, and was replaced in 1946 by the Federation of Malaya under British protection.

Between this time and the formation of modern day Malaysia in 1965, there were numerous guerilla operations launched by the Chinese against the British. As a result, in 1963 a federation of Malaya with the British colonies of Sabah, Sarawak and Singapore, was created as depicted in Figure 2.1 (Wonderfulmalaysia, 2017).

Figure 2.1: Malaysian Map
Source: (Beautifulholidays, 2018).

Malaysia is a federal constitutional elective monarchy, which is modeled on the British parliamentary system. The head of state is Yang di-Pertuan Agong, often referred to as the King. The head of state is elected to run a five-year term by the nine hereditary rulers in the Malay states. The four states, which do not have Governors, do not participate in the election. Since 1994 the head of state's role has been mainly ceremonial.

Legislative power is divided between the federal and state legislatures. Parliament consists of the Lower House, the House of Representatives and the Upper House, the Senate. Each member of the House of Representatives is elected in a general elections and represents a constituency.

Malaysia has a tropical climate. Temperatures range between 21 and 32 degrees centigrade, but it is colder in the mountains. Average annual rainfall is between 2,000 and 2,5000 mm. The monsoon season is from April to October in the southwest, and from October to February in the northeast. Humidity is usually high. Earthquakes and tsunamis are also known to occur in the region (Angloinfo, 2018).

2.2.1 Overview of the Malaysian economy

From an economy dominated by the production of raw natural resource materials, such as tin and rubber, even as recently as the 1970s, Malaysia today has a diversified economy and has become a leading exporter of electrical appliances, electronic parts and components and natural gas. After the Asian financial crisis of 1997-1998, Malaysia continued to post solid growth rates, averaging 5.5 percent per year from 2000-2008. Malaysia was hit by the Global Financial Crisis in 2009 but recovered rapidly, posting growth rates averaging 5.7 percent since 2010.

Less than 1 percent of Malaysian households live in extreme poverty, and the government's focus has shifted toward addressing the well-being of the poorest 40 percent of the population ("the bottom 40"). This low-income group remains particularly vulnerable to economic shocks as well as increases in the cost of living and mounting financial obligations. Income inequality in Malaysia remains high relative to other East Asian countries, but is gradually declining. For example, from 2009 to 2014 the real average household incomes of the bottom 40 grew at 11.9 percent per year, compared to 7.9 percent for the total population of Malaysia, thus narrowing income disparities. Following the removal of broad-based subsidies, the government has gradually moved toward more targeted measures to support the poor and vulnerable, mainly in the form of cash transfers to low-income households.

Malaysia's near-term economic outlook remains favourable, reflecting a well-diversified and open economy that has successfully weathered the impact of external shocks. Domestic demand is expected to continue to anchor economic growth, supported by continued income growth and a stable labour market, while an improving external environment would contribute positively to demand for Malaysia's tradable goods and services. Accelerating structural reforms to enhance public sector performance and boost the productivity of public spending will be vital to sustain robust growth in a challenging external environment.
While significant, Malaysia's productivity growth over the past 25 years has been below those in several global and regional comparators. As factor accumulation is expected to slow, accelerating productivity growth is the main path for Malaysia to achieve convergence with high-income economies. Accelerated implementation of productivity-enhancing reforms to increase the quality of human capital and create more competition in the economy will be key for Malaysia to secure a lasting place among the ranks of high-income economies (World Bank, 2017).

2.2.2 Overview of Malaysian Construction Industries

The construction industry is an economic investment and its relationship with economic development is well posited. Many studies have highlighted the significant contribution of the construction industry to national economic development (Myers 2013).

Malaysia is actively working towards achieving a high-income status by 2020. This involves intensive transformation of the economic structure. The government has outlined an economic road map to transform the country in order to be recognised as a developed nation. Since independence, the Malaysian economy has observed plans with five-year strategic thrusts. The strategic trusts are in line with the goal to become a high-income nation by 2020. Looking towards the 2020 target, the challenge is to sustain the impetus of robust growth. Specifically, this requires average growth of 6.0 % in GDP per annum during the Tenth Plan Period. To achieve this target, the economic sectors are to play significant roles. The construction sector is active and features prominently in terms of policy formulation and implementations. A comparison of the size of the construction industry with other countries suggests that its contribution has been consistent and stable. As may be seen, among the countries cited, the contribution of the Malaysian construction industry, although not the highest performer, its contribution nevertheless remains modest (Olanrewaju & Abdul-Aziz, 2014).

In 2013, Malaysia's economy grew at 4.7 % with the all sectors registering positive growth. The Services and Manufacturing sectors remained the key engine in terms of supply. Consecutively, the Construction sector continued a double-digit growth by registering 18.6 %. The growth is mainly accountable by the strong growth in the residential sector (Table 2.5) coupled with the underlying strength in infrastructure and civil engineering projects.

The Malaysian construction industry is classified into four sectors namely, residential buildings, none-residential buildings, civil engineering and the special trade sectors. The residential sector involves the construction of houses and condominiums. The non-residential construction comprises of all building construction other than residential. These include the construction of commercial and industrial buildings. Civil engineering pertains to the construction of public infrastructure such as bridges and highways (Department of Statistics Malaysia, 2013).

2.3 Project Management Process

This research rest on risk management, so giving the definition of a project will be most relevant to the study. Larson & Gray, (2011) defined a project as an irregular effort guaranteed to make a unique product service, or result which includes major characteristics such as an accomplished objective, time, cost and specific performance requirements, in addition to the affair of different professionals and sectors. Although, this definition is comprehensive, it failed to capture the start and end of a project (PMBOK, 2013).

Smith, (2008) and Kerzner (2001), provide a definition which says that a project is a sequence of activities which has start and end dates, with a specific goal to be achieved within confined time, cost, and resources.

After every plan for a project which has the start and the end date are known, the management of the project must be initiated with it. Though, project management has numerous definitions; however, it hardly differs in meaning. PMBOK (2004) defined project management as an act of planning, organizing and managing the available resources to present the aims and objectives of the project successfully.

Similarly, PMI (2004) defined project management as “the act of directing and coordinating humans and resources through the life of the entire project by using the latest management techniques to reach pre-determined goals of scope, cost, time, quality and participants' satisfaction”.

Therefore, the UK Association of Project Managers defined project management as “the planning, organizing, monitoring and controlling of all aspects of a project to achieve the project objectives safely and within agreed stipulated time, cost and performance standards” (Smith, 2008).

As every project is connected with time, cost and quality, there is need for the triple constraints of PM in the study, which are time, budget and the amount and quality of work (scope) to be completed for every project, as shown in Figure 2.2.

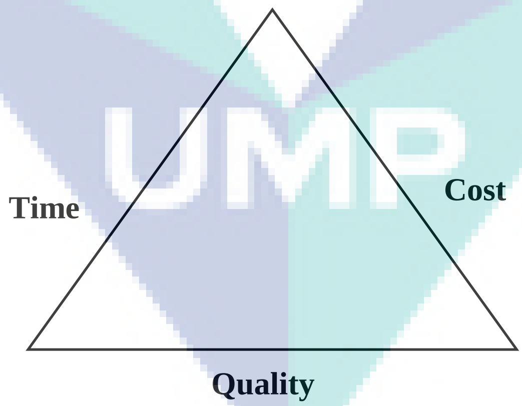

Figure 2.2: *Project management constraints*
Source: (Fewings, 2005) and (PMBOK, 2004)

In as much the triple constraint has been affirmed to be the element that proves the success of every project, Fewings (2005) pointed out that both cost and time are positively connected, where the original cost is most likely to be overrun if the planned schedule is exceeded.

2.4 Risk Management Overview

The origin of risk was from France, and insurance transactions started to use it around 1830 in England. Risk are placed under three categories, namely; known risks, known unknown, and unknown unknown. Known risks are the slight changes on the project, known unknown risks are the predicted occurrence which may be either by their probability or by the likely effect, and unknown unknown risks are those events with unknown probability joined to it and unknown likely effect, which all need proper management in order to achieve the project objective (Smith, Merna, & Jobling, 2014).

Managing risk has been practiced since the beginning of civilization when farmers needed to store their harvest for future use, and when they started to build forts and fences to protect their villages and properties. Another related example is when a tradesman manages his risk during the process of moving goods from one place to another by asking the buyer to pay initial deposit to the seller which will be balanced up when the buyer receive the goods in good condition, so if any unforeseen circumstance arises during the movement of the goods, the tradesman will receive a compensation. Risk was not managed systematically from Babylonian days until the Age of Enlightenment, at the same time was based on 'gut feeling'. However, a more systematic methodology was discovered after theorists and statisticians developed measured techniques for assessing risk (Hubbard, 2009).

Zou, Zhang, & Wangu (2007) defined risk management as 'a system whose purpose is to identify and quantify all risks that can affect the project and decide on how the risk can be managed'.

Lester (2007) viewed it as a process of making decisions within project management, and it is an essential part of the project management plan; it defines the sources, impacts and types of potential risks in the project, in which tools and techniques would be used in risk identification and assessment of the risk.

The two authors' assumptions failed to consider the origin of risk and it is essential to know the starting point of every risk before its management. Therefore, Dikmen *et al.* (2008) viewed RM as defining the origin of uncertainty (risk identification), estimating the effects of the uncertain condition/events (risk analysis), gathering of response strategies because of the expected outcomes and lastly, depending on the feedback obtained on literal outcomes and occurred risks, conducting identification, analysis and response steps respectively during the life cycle of a project to see the project objectives are achieved. RM in construction is a wearisome task as the purpose of the objective is likely to change during the project life cycle, and assumptions are legion due to the predisposition of projects to unmanageable risks hailing from the modifications of the macro-environment.

2.4.1 Risk Management Process

Majority of the construction projects experience cost and/or time overrun as a result of risks. The concept of risk assessment is absolutely different from risk management, although some may use the risk management concept to designate a risk assessment process (Kaplan & Garrick, 1981). According to Westland (2007), risk management is 'the process by which risks attached to the project are properly identified, quantified and managed'. However, during the planning and construction stage, numerous types of risk may need to be identified, assessed and analyzed by using the relative importance index theory or probability theory for evaluation of the risk and regulate their effects on the construction project.

Risk management assists in reduction of delays, and also reduces predetermined disputes. One of the key discoveries of the existing methodologies used in analyzing delays in construction projects from the viewpoint of clients and consultants is to use simple methodologies instead of the complex one in analyzing delay, though it is recognized for less reliability (Yang & Kao, 2012).

Risk in construction projects is generally categorized into internal and external risks. Other categorizations are more in depth, which comprise of more specific categories, such as market, intellectual property, political, financial, safety and social risks (Songer, Diekmann, & Pecso, 1997; and El-Sayegh, 2008).

In general, identification of risks can be done at any stage in a project by recording relevant details of the risk in a register; nevertheless, risk can be identified in the construction company by the chance of occurrence of an event or the definite occurrence of an event during the construction process (Wang, Dulaimi, & Aguria, 2004).

According to Hertz and Thomas (1983), lack of predictability of structured outcomes in making decisions or planning situation can lead to risk. The outcome of an estimation which depends on the uncertainty related with various results might be better or worse than what is anticipated and later lead to cost overrun (Lifson & Shaifer, 1982). This study will adopt the definitions of risk management as presented by Larson & Gray (2011) and Westland (2007) that state that risk management is the process by which risks associated with the project are identified, quantified (assess) and managed (responses).

Nevertheless, the major source of uncertainty in Malaysian projects is cost overrun, which is considered to be the main reason behind the claims and disputes between parties in the region, as cost overruns and delays are the effects of the risk factors (Abdul Rahman et al., 2013). Construction industries in Malaysia have started to realize how important risk management as a project management tool, and as a mixed process in any project, is. Figure 2.3 illustrates the process of risk management.

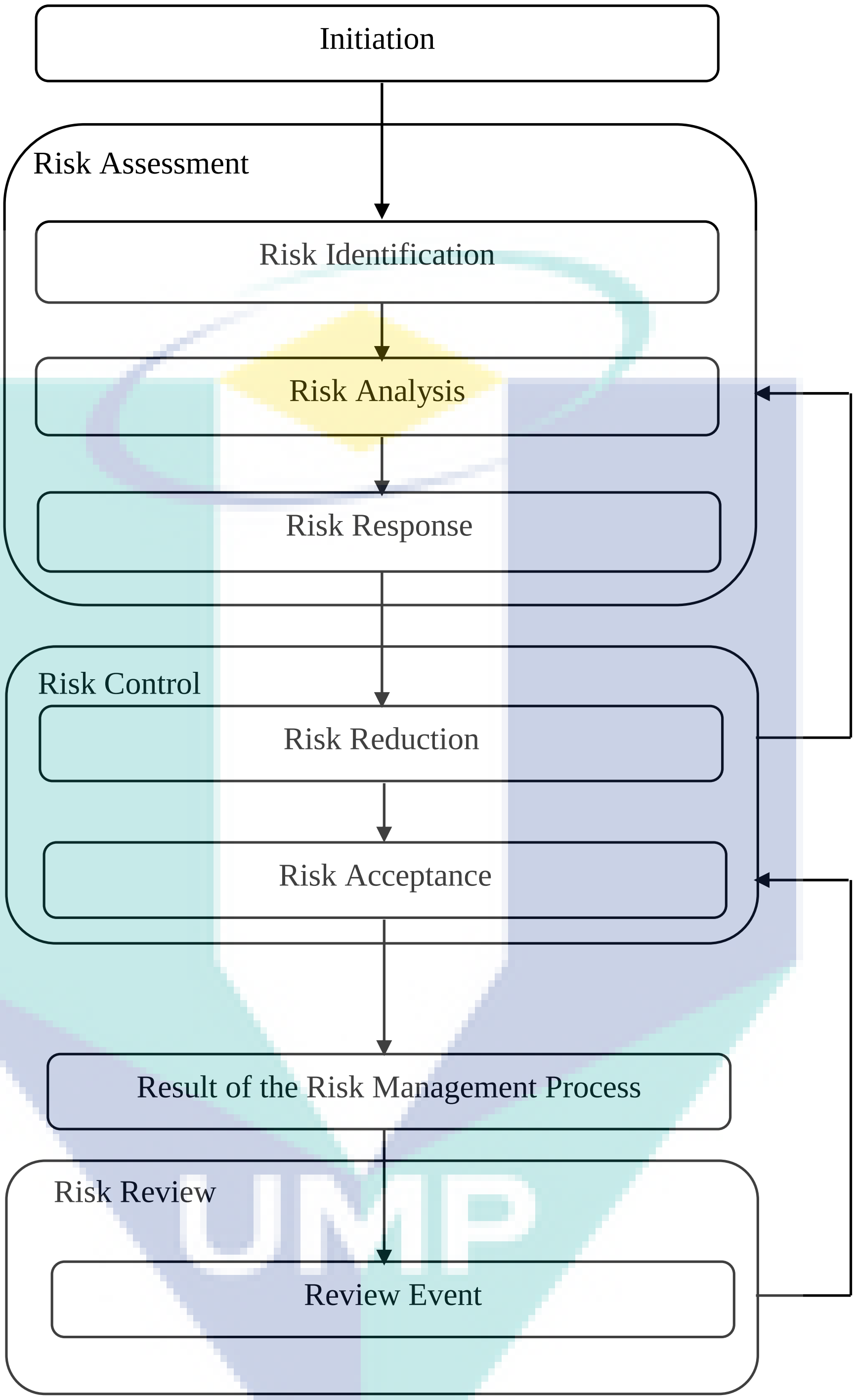

Figure 2.3: *Process of risk management.*
Source: (BurtonShAw-Gunn, 2009)

Figure 2.3 demonstrates the three stages in the initiation of the risk management process tool. The initiation process begins with the risk assessment phase, moves to risk control and ends with a risk review. More so, there are various types of risk, for example dependent and independent, controllable and uncontrollable risks. Hence, this study focused on the first stage, which is the risk assessment stage, following (Lockyer & Gordon, 1996).

2.5 Dependent Variable

Considerable number of experts such as Creswell, Fetters & Ivankova (2004); David & Sutton (2011); Hair, Ringle & Sarstedt (2011) viewed dependent variable as variable that depends on independent variable. These are the variables that the researchers want to understand and explore, and any changes in independent variable might also cause a change in dependent variable. The dependent variable can also be called effect variable and is being influenced by the independent variable. In most cases, dependent variable is on right side of the theoretical framework. In this study, construction risk management is the dependent variable which was later conceptualized into five (3) dimensions; management risk, material risk, design risk.

2.5.1. Construction Risk Management

The classifications for construction risk factors can be done in several ways depending on the purpose. For example, some risks are classified into internal and external risks, while others are categorized as financial risk, client risk, design risk, material risk, and sub-contractor risk (Jarkas, Haupt & Haupt, 2015; Raftery, 1999; El-Sayegh, 2008). The categorizations of the risks factors in this study have been derived based on the previous risk relevant studies attended are presented in Table 2.1.

Table 2.1: *Categories and Classifications of Risk Factors from Previous Studies*

Categories	Rank
Management/administrative risk factors	1
Material risk factors	2
Design risk factors	3

After comparing the different categories included in the reviewed literatures on identification of risk factors, the results (Table 2.1) shows three leading categories which are management, materials and design.

However, in this research, the main categories were chosen after several revealed literatures from different countries, it was affirmed that these are the top three leading risk factors. In that case, this study seeks to investigate them thoroughly.

2.5.1.1 Management Related Risk Factor

There are two major aspects in project management, the science and the art of the project. The science aspect of it deal with defining and coordinating the work to be carried out, while the art aspect of it deal with people involved in the project; for an instance, it requires the understanding, knowledge, and the skillful application of a project management process (Heerkens, 2001).

Wahab (1990) established that there is poor management in Nigeria construction companies, which has led to higher importation of raw materials from foreign country with abundant of raw materials in Nigeria but they are yet to make use of them.

However, Zavadskas *et al.* (2010) claimed that the contractor's assessment and selection stages should be exposed to taking into consideration the factors that influence the process of construction efficiency.

Similarly, it was found by Johnston (2002) and Zakeri *et al.* (1996) that lack of proper caring from the management in Iran construction projects has led to identify the following factors influencing construction workers to be less productive while working in the construction site, which are; poor housekeeping, poor lighting in the work area, excessive moving of skillful people from one project to another, inadequate ventilation, uncontrolled breaks, inadequate tools and equipment, high employee turnover, shortage of rest rooms and drinking water and impromptu decisions making by the supervisors have found to be the leading factors caused by management during construction project in Iran as cited by Ghoddousi & Hosseini (2012). In line with the study of Jarkas, Haupt & Haupt (2015) which revealed lack of proper management in Qatar Construction Company as one of the major factors to construction risk management.

Faridi & El-Sayegh (2006) reported that shortage of skillful manpower, poor supervision, unsuitable leadership, poor site management, shortage and breakdown of equipment are factors caused by the management in United Arab Emirate construction projects.

Kaming *et al.* (1997) in their study revealed that skill workers in Indonesia spend almost 75% of their time working productively, but there are five major factors that make them to less productive which are; lack of equipment and tools, lack of materials, rework, absenteeism and gang interference during construction process.

More so, survey studies conducted in Malaysia shows that workers are not satisfied with the financial situations. It was also shown that workers were not satisfied with the level of training and the state of participation in decision making process which has adversely affects productivity as a results of the poor management (Sambasivan & Soon, 2007, Awang & Iranmanesh, 2017).

2.5.1.2 Material Related Risk Factor

Material related risk can directly affect project activities, and the effect on the cost of any project maybe important (Jusoh & Kasim, 2017; Amoatey & Ankrah, 2017). Risk factors that are associated to materials are selection time, type of materials, and availability of the material in the local market. The material category can have an understandable effect on increase in cost and delays.

Adeleke et al., (2017) perceived that Nigeria is blessed abundantly with raw materials, which may be converted to new building materials with reasonable price to the growing population, but till date no difference in the Nigeria construction industry. However, the current study framework maybe a base benchmark for the Nigeria construction industry to make sure that all materials are available at their disposal since it has been affirmed in this study and other experts as the major risk factor affecting the industry globally.

Experts have identified various inter-related challenges the construction industries in developing countries are facing as stated by the Department of Economic and Social Affairs (1962) Ofori (1993): (a) recurrent scarcity of construction materials resulting from the performance of users for conservative materials, of which most of them were brought from foreign countries; (b) lack of technological development in majority of the organization's, with lacks of equipment and plant, insufficient research and development programs and facilities, and poor relationship between practice and research; (c) inadequate skilled construction workers, and a poor reputations of construction companies; (d) an unfavorable working environment for construction companies, with difficult procedures and regulations, delays in payment to workers, and inappropriate contract documents; and (e) fluctuating and low level of construction activities.

Jarkas, Haupt & Haupt (2015) also affirmed late delivery of materials as the major construction risks to the Qatar construction companies, while the findings of Manavazhi & Adhikari, (2002) shows that delays in delivery of materials to the construction site, have a high impact on the overall schedule cost for the entire project. According to Mojahed & Aghazadeh (2008) availability of raw materials appears to be the only major productivity factors among the results of the research gathered by the experts in Malaysia, Iran, Nigeria, Thailand and USA (Banihashemi et al., 2017).

2.5.1.3 Design Related Risk Factor

Allocation of sufficient time and money at the design phase is one of the most important requirements to reduce some of the risk factors like time delay and cost overrun in the project (Tesfaye, Berhan & Kitaw, 2018). Design is one of the most serious categories because the related factors associated to it were identified as the key risks in construction projects (Sabah, Nassereddine & Hanna, 2018; Fereig & Kartam, 2006).

Furthermore, in the relationship study conducted between the contractors and subcontractors in Saudi Arabia construction companies, it was discovered that some factors significantly affected their relationship.

Based on the findings from the questionnaire survey of 16 contractors generally and 17 subcontractors, the factors were ranked as follows: poor design from the architecture as the leading factors which has led to scope creep by the clients, delay in payment of the workers, lack of quality in construction work, error and delay in drawing (Eastman, 2018; Al-Hammad, 1993).

The results of Koushki, Al-Rashid & Kartam (2005) showed that a significant reduction between time delay and cost overrun was experienced by clients who spent more money and time on design phase of their residential project. Early design and money spent during the design phase of a construction project would ensure a better design quality and a more complete set of design drawings which would consequently reduce the possibility of change orders and mitigate costly delay during implementation phase of the project.

In line with the study of Durdyev, Omarov, & Ismail, (2017) and Shehu, Endut & Akintoye, (2014) conducted in Cambodia and Malaysia respectively, the study revealed a strong association with design risk factors and delay to be affecting majority of the developing countries construction industries outputs.

2.6. Independent Variable

According to Creswell, Fetters & Ivankova (2004); David & Sutton (2011); Hair *et al.,* (2007), Independent variable is a variable which affects and explains the dependent variable. Increase and decrease in independent variable affect level of dependent variable. Independent variable refers to influenced by dependent variable.

2.6.1. Organizational Internal Factors

In this study, organizational internal factors are conceptualized as effective communication, team leadership and skill and active leadership following (Safapour, Kermanshachi, & Ramaji, 2018; Kumaraswamy & Chan, 1998). Organization resources might be tangible or intangible and it can be combination of the two, or human resources. The tangible resources are organization assets like; equipment, land, capital and labour. The intangible resources are those that cannot be seen physically by the organizations, like the internal factors in this study. While the human resources comprise of the training and education of manager, team members and the owners (Inmyxai & Takahashi, 2009).

2.6.1.1. Effective Communication

In most cases, effective communication can be seen as hidden element for success. The disposition of the research warrants this variable and to check it influence with the dependent variable as stated in the research theoretical framework. Reliable and frequent communication is essential for successful project with less risk. This variable is vital for any project team or organization. It is necessary that authentic and clear information are disseminated at the appropriate time and place to the right person during the construction project. Also, the flow of information, either top down or bottom up communication is an essential characteristic of project to think about. It also lessens conflicts, and improve decision making and it influence on project team member performance to their project manager (Yap, Abdul-Rahman, & Chen, 2017). The critical issues is that, most of the time crucial information are not available to take right action, so it is required to make communication most vibrant tool for successful project (Moe & Pathranarakul, 2006).

Communication is a channel by which a sender transfers some information to the receiver. Both the sender and the receiver might be the project manager to the team members. Information can be transfer from various medium like; email, Facebook, Telephone and face to face (Thompson, 2018; Ulmer, Sellnow & Seeger, 2017).

Ineffective communication of project requirements between the contractors, project managers and team members has been reported to be the causes of most project failures (Li *et al.*, 2011; Robertson & Robertson, 2006; Karim Jallow *et al.*, 2014).

2.6.1.2. Team Competency and Skills

Team competency and skills are important variable to be considered, because these provide knowledgeable and technical human resource which are necessary for contractors, project managers and team members to achieve the project goals. Team competency and skills can be seen in terms of skills, knowledge and attitude. Team dynamics are also connected with team competency; that is what type of characteristic team have and what are the characteristics required for the project execution. These should be the first priority of every organization to educate/ train the project managers with the team members on how to deal with urgent action (Simpkins, 2009). Reduction of risks in construction project cannot be effective without participation of project team members. Team member's competencies and skills are important for a successful project delivery, which require an effective training to increase their competencies (Moe & Pathranarakul, 2006).

Therefore, each and everyone have different abilities (capacity to handle different tasks) and skills (actions on specific task, which has been acquired through training). Skills and competencies are both important for contractors, project managers and team members in order to tackle uncertain event in the project (Adeleke et al., 2017).

A team can be defined as a group of people that are working together in order to accomplish a common goal which all team members are accountable for that. Project team are working temporarily on a project and once the project come to an end, they also end their contract for that particular project. To reach a closure in project based on the schedule time and budget, it is required to provide essential skills to team members, this would be helpful in performing their tasks efficiently in normal as well as in emergency condition (Greenberg & Baron, 2008).

2.6.1.3. Active Leadership

Most of the previous studies emphasis on strategies, leadership styles and behaviour. Successful project necessitates different kind of leadership from the normal routine project work. In construction project, there are needs for active leaders that can take serious actions on run time in order to avoid making situation worse. Active leader is one of the most important independent variable proposed in the theoretical framework. Project leader priority is to run project in emergency situation as it will be run in condition (Simpkins, 2009). For active leadership to respond to normal risk event, there are needs proactive leaders not reactive as proactive leaders give instructions in a project and reactive leaders try to bring a solution to the existing and foreseeable events in the projects. Proactive leaders are successful to finish the project based on the estimated budget and time. Proactive leadership is required when some uncertain event occurred in the project. The proactive leaders are the firelighters while the reactive leaders are the fire-fighters. Before a successful project can be attain, it is required to move from reactive to proactive leadership (Barber & Wan, 2005).

More so, a leader can be define as a person who possess an authority to influence others. Leadership is to influence others in order to achieve a certain objective. Leadership includes followers; in construction project, leaders are usually the contractor's/ project managers and followers are usually the project team members. Leaders should be competent enough to lead in stressful conditions, guide and direct their followers. Flexibility is also vital, because they are various kind of risks and the ways to tackle each risk would be different based on state of projects. So leaders are expected to change their actions based on risk events (Greenberg & Baron, 2008).

2.7. Moderator

Baron & Kenny (1986) stated that a moderator is a quantitative (for example, level of reward) variable that affects the strength or direction of the relationship between an independent or predictor variable and a criterion or dependent variable.

The author stated that with a correlational analysis framework, a moderator is a third variable that affects the zero order correlation between two other variables as stated in the framework for this study. A moderator effect within a correlational framework may also occur where the direction of the correlation changes. However, before a moderator can be used, statistical analysis must be measured and test the influencing effects of both the independent and the dependent variable with the function of organizational culture as a moderator in this study (Stern, McCants & Pettine, 1982; Baron & Kenny, 1986).

2.7.1. Organizational Culture

Organizational culture is a mental concept that has been discussed for over thousands of years by experts, anthropologists, sociologists, historians and philosophers.

According to Walker (2015), cultural influences are denoted to the acceptability of the general public and the locals to particular activities.

Many authors have already attempted the importance of establishing a strong culture in the organizations (Hofstede *et al.*, 1990; Sackman, 1991; Kotter &Heskett, 1992; Schien, 1996) for successful project in the organization, the contractors, project manager and team members must have total commitment to the project.

Hofstede *et al.* (1990) and Schein (2004) perceived organizational culture as the elementary assumptions, values, beliefs and models of behaviour, practices, rituals, heroes, symbols, technology and artefacts. In addition, Hartog & Verburg (2004) indicated that organizational culture is a strong tool that is associated with "behaviour and attitude" of contractors, project managers and team members during execution of project which significantly influenced construction risks.

Likewise, several researchers have attempted in classification of organisational culture and finally a single definition was given. It was further expanded by those who are the pioneers in the field of organizational culture such as (Hofstede, 1980; Deal & Kennedy, 1982; Schein, 1985). Firstly, Hofstede (1980) highlighted that there are regional and national cultural groupings that might have an influence on organization.

Hatch, (2018) and Hastak & Shaked (2000) highlighted that rules and regulations significantly influence the agencies in the country, by introducing trade restriction, foreign currency exchange, or change of trade legislation with a positive relationship on construction risk management, organizational internal and external factors. For example, macroeconomic stabilities are associated with fiscal and monetary policy attitude, and with a country exposure to economic melt-down which may affect the prices of building materials. It is clear that government policy has a significant impact on the organization, although the extent of the impact is still immeasurable, especially on the moderating effect.

In particular, it is paramount to maintain a safe working environment in construction business. Human mistake plays a vital role in the causes of the accident. It constitutes up to 90% while the remaining 10% represents technical mistakes due to uncontrollable conditions. Most time in construction business, health and safety regulations are pressured to reduce accidents and large contractors need prove of minimum safety training for workers and managers, which organizational culture tends to stabilize in every organization (Gomez et al., 2018; Hamid *et al.*, 2003).

Cascio (2018) organizational culture from every government perspective which have a positively significant influences on materials used in construction project in which suppliers monopolize their products, but if organizational culture are well established in the market, monopoly will not occur which would go to the extent of affecting construction projects.

2.8. Relationship between Organizational Internal Factors and Construction Risk Management

Previous researches have shown that dispersed and informal company resources facilitates construction risk management though they are intangible resources. On the other hand, effective communication, team competency and skill and active leadership are found to be the major barriers to the construction company during the execution of a project which if, it is taken with levity hands, it results to risk (Geraldi, Lee-Kelley & Kutsch, 2010; Karim Jallow *et al.*, 2014).

This present research seeks to assess the relationship between effective communication, team competency and skill and active leadership on effective construction risk management of Nigerian construction companies. In this research, effective communication refers to the life-blood of any company and the project team. It required that authenticity of information is passed at the right time, place and to the right person, it is also consistent with study of (Moe &Pathranarakul, 2006; Doloi, 2009) that effective communication minimizes conflicts, improve decision making and effect on project team member performance, which shows that most of the time vital information are not available to take proper action, that make communication more important in construction companies to reduce risk that occur during construction projects. The study of Bakar, Ali, Onyeizu & Yusof (2012) confirmed that communication has a significant relationship with construction risk management. Doloi, Sawhney, Lyer & Rentala (2012) also affirmed that lack of communication in Indian construction projects influenced construction risk management.

Likewise, the study of Bresnen and Marshall (2000) in the UK construction industry, affirmed no significant relationship between effective communication and construction risk management. In contrary, research conducted by Alinaitwe (2008) in Uganda construction companies demonstrated a negative relationship between effective communication and construction risk management.

However, team competency and skills refer to skills, knowledge and attitude. They also pronounce team competency, that is what type of characteristics the team has and what are the characteristics required for risk situation. These should be the highest priority of all company to make sure contractors, project manager and team members are educated especially in taking quick action to reduce risk during construction process. Risk response cannot be effective without the project team member's participation. Team member's competencies and skills are important for project success which produce positive relationship with construction risk (Simpkins, 2009).

Also in line with the study of Moe & Pathranarakul (2006) that different person possesses different abilities (ability to perform different task) and skills (command on actual tasks, which has been gained during the training) with influence to construction risk. Skills and competencies are both essential for contractors, project managers and team members, in order to respond to uncertain events and achieve project success (Greenberg & Baron, 2008). The study of Akintoye and Macleod (1997) revealed a non-significant relationship between the team competency and skills with construction risk management.

According to Simpkins (2009) active leadership must be the first priority of all project leaders to direct project in an emergency condition as it is expected to be directed in a normal condition. The author further classified leadership into two, which are proactive and reactive leadership. Reactive leadership solve the existing and foreseeable uncertainty in a project while proactive leadership are used to be successful in project completion within the stipulated time and budget. It is also in line with the study of Barber & Wan (2005) which stated that a leader is a person who has power to influence other team members in order to achieve a certain goal with a positive effect on construction project.

Active leadership has been found to be an important dimension affecting construction risk management. In a study that examined the relationship between active leadership and construction risk management, (Greenberg & Baron, 2008; Geraldi, Lee-Kelley & Kutsch, 2010) found out that active leadership positively influenced construction risk management such that in any organization where there are monitoring and control, there seems to reduce risk occurrence on construction projects. Contrary, the study of Ahmed, Ahmad, Saram and Darshi (1999) in Hong Kong affirmed a negative relationship between active leadership and construction risk management. Also in line with the study of Assaf & Al-Hejji (2006) affirmed a non-significant relationship between active leadership and risk management in Saudi Arabia construction industry.

2.9. Relationship between Organizational Culture and Construction Risk Management

In this study, organizational culture refers to certain set of beliefs, assumptions, values and ways of interacting that contribute to the unique social and psychological environment of an organization. It also comprises of an organization's expectations, experiences, philosophy, as well as the values that guide member behavior, and is expressed in member self-image, inner workings, interactions with the outside world, and future expectations. Culture is based on shared attitudes, beliefs, customs, and written and unwritten rules that have been developed over time and are considered valid.

Mills (2017) examines the influence of organizational culture in most organization. The findings revealed that organizational culture significantly influenced construction risks.

Organizational culture has been a focus of debate for researchers and professionals since the 1980s, which led to several studies over the years (e.g., Deal and Kennedy, 1982; Cooke and Lafferty, 1983; Schein, 2004; Cameron and Quinn, 1999). Schein (2004) defines the culture of a group as "a pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems."

Cameron and Quinn (2011) state that organizational culture is the major distinguishing feature of successful industries such as the construction industries. Even though organizational culture is not the only factor that affects the success of an industry, developing a corporate culture supersedes these factors such as corporate strategy, market presence, and technological advantage. It does this by facilitating a common interpretation system for organization members, making clear to members what is expected, creating continuity, binding organization members together, and energizing forward movement. Professionals and researchers commonly acknowledge that organizational culture has a vigorous impact on the longterm performance of organizations. It must be noted however that there is still a need for guidelines, frameworks, or tools that allow establishing and adjusting as necessary the organizational culture, hence enhancing the performance of the organization (Arditi, Nayak & Damci, 2017; Schein, 2004; Trice and Beyer, 1993, Cameron and Quinn, 2011).

There are several studies that propose theoretical models and measurement tools for organizational culture, such as Askansasy et al.'s (2000) Organizational Profile Questionnaire (OPQ), Glover et al.'s (1994) Cultural Assets Profiles (CAPS), O'Reilly et al.'s (1991) Organizational Culture Profile (OCP); Maull et al.'s (2001) Personal, Customer Orientation and Cultural Issues (PCOC); Cooke and Lafferty (1983) Organizational Culture Inventory (OCI); and Cameron and Quinn's (1999) Organizational Culture Assessment Instrument (OCAI). A number of studies have attempted to apply some of those theoretical models and measurement tools to construction, health, financial, and other types of organizations. For example, Giritli et al. (2013) used Cameron and Quinn's (1999) OCAI to examine the link between leadership and organizational culture in the Turkish construction sector; Love et al. (2000) used Glover et al.'s (1994) CAPS in their framework for the implementation of total quality management in construction organizations; Bellou (2010) used O'Reilly et al.'s (1991) OCP to examine how values comprising organizational culture impact employees' job satisfaction; Xenikou and Simosi (2006) used Cooke and Lafferty

(1983) OCI to examine the relationship between transformational leadership and organizational cultural orientations.

Researchers and professionals from various domains have recognized the role of organizational culture in the performance of organizations (e.g., Ankrah, 2007; Deal and Kennedy, 1982; Peters and Waterman, 1982; Kotter and Heskett, 1992). The participants of the construction industry made this subject a focus of debate as they have become aware of its significant role. However, the majority of the studies have focused on the organizational culture profiles of construction-related organizations in different countries. For example, Ankrah and Langford (2005) investigated the organizational culture of architectural and contracting firms in Scotland; Jaeger and Adair (2013) explored the organizational culture of firms that are involved in construction project management in the Gulf Cooperation Council countries; Oney-Yazici et al. (2007) examined the cultural profile of architectural and contracting firms in Turkey; and Zhang and Liu (2006) investigated the organizational culture of construction enterprises in China. These studies led professional and researchers to explore the use of organizational culture in order to improve other aspects of construction. For example, Hartmann (2006) addressed the motivational aspects of organizational culture on innovative behavior in a contracting firm; Koh and Low (2008) examined the implementation of total quality management practices from an organizational culture perspective; Cheung et al. (2011) investigated improving the performance of construction organizations considering the organizational culture perspective; Liu (1999) discussed job satisfaction through organizational culture; Giritli et al. (2013) demonstrated the interplay of organizational culture and leadership; and Fong and Kwok (2009) investigated the knowledge management systems of contracting firms operating in Hong Kong from an organizational culture perspective. The review of the literature reveals that the relationship between organizational traits such as culture and delay in construction has never been discussed. This study was undertaken partly in response to the absence of such research.

2.10 Organizational Control Theory

Organisational control theory demonstrates some theoretical underpinnings to support the relationship between organizational culture, organizational internal factors, and construction risk management. The organisational control theory (Adeleke et al., 2018; Flamholtz *et al.*, 1985; Jaworski, 1988; Ouchi, 1979; Snell, 1992) proposes that proper control established and applied by an organization must theoretically be able to regulate risk occurrence on construction projects within the organization with the aids of proper monitoring, control and compensation among the stakeholders, project managers, team members and the organizations themselves. Similarly, organisational control theory presumes that risk occurrence can be minimized through control introduced by an organisation with the influence of organizational culture which would certainly encourage compliance and must be flexible in every organizational.

Perceiving the relationship between organizational culture, organizational internal factors and construction risk management, organizational control prior literatures recommended that mutual agreement subsist among the researchers that organisational control procedures play an important role in reducing risk in every organization. Likewise, basis for the organisational control theory were discovered across a diversity of some life situations, such as performance outcomes, social and communication (Miao & Evans, 2012; Miao, Evans, & Shaoming, 2007; Panagopoulos & Dimitriadis, 2009), construction risk management

(Aibinu & Odeyinka, 2006), and irregular information issues in corporate governance (O'Sullivan, 2000).

Tannenbaum et al., (1968) affirmed that the problems of conformity and control in most organizations contribute to a serious dilemma due to the perception from various parties. Likewise, Coorperrider (1995) describes that organization development is preprogramed, unilaterally determined, economic, material and also a sociological way. Where, the ideas about people and organizations are being directly transformed and challenged on unpredictable scale. In that case, some of the researchers affirmed that effective control and efficiency within the organization strongly relied on the organizational control theory.

2.11. Theoretical Framework

Organizational internal factors were used as variables in this study grounded on the previous empirical studies of (Greenberg & Baron, 2008; Geraldi, Lee-Kelley & Kutsch, 2010; Li *et al.*, 2011 and Hartono, 2014). While Geraldi, Lee-Kelley & Kutsch, (2010) associate's internal factors (effective communication, team competency and skill and active leadership) with construction risk management.

Organizational culture to play a moderating effect on organizational internal and construction risk management by strengthening their relationship. Bresnen & Marshall, (2000) stated that partnering together of organizations working on a project might lessen the risks on project. It was further discussed by the authors that behaviour, practices, rituals, heroes and symbols must be the priority of all construction industries to reduce the risk on projects (Okeola, 2009).

Hence, this research ponders the effective communication, team competency and skill and active leadership as internal factor with organizational culture as the moderator to be examined, and that might influence construction risk management among construction developers in Kuantan Malaysia, as shown in Figure 2.4.

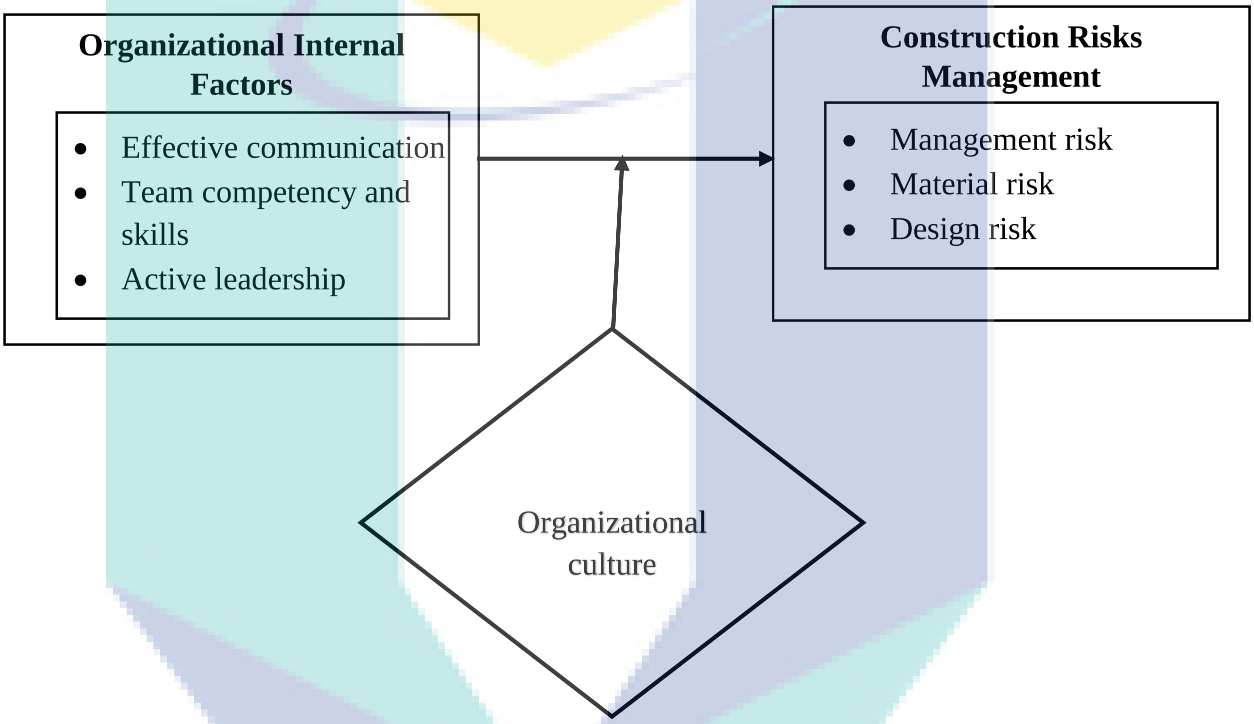

Figure 2.4: *Proposed Conceptual Framework for Factors Influencing Construction Risk Management among Kuantan Malaysian Construction Industries.*

2.12. Hypothesis Development

Sekaran (2006) acknowledged two dissimilar relationships between variables within a hypothesis, which may be directional or non-directional. The directional hypothesis highlights the direction effects of a variable on another variable (for example, the independent and dependent variables). While the non-directional relationship designates a relationship between two variables, but the directions of the relationship are not stated.

Directional hypothesis approach will be adopted in this research. To examine the influence of construction industries internal factors on construction risk factors, two (2) direct and one (1) indirect hypotheses are developed. Below are the hypotheses.

H1: There is a significant relationship between active leadership and construction risk management among Kuantan Malaysia construction industries.

H2: There is a significant relationship between organizational internal factors and construction risk management among Kuantan Malaysia construction industries.

H3: There is a significant relationship between organizational culture and construction risks management among Kuantan Malaysia construction industries.

H4: Organizational culture moderate the relationship between active leadership and construction risks management among Kuantan Malaysia construction industries

H5: Organizational culture moderate the relationship between organizational internal factors and construction risks management among Kuantan Malaysia construction industries

2.13. Summary

This chapter reviews the concept and dimensions of risk management based on previous studies, as underpinned with organizational control theory with the dimensions of construction risks studied were deliberated. How construction risks were deliberated in previous studies are also presented in this chapter, and also how they were viewed in the current study. Organizational internal factors were discovered to influence construction risk management with the moderating effect of organizational culture were explained vividly. The theoretical model and the developed hypotheses were also shown.

Likewise, review of the related studies has contributed to an investigation of different areas such as worldwide risk identification, assessment and management. This may give encouragement to Malaysia as a standard risk management model in the construction industries.

Project management process concept has also been discussed in this chapter. The next chapter three (3) will depict the methodologies that were used in this research.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter explained the research methodology that was used to achieve the research objectives in this research. The chapter begins with the nature and epistemology of the study research, methodology flow chart as depicted in Figure 3.1, research design, justification for adapting quantitative research, population and sampling with data collection procedures. Likewise, the questionnaire designed for the data collection with the measurement and operationalization of all the variables including the pilot study were explained. Appropriate techniques and methods have been adapted and adopted in this study to show the clarifications of these tools. Lastly, this chapter shows the appropriate statistical techniques used to analyse the data in this research.

3.2 Epistemology and Nature of this Study

In general, researchers have their particular general perspectives regarding the nature of certain social reality or knowledge based about their own philosophical paradigm. Therefore, linking the research and the philosophical orientation which help to elucidate researcher's theoretical frameworks (Cohen & Vigoda, 2000). Subjectivism, positivism and realism recommend that research is anticipated to uncover the current truth or reality within the social environment (Creswell, 2016). Positivist paradigm proposes that social phenomenon is required to be treated as an entity in as much as possible, the same ways that natural scientists are treating the physical phenomena (Creswell, 2016). However, it suggests that the researchers are required to be independent of the research and, moreover adopt techniques that increase objectivities and reduce the effects of the researchers in the research procedures.

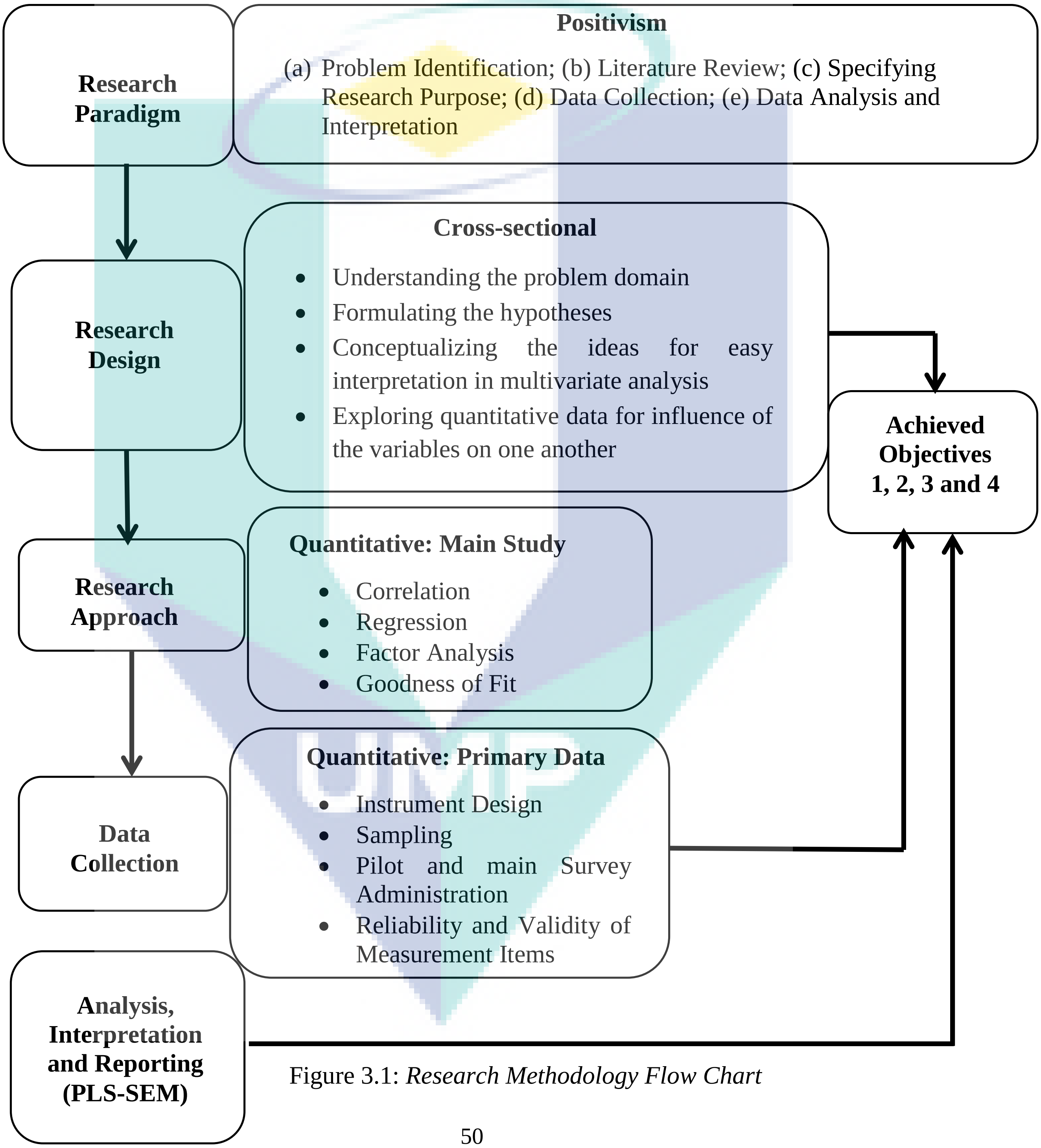

Figure 3.1: *Research Methodology Flow Chart*

Precisely, this study is quantitative in nature. Quantitative research can be defined as social survey which adopts the use of empirical approaches and empirical statements (Cohen & Manion, 1980). Furthermore, quantitative research is also defined as the type of research which the phenomena are explicated by gathering and analysing numerical data with the use of statistical based approaches (Creswell, 1994). Therefore, this study is quantitative in nature because the use of measurement is employed (i.e. making use of statistical tools) to understand the relationship between internal organizational factors and construction risks management.

3.3 Research Design

This study is cross-sectional design in nature, through which data was collected once to provide answer to the research questions. While a longitudinal design is much preferred to cross-sectional because it create higher quality of the data to be collected and the depth of analysis, although it is time consuming and expensive (Sekaran, 2006), as a result of that cross-sectional design is adapted for this research. Besides, this study depends on quantitative approaches. Survey will be employed to acquire personal and social evidences, attitudes and beliefs (Kerlinger, 1973). The unit of analysis for this study are construction industries in Kuantan, Malaysia.

3.3.1 Justification for Employing the Quantitative Approach

A quantitative survey, cross-sectional design is regarded as the best suitable research design and approach to adopt in this study for a number of reasons. Firstly, the main objective of this study can be better accomplished by adopting the quantitative approach which includes collecting primary data and testing of a theoretical model to forecast future behaviours (Henn, Weinstein & Foard, 2006).

To better forecast the purpose of relationship among the variables, this study used the partial least squares grounded structural equation modelling (PLS-SEM) approach "to obtain values of the latent variables for predictive purpose" therefore necessitating to adopt only the quantitative research approach (Chin, 1998).

3.3.2 Population of the Study

Kuantan, the state capital of Pahang was selected as the study area. It is located near the mouth of the Kuantan River and faces the South China Sea, as depicted in Figure 3.2.

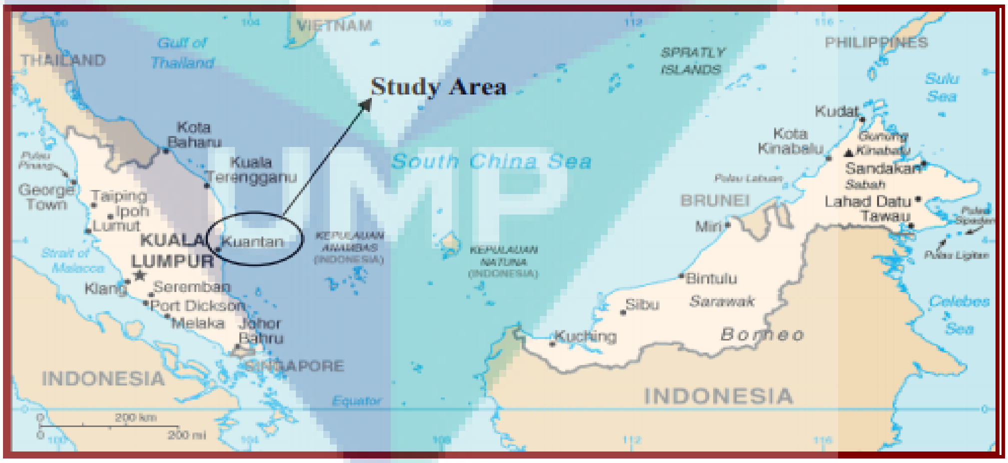

Figure 3.2. Location of the study area

Kuantan was chosen in this study because the National Physical Plan of 2005 identified Kuantan as one of the future growth centres and a hub for commerce, trade, tourism and transportation. Kuantan is also regarded as the economic, social and commercial hub for the East Coast of Peninsular Malaysia due to its strategic location. Also, rapid development has modernized and transformed Kuantan for both citizens and the tourists as a place of attractions (Romali et al., 2013). Hence, Kuantan as the state capital of Pahang, represents an important Malaysia's zone for an effective operation of the G-7 contractors registered with CIDB Malaysia under this study.

A sample is a group of participants or individuals chosen from a higher population for the use of a survey (Salant & Dillman, 1994), and to make sure there are equal treatment and no biasness in survey between the eleven (11) districts (Bera, Bentong, Cameron Highland, Jerantut, Kuantan, Lipis, Maran, Pekan, Raub, Rompin and Temerloh) in Kuantan Pahang, as shown in Figure 3.3.

Figure 3.3 Districts of Pahang

3.3.3 Sampling Techniques and Sample Size

The sampling in this study relies on two sources such as Krejcie & Morgan (1970) and G-power analysis. Sampling can be seen as a research procedure of choosing a suitable participant of the population in a certain study (Sekaran, 2006). Proportionate stratified random sampling techniques was chosen to the disproportionate sampling. Sekaran (2006) revealed that the proportionate sampling can be seen as the same percentage of a set of levels at the process of conducting a survey.

The total numbers of construction industries as at 2017 when the data for this study was collected were 108 registered construction industries under the CIDB database ranging from grade 1 to grade 7 contractors. Following the assumption of Krejcie & Morgan (1970), the sample size was drawn based on the below computation.

$n = N \div [1 + N (e)^2]$

- n = required sample size.
- N = the population size.
- e = the acceptable sampling error.

(Assumed to be 0.05 since this would provide the maximum sample size).

Therefore, the sample size will be calculated as follows:

$n = N \div [1 + N (e)^2]$

$n = 108 \div [1 + 108 (0.05)^2]$

$n = 85.04$

The required sample size for this study is 85 construction industries in Kuantan.

Hence, the sample from the population of this study comprise of 85 construction industries in Kuantan, Pahang and the targeted respondents were the experienced architects, engineers, contractors and project managers.

3.3.3.1: Power Analysis

Furthermore, an optimal sample is important for decreasing the cost of sampling error, hence, one need to specify the advantages of choosing an appropriate sample size. Precisely, Salkind (2003) highlighted that a suitable sample size is essential for any research because choosing too small sample size is not an ideal representation of the population. In spite of that, the results of too small sample size will lead to Type I error, which is the likelihood of mistakenly rejecting a particular result when it supposed to be accepted (Sekaran, 2003). More so, it was also argued by Sekaran (2003) that too enormous sample size is not suitable because of likely problem of type II error, which means, accepting a specific result when it is supposed to be rejected.

Therefore, for the sample size of this study to be ascertain, a priori power analysis was carried out using the software package G*Power 3.1.9.2 (Faul *et al.*, 2007). Two (2) predictor's variable equations were used in this study for determining the sample size. Moreover, going by the Cohen's (1998) recommendations, the subsequent standards were used in computing the sample size being used for this study: effect size ($f2$= 0.15); significance alpha level (α= 0.05); chosen statistical power ($1-\beta = 0.95$); with the total number of two (2) predictors (IF and OC).

As depicted in Figures 3.4 and 3.5, results of the statistical test disclosed that for a multiple regression based statistical analysis, a sample size of 107 is suitable for this study. The results also disclosed the statistical power for discovering the effect sizes for this study was determined at a suggested value of 0 .95 (Cohen, 1977).

Subsequently, Krejcie and Morgan's (1970) scientific approach guideline was employed to determine the sample size for this study. As a result, the total of 108 industries were figured-out to be adequate for the population of 85 subjects.

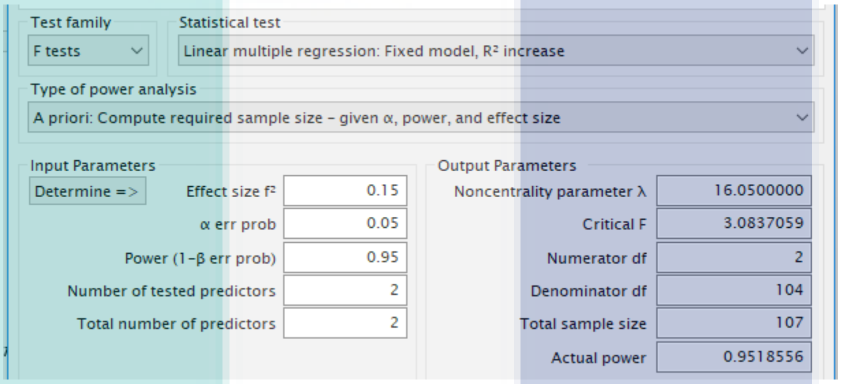

Figure 3.4: *Power Analysis for Medium Effect*

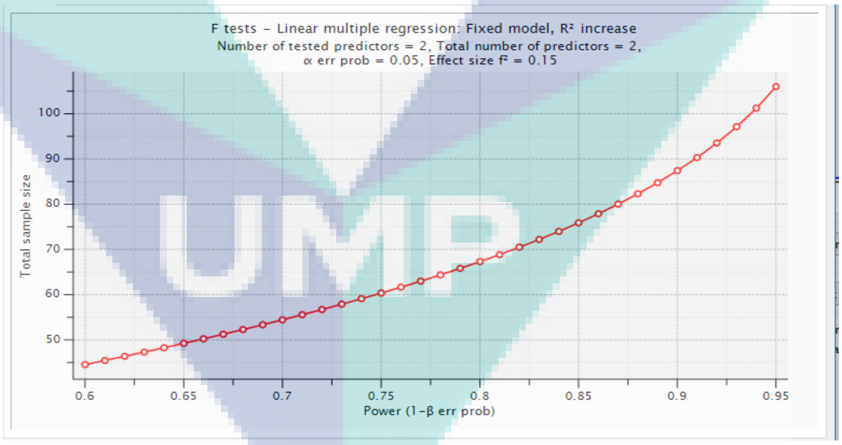

Figure 3.5: *X-Y Plot for Medium Effect Power Analysis*

The sample size determined for this study was also appropriate following Roscoe's (1975) rule of thumb. Roscoe states that, for most of the research with sample more than 30 and less than 500 is appropriate. More so, Hair *et al*. (2010) stated that, for all multivariate research, the sample size must be several times (preferably 10 or more times) greater than number of variable in the research. In the current study, there were four variables which the expected sample must be 40 or more.

In order to avoid inappropriate sample size and to ensure accuracy in determining a sample size representative for this study, a more thorough method proposed by Dillman (2000) was employed. Therefore, with the population size of 108, sample size of 107 was used for this study following the G*Power 3.1.9.2 assumptions for PLS-SEM.

3.3.4 Procedure of Data Collection

Quantitative data was collected to organize and describe the attributes, behaviours and activities of populations (Parahoo, 2014). Data collection should be objective, systematic and repeatable (Gerrish & Lacey, 2010). Robson (2007) maintains that a researcher should use the simplest manner of collecting the data to get answers to the research question and should not collect any more data than necessary. Mindful of these conditions, the data collection instrument selected for this study is a questionnaire. In the current study, the researcher is the appropriate person to administer the questionnaire to the targeted respondents.

According to suggestion made by Krejcei & Morgan (1970), a 5% margin of errors was given, the appropriate sample size (107) would be needed in to show the population of (108) for the respondents. In addition to that, questionnaires will be distributed physically to the industries in Kuantan. There is some rationale behind physical distribution of questionnaire.

Firstly, to use the opportunity to exchange contacts with the respondents. Secondly, to get immediate response to any question or inquiry from the respondents regarding the survey. Lastly, is to possess a good response rate and not to waste time to get back the questionnaires. Also, for the respondents to reveal a reliable response rate, a souvenir was distributed to reciprocate their caring gesture to complete the survey (Dillman, 1978).

Following Adeleke *et al*. (2017), the questionnaire is design inform of booklet sheet with the logo of Universiti Malaysia Pahang and English language is the medium of communication in it, but later translated to bahasa malayu because it is the only official language in Malaysia which everyone flows well in it.

3.3.5 Expected Response Rate

For the purpose of this study, 108 questionnaires instead of 107 were distributed among the construction industries operating in Kuantan Pahang, Malaysia. The oversampling helps to take care of the possible loss as a result of damages and non-cooperative subjects (Salkind, 1997). Specifically, the oversampling was used so that the non-response bias and non-response rate will not have an impact on the results, following (Phokhwang, 2008; Sindhu & Pookboonmee, 2001; Ringim, Razalli, & Hasnan, 2012). In line with Babbie's (1973) controversy that 50% (54) response rate is considered as an acceptable rate in any social research study; however, this current study is set out to attain just that.

3.4 Questionnaire Design

The main aim of this study was to measure the extent of construction risk affecting construction industries and to investigate the relationship between industries factors with construction risk among construction industries in Kuantan Pahang, Malaysia. Therefore, the designed questionnaire booklet contained the below items;

1. The cover letter is displayed in the front page.
2. Subdivision1: Overall information about the respondent and the industries.
3. Subdivision 2: Information about internal factors.
4. Subdivision 4: Information concerning the construction risk management.
5. Subdivision 5: Information concerning organizational culture.

The aim of providing a simple and clear questionnaire is to avoid ambiguous questions.

3.4.1 Measurement of Variables

Sekaran (2006) advocated that the relationship between independent and dependent variables may be negative or positive. The current study has organizational internal factor as the main construct for the independent variables, while the dependent and the moderator in this study has a single construct which are construction risk management and organizational culture respectively. This study adapts PMBOK (2000) 5-point Likert scale and the value range were used in this study questionnaire in ascending order as follows presented in Table 3.1 to represent the extent of risks occurrence.

Table 3.1: *Scale and range*

Scale	Range
1	= *very low* (1.0-1.49)
2	= *low* (1.5-2.49)
3	= *medium* (2.5-3.49)
4	= high (3.5-4.49)
5	= *very high* (4.5-5.00)

It was supported by previous literatures such as Krosnick & Fabrigar (1991) that a scale between1-5 is enough to points out reliably and validly measure of an item, then a longer or shorter scale point. Likewise, Table 3.2 below depicted the summary and indicator that was measured.

Table 3.2 *Summary of Variables and Measurement of Indicators*

Constructs	Variable & Dimensions	Scale	No. of indicators
Org. Int. Factors	Effective communication	5 points	15
	Team competency and skills	5 points	16
	Active leadership	5 points	4
Con. Risk Mgt.	Management	5 points	20
	Material	5 points	15
	Design	5 points	10
Moderator	Organizational culture	5 points	11

3.5. Source of Measurement Instrument

The Table 3.3 below depicts the source of each measurement instrument that was used in the questionnaire survey.

Table 3.3: *Sources of Measurement Instrument*

S/N	Variables	Sources	Remarks
1.	Effective communication	Kumaraswamy & Chan (1998)	Adapted
2.	Team competency and skills	Kumaraswamy & Chan (1998)	Adapted
3.	Active leadership	Kumaraswamy & Chan (1998)	Adapted
4.	Management risk	Aibinu & Odeyinka (2006)	Adapted
5.	Material risk	Aibinu & Odeyinka (2006)	Adapted
6.	Design risk	Aibinu & Odeyinka (2006)	Adapted
7.	Organizational culture	Cameron & Quinn (2011)	Adapted

3.6. Pilot Study

According to Hulley (2007), a pilot study is a small scale initial investigation carried out in order to assess cost, time and feasibility for the purpose of predicting an accurate sample size and meliorate upon the study instrument earlier to the actual conduct of a full-scale study. A pilot study is essential because it may reveal deficiencies in the design of a proposed study which can be treated before the commitment of resources and time on huge scale study (Doug *et al*. 2006).

Precisely, the purpose of this pilot study comprise: (1) to ascertain validity and reliability of items in the questionnaire; (2) to determine the adequacy of item-wording and phrasings for proper results; (3) to determine if questions are framed in such a way that would produce a better response; and (4) to determine if respondents can supply the accurate data needed. The validity of research instrument is the magnitude to which it measures what it is supposed to measure and not something else, while reliability of instrument is the magnitude to which the instrument is free from errors and results are reliable and stable across time and contexts (Sekaran & Bougie, 2010).

3.6.1 Validity of Research Instruments

The face or content validity of the research instrument was carried out before the pilot study. According to Babbie (2004), content validity is defined as the degree to which an instrument shows its meaning imbedded in specific concepts. More so, content validity include meeting with a small number experts or potential panels for their view over the wordings, and phrases of items in the research process (Hair *et al*. 2007; Sekaran & Bougie, 2010).

Following Malhotra (1999), a sample size for a pilot study is usually smaller comprising of 15 to 30 components, though it can increase considerably depending of individualities. Fifty questionnaires were distributed among the construction industries located in Kuantan Pahang Malaysia. The number of the questionnaires was enhanced to 50 above based on the suggestion made by Malhotra's (1999) for low response rate not to occur. However, 35 questionnaires were completed and returned, but only 30 were retained usable after five of the questionnaires were removed as a result of different errors, signifying a response rate of 60 percent.

The pilot study commenced on August 20 to September 23, 2017 and the process last for about four weeks. There were various kind of reliability test, however, the mostly used method by the researchers is "internal consistency reliability test" (Litwin, 1995). It is the magnitude to which items of a specific construct congregate together and are autonomously capable of measuring the actual construct; and at the same time the items are correlated with each other. The internal consistency reliability test of Cronbach's alpha coefficient (Sekaran & Bougie, 2010) was adopted. As presented in Table 3.4, the results revealed that all measures achieved a high reliability coefficient, ranging from 0.729 to 0.917. Research pundits regard a reliability coefficient of .60 as average reliability, and a coefficient of .70 and above as high reliability, therefore, what was achieved in this study meets the threshold (Hair *et al*., 2006; Nunnally, 1967; Sekaran & Bougie, 2010).

Table 3.4: *Summary of Pilot Test Reliability Results*

Constructs	Dimensions	No of items	Cronbach's Alpha
Internal factors	Effective communication	15	0.810
	Team competency and skills	16	0.846
	Active leadership	4	0.792
Construction risk management	Management risks	20	0.729
	Material risks	15	0.917
	Design risks	10	0.821
	Organization culture	11	0.769

3.7. Statistical Analysis

The Partial Least Square – Structural Equation Modelling (PLS-SEM) was used to analyse the data collected for this study. Precisely, two main PLS-SEM software applications which comprises SmartPLS by Ringle *et al*., (2005) and PLS-Graph by Chin (2003) were used in the presentation of the analysis results.

3.7.1 Justification for using PLS-SEM in this study

According to Hair, Sarstedt, Pieper & Ringle (2012), the variance based PLS-SEM were chosen as the best over others. The authors further explain that if the aim of a study lies in the confirmation of a relationship instead of prediction. However, the PLS approach seemed to be the appropriate data analysis technique for this study because the aim of the study is to investigate the extent of construction risk management in Malaysian construction industries, and also to investigate certain internal organization factors that were established to have a positive relationship with construction risk management in this study with the moderating effects of organizational culture.

Likewise, the methodologists argue that PLS-SEM analysis provides a robust statistically solutions where the basic expectations of CB-SEM, such as multivariate normality, less complex model, large sample size, and factor indeterminacy are hard to satisfy (Fornell & Bookstein, 1982; Chin, 1998; Hair, Ringle, &Sarstedt, 2011). However, in the context of this study, the data do not fulfil the assumption of multivariate normality, the theoretical model is reasonably complex. Therefore, the PLS-SEM approach was adopted for this study.

Concerning this study, SmartPLS path modelling was used to create measurement and structural models. In order to explain or assess constructs' reliability and validity of the current study, measurement model was used. More so, in conducting bivariate correlation analysis and simulations regressions analysis to create correlations and relationship effects within constructs in this study, structural model will be used. Lastly, using the PLS software of algorism and bootstrapping, the moderating effects of rules and regulations on the relationship between organizational internal and external factors and construction risk management were analysed and Table 3.5 shows the summary of the objectives and analytical technics.

Table 3.5: *Summary of objectives and analytical technics*

Objectives	Analytical Technics
Objective 1	SPSS
Objective 2	PLS-SEM
Objective 3	PLS-SEM
Objective 4	PLS-SEM

3.7.2 Descriptive Analysis

According to Sekaran & Bougie (2010), descriptive analysis is mostly used to depict phenomenon interest. Descriptive analysis like the mean score, percentage, and standard deviation, minimum and maximum was used. There were two functions of descriptive analysis such as; one, is to find out the profile of the respondents with the companies that participated in the survey. Two, is to investigate the extent of risk management in the construction industries using the mean scores acquired from the SPSS outputs. Lastly, this study investigates the extent of risk management by checking which of the range above are consistence the mean score in the SPSS output.

3.8. Summary

This chapter has discussed the epistemology and nature of the current research. It also discussed the research design and the research method that was employed for data collection in this study. Further discussed how the questionnaire was developed and the sources of measurement for all the variables that was used in this research. Hence, it also discussed the pilot study procedures and how 87 questionnaires were returned from the filed with 107 questionnaires distributed for the main survey among the construction industries in Kuantan Pahang Malaysia, because this research is mainly based on quantitative approaches. The next section in this study discussed the analysis of the entire research.

CHAPTER FOUR

ANALYSIS

4.1 Introduction

This chapter presented the results of data that were analysed with the use of SPSS and Partial Least Square (PLS) path modelling. Likewise, the initial data screening and preliminary analysis were discussed. The descriptive statistics results for all the latent variables were also reported. Next, the actual results of the current study were depicted in three main sections. For section one; the descriptive statistics was analysed with the use of SPSS to achieve the first objective of this research. Section two, the measurement model was measured to determine the individual indicator reliability, internal consistency reliability, convergent validity and discriminant validity. Section three presented the results of the structural model (for example, how significance is the path coefficients, level of the R-squared values, effect size, and predictive relevance of the model). Lastly, the results of complementary PLS-SEM analysis, meant to examine the moderating effects of organizational culture on the structural model, were all presented.

4.2 Response Rate

The word response rate refers to the total number of completed and returned survey questionnaires, classified by the number of sample respondents which are qualified for the survey (Frohlich, 2002). Prior managerial studies depicted that 32% were the average response rate for survey studies (Fohlich, 2002). Thus, the author suggested some approaches to improve response rate in survey studies such as:

1) The respondents must be aware before the survey
2) Give a sincere appeal on the cover letter
3) Conduct a pilot study, and use the existing scale for survey
4) Be sure the items are well formatted and managed
5) Mailed the questionnaire more than once
6) Provide a prepaid postage
7) Make non-stop follow up
8) Send the questionnaire to the appropriate respondent
9) Provide the third party logo (such as construction company logo) on the survey questionnaire
10) Add more effort to get accurate result at the end of the research.

This research adopted the strategy listed above but with the exceptions of number 5 and 6 because the questionnaires were delivered by hand to all respondents to get more response.

In this study, a total of 107 questionnaires were distributed to construction industries in Kuatan, Malaysia. In an effort to attain high response rates, a lot of SMS (Salim Silva, Smith, & Bammer, 2002; Traina, MacLean, Park, & Kahn, 2005) and phone call reminders (Sekaran, 2003) were sent from time-to-time to all the respondents who were yet to complete their given questionnaires after four weeks (Dillman, 2000; Porter, 2004). The Table 4.1 below depicts the questionnaire distributed and decisions.

Table 4.1: *Questionnaire Distributed and Decisions*

Response	Frequency/Rate
No. of distributed questionnaires	107
Returned questionnaires	96
Return and usable questionnaires	87
Return and excluded questionnaires	9
Response rate	90%
Valid response rate	81%

4.3 Data Screening and Preliminary Analysis

Data screening at the initial stage is very paramount in any multivariate analysis because it helps researchers discover any likely desecrations of the main assumptions concerning the implementations of multivariate methods of data analysis (Hair *et al.*, 2007). In addition, data screening at the initial stage helps the researchers to better comprehend the collected data for further analysis.

Prior to the initial data screening, all the 87 returned and usable questionnaires were all entered and coded into the SPSS (version 21). After the data entry and coding, the following preliminary data analyses were conducted: (1) Normality test, (2) Multicollinearity test, (3) Non-response bias test and common method variance test (Hair, Black, Babin, & Anderson, 2010; Tabachnick & Fidell, 2007). According to Hossain (2013), PLS accommodate non-normal or extremely non-normal data without conducting the above test. However, the current study still conducted the test but test for missing values was not conducted in the present research because all the data from respondents contains no missing values but instead void data which have been removed from the data set.

4.3.1 Normality Test

Previous studies (for example, Cassel, Hackl, & Westlund, 1999; Reinartz, Haenlein, & Henseler, 2009; Wetzels, Odekerken-Schroder, & Van Oppen, 2009) have conventionally presumed that PLS-SEM offers accurate model estimations in circumstances with enormously non-normal data. Nevertheless, these presumptions may change to be false. Lately, Hair, Sarstedt, Ringle and Mena (2012) proposed that researchers should carry out a normality test on the data. Extremely kurtotic or skewed data can amplify the bootstrapped normal error estimates (Chernick, 2008), which in turn undervalue the statistical significance of the path coefficients (Dijkstra, 1983; Ringle, Sarstedt, & Straub, 2012a). Following Field's (2009) proposition, in the current study, a histogram and normal probability plots were carried out to ensure that normality presumptions were not breached. Figure 4.1 shows that collected data for this study follow normal rule since all the bars on the histogram were shut to a normal curve. Therefore, Figure 4.1 shows that normality presumptions were not breached in the present study.

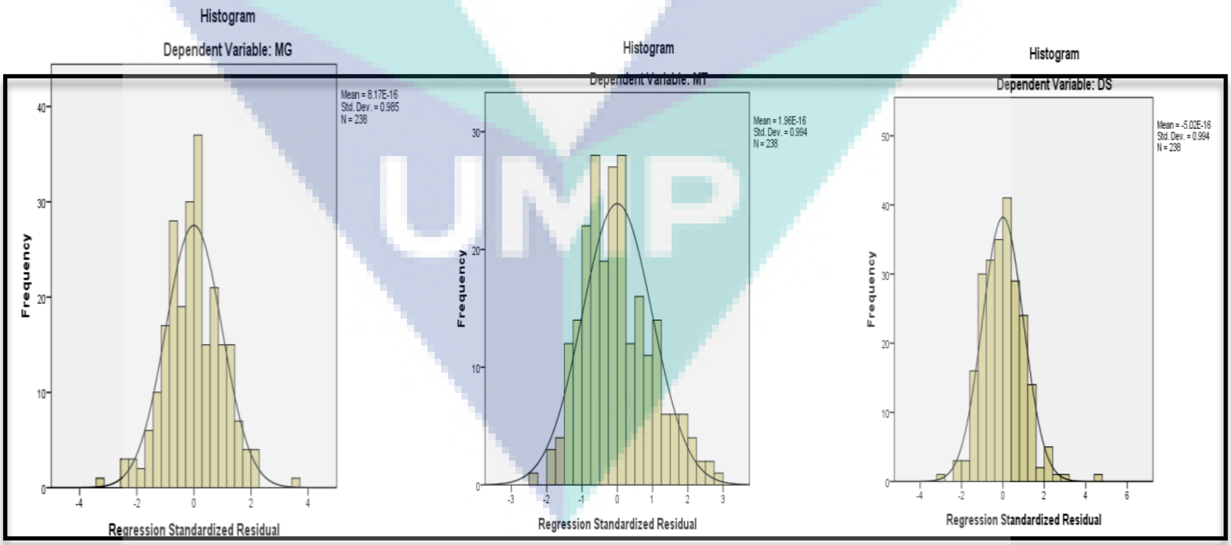

Figure 4.1: Histogram and Normal Probability Plot

4.3.2 Multicollinearity Test

Multicollinearity is a state where more exogenous latent constructs are highly correlated. The existence of multicollinearity between the exogenous latent constructs can considerably change the estimates of regression coefficients with the tests for their statistical significance (Chatterjee & Yilmaz, 1992; Hair *et al.*,2006). Specifically, multicollinearity increases the standard errors of the coefficients, which later makes the coefficients statistically nonsignificant (Tabachnick & Fidell, 2007).

To detect multicollinearity, variance inflated factor (VIF) with its tolerance value were examined to detect multicollinearity problem. Hair, Ringle and Sarstedt (2011) proposed that multicollinearity is a concern if VIF value is more than 5 and the tolerance value is less than .20, Table 4.2 depicts the VIF values and the tolerance values for the exogenous latent constructs. Thus, Multicollinearity has no effects on the data collected for the present study.

Table 4.2: *Multicollinearity Test for Exogenous Latent Constructs*

Coefficients		
	Collinearity Statistics	
Latent Constructs	Tolerance	VIF
Organizational culture	.634	1.578
Effective communication	.716	1.397
Team competency and skills	.739	1.352
Active leadership	.631	1.587
Dependent variable: Management risk		
Material risk	.513	1.950
Effective communication	.383	2.611
Management risk	.351	2.845
Team competency and skills	.580	1.724
Dependent variable: Organizational culture		

4.3.3 Test for Non-Response Bias

Non-response bias was defined by Lambert and Harrington (1990) as “the dissimilarities in the answers provided by the non-respondents and respondents”. Hence, in order to eradicate the likelihood of non- response bias, Armstrong and Overton (1977) proposed a time-trend extrapolation method, that involves relating the early and late respondents (i.e., non-respondents). It was further disclosed from the author’s argument that late respondents share akin features with non-respondents.

Likewise, to reduce the issue of non-response bias, Lindner and Wingenbach (2002) proposed that a 50% minimum response rate must be accomplished. Therefore, those that responded to the questionnaires from August 19, 2017 (i.e., early respondents with 37 (43%) within 30 days) and those who responded after August 19, 2017 (i.e., late respondents 50 (57%) after 30 days) as shown in Table 4.3 (Vink & Boomsma, 2008).

Table 4.3: *Results of Independent-Sample T-test for Non-Response Bias*

					Levene's Test for Equality of Variances	
Variable	GROUP	N	Mean	Std. Deviation	F	Sig.
EC	Early response	37	2.8640	.72277	1.182	.278
	Late response	50	2.7174	.76598		
TC	Early response	37	2.6240	.80482	.046	.831
	Late response	50	2.7362	.80941		
AL	Early response	37	2.5600	.70814	2.529	.113

	Late response	50	2.7817	.85877		
MG	Early response	37	2.6862	.60239	.219	.640
	Late response	50	2.6941	.61336		
MT	Early response	37	2.8100	.95274	1.632	.203
	Late response	50	2.7171	.79620		
DS	Early response	37	2.6200	.81155	.257	.613
	Late response	50	2.6886	.70732		
OGC	Early response	37	2.2800	.73711	.264	.608
	Late response	50	2.4404	.69802		

The results of independent-samples t-test as depicted in Table 4.2 shows that equal variance significance values for the thirteen main research variables were higher than the 0.05 significance level of Levene's test for equality of variances as proposed by Pallant (2010) and Field (2009). Therefore, this proposes that the premiss of equal variances among early and late respondents has not been desecrated. Hence, it can be sealed that non-response bias was not main issue in the current study.

4.3.4 Common Method Variance Test

One of the most widely techniques used by researchers to solve the problem of common method variance is Harman's single-factor test. However, the technique allows loading simultaneously of all research variables into an exploratory factor analysis and studying the un-rotated factor solution to create the number of factors that are essential to account for the variance in the variables. The rule states that if a significant number of common method variance is present, the results of the factor analysis may be a single factor, or that a single factor will cause for most of the covariance between the measures (Podsakoff *et al*., 2003). The results of the un-rotated exploratory factor analysis signify 7 factor variables, signifying a cumulative of 48.7% of the variance; with the first (largest) factors explaining 20.2% of the total variance, which is below 50% (Kumar, 2012). Furthermore, the results signify that no single factor accounted for the majority of covariance in the predictor and the criterion variables (Podsakoff *et al*.2012). Thus, this proposes that common method bias is not an issue and is unlikely to amplify the relationships among variables measured in the current study.

4.4 Demographic Profile of the Respondents

This part depicts the demographic profile of the respondents in the sample. The demographic features observed in this study contain positions in the company, years of experience and gender, (see Table 4.4).

Table 4.4: *Demographic Profile of the Respondents*

Respondents	Frequency	Percentage (%)
Position in the company		
Contract manager	15	17.2
Executive director	5	5.7
Marketing manager	4	4.6
Project manager	35	40.2
Engineer	23	26.4
Other employees	5	5.7
Working experience (Years)		
Lowest working experience	3	0.7

Highest working experience	55	8.7
Gender		
Male	76	87.3
Female	11	12.6

Amongst the 87 industries representatives that participated in the instrument survey, 17.2% were contract manager, 5.7% executive director, 4.6% marketing managers, 40.2% project manager, 26.4% engineer and 5.7% other employees. Their years of working experience were rated from 3 to 55. Relating to the gender of respondents, the percentage of male respondents was 87.3% compared with 12.6% female respectively. Table 4.3 shows the features of the respondents that partake in the study.

4.5 Demographic Profile of the Industries

Table 4.5 shows the features of the industries that took part in the current study. A total of 35.6% of the industries specialized in building apartment. The next 44.8% of the industries specialized in roads construction, 16.0% of the industries specialized in bridges constructions, while 3.4% of them are other specializations. The industries' ownership was from local and national industries, with 78.1% and 21.8% respectively.

The industries operational business location rated from local markets to international markets. Industries that are operating across Malaysia have the highest percentage with 62.0%, followed by industries that work within local markets 17.2%, industries working within few states 8.0%, followed by industries that work within regions 3.4%. Industries that work within the international market were also 6.9%. Concerning the year of industries existence, which rated from 6 to 42 years of experience with 17.4% as the highest and 0.9% as the lowest respectively.

Table 4.5: *Demographic Profile of the Industries*

Parameters	Frequency	Percentage (%)
Industry specialization		
Apartment buildings	31	35.6
Roads	39	44.8
Bridges	14	16.0
Others	3	3.4
Industry ownership type		
National	19	21.8
Local	68	78.1
Industry business location		
Local market areas	15	17.2
Within few states	7	8.0
Regional	3	3.4
Across Malaysia	54	62.0
International markets	6	6.9
Industry existence (years)		
Lowest	6	0.9
Highest	42	17.4

4.6 Descriptive Analysis of the Latent Constructs

This part is directly linked with the descriptive statistics for the latent variables used in the current study. Descriptive statistics in the terms of means and standard deviations for the latent variables were calculated. All the latent variables used in the current study were measured using a five-point likert scale anchored with 1 = *very low* (1.0-1.49); 2 = *low* (1.5-2.49); 3 = *medium* (2.5-3.49); 4 = high = (3.5-4.49); 5 = *very high* (4.5-5.00), following PMBOK (2000).

The results of descriptive statistics depicted in Table 4.6 show that all latent variables with their dimensions have a mean rating from 3.1996 and 4.0927, While the standard deviation of all latent variables rated from 0.24523 and 0.55839which are also regarded acceptable. Thus, it can be drawn that on the basis of responses i.e. the views of respondents gathered in this study clearly show to a satisfactory and acceptable level of application with regard to all latent variables viz. effective communication, team competency and skills, active leadership, management risk, material risks, design risks, and organizational culture. Table 4.6 shows the descriptive statistics for the latent variables.

Table 4.6: *Descriptive Statistics for Latent Variables*

Latent Constructs	Number of Items	Mean	Standard Deviation
Effective communication	15	4.0927	0.32203
Team competency and skills	16	4.2119	0.37347
Active leadership	4	3.4052	0.6769
Management risk	20	4.0805	0.24523
Material risk	15	3.7042	0.55839
Design risk	10	3.9885	0.4481
Organizational culture	11	3.1996	0.7062

4.7 Extent of construction risk management among construction industries operating in Kuantan Malaysia

This part depicts the analysis performed in other to accomplish the first research objective in this study.

As mentioned earlier in Chapter 1, the first objective of this research is to determine the extent of construction risk management among construction industries operating in Kuantan Malaysia. PBOK (2000) categorize risk management into five different levels such as, *very low, low, medium, high and very high*. PMBOK defines risk management as the process of identifying, analysing and responding to risk events throughout the stages of a project in order to obtain the acceptable or optimum degree of risk control or elimination.

Following PMBOK (2000) and Ahmed *et al.* (1999) interpretation of the Likert scale, the subsequent values range was used to interpret the 5-point Likert scale in ascending order (in the questionnaire) as follows: 1 = *very low* (1.0-1.49); 2 = *low* (1.5-2.49); 3 = *medium* (2.5-3.49); 4 = high = (3.5-4.49); 5 = *very high* (4.5-5.00). Finally, the extent of construction risk management among extent of construction risk management among construction industries operating in Kuantan Malaysia was ascertained by examining which of the range observed matched the mean score of construction industry risk in the SPSS descriptive statistics result. For example, a mean score of 1.0 to 1.49 signifies that extent of risk management within the construction industry is very low. Table 4.7 shows the extent of construction risk management in Kuantan Malaysia construction industries.

Table 4.7: *Extent of Construction Risk Management among Kuantan Malaysia construction industries*

Construction risk management extent	Frequency	Percentage	Mean	Median	Mode	SD
Very low	_	_				
Low	_	_				
Medium	6	6.9				
High	77	88.3	3.8118	3.7680	3.60	0.268
Very high	4	4.6				

The Table 4.7 above depicts the frequency and percentage scores for the extent of construction risk management among Kuantan Malaysia construction industries. The group *high* scored the highest frequency (77) with 88.3%. However, the mean score (3.8118) signifies that the extent of construction risk management among Kuantan Malaysia construction industries is at the *high* level, this signifies that risk management measures are well implemented within these industries but not at the peak of very high which is the target of every industry. This is also in line with the study of Yusuwan et al., (2008) which affirmed that, risk management measures are well implemented in Malaysian industries especially in construction industries. However, their target is on very high risk management implementation in every aspect of Kuantan Malaysia construction industries projects. Table 4.8 shows the extent of management risk among Kuantan Malaysia construction industries.

Table 4.8: *Extent of management risk among Kuantan Malaysia construction industrie*s

Management risk	Frequency	Percentage	Mean
Very low	_	_	
Low	_	_	
Medium	_	_	
High	87	100	4.0805
Very high	_	_	

Table 4.8 explains the frequency and percentage score for management risk of Kuantan Malaysia construction industries. The score with highest frequency (87) and percentage (100%) is high. The mean score (4.0805) implies that risk management from the management perspectives of Kuantan Malaysia construction industries is at high level

which is in line with the study of (Yusuwan et al., 2008)). Table 4.9 shows the extent of material risk among Kuantan Malaysia construction industries.

Table 4.9: *Extent of material risk among Kuantan Malaysia construction industries*

Material risk	Frequency	Percentage	Mean
Very low	_	_	
Low	_	_	
Medium	19	21.8	
High	62	71.1	3.7042
Very high	6	6.9	

Table 4.9 depicts the frequency and percentage score for material risk of Kuantan Malaysia construction industries. The score with highest frequency (62) and percentage (71.1%) is high. The mean score (3.7042) explains that risk management through qualities of materials from Kuantan Malaysia construction industries is at high level, which means that every material to be used in Malaysians construction industries must undergo a proper testing stage. Table 4.10 shows the extent of design risk among Kuantan Malaysia construction industries.

Table 4.10: *Extent of design risk among Kuantan Malaysia construction industries*

Design risk	Frequency	Percentage	Mean
Very low	_	_	
Low	_	_	
Medium	17	19.5	
High	53	60.9	3.9885
Very high	17	19.5	

Table 4.10 explains the frequency and percentage score for design risk of Abuja and Lagos State Nigeria construction companies. The score with highest frequency (53) and percentage (60.9%) is high. The mean score (3.9885) signifies that risk management through design is

at high level because preventive measures are given to design in Malaysian construction industries and that is why less risk are bound to occur within this stage, as also perceived by (Dzazali, 2009).

4.8Assessment of PLS-SEM Path Model Results

It is paramount to state that a study conducted by Henseler and Sarstedt (2013) proposes that goodness-of-fit (GoF) index is not appropriate for model validation (see also Hair et al., 2014). For example, using PLS path models with induced data, the authors revealed that goodness-of-fit index is not appropriate for model validation because it cannot distinguish invalid models from valid ones (Hair, Ringle, & Sarstedt, 2013).

In the light of the latest development about the precarious of PLS path modelling in validating the model, the current study adopted a two-step process to measure and report the results of PLS-SEM path, as proposed by Henseler, Ringle and Sinkovics (2009). The adopted two-step process in the current study includes (1) the assessment of a measurement model, and (2) the assessment of a structural model.

4.9 Assessment of Measurement Model

An assessment of a measurement model requires the definitions of individual item reliability, internal consistency reliability, content validity, convergent validity with discriminant validity (Hair *et al.*2014; Hair *et al.* 2011; Henseler *et al.* 2009).

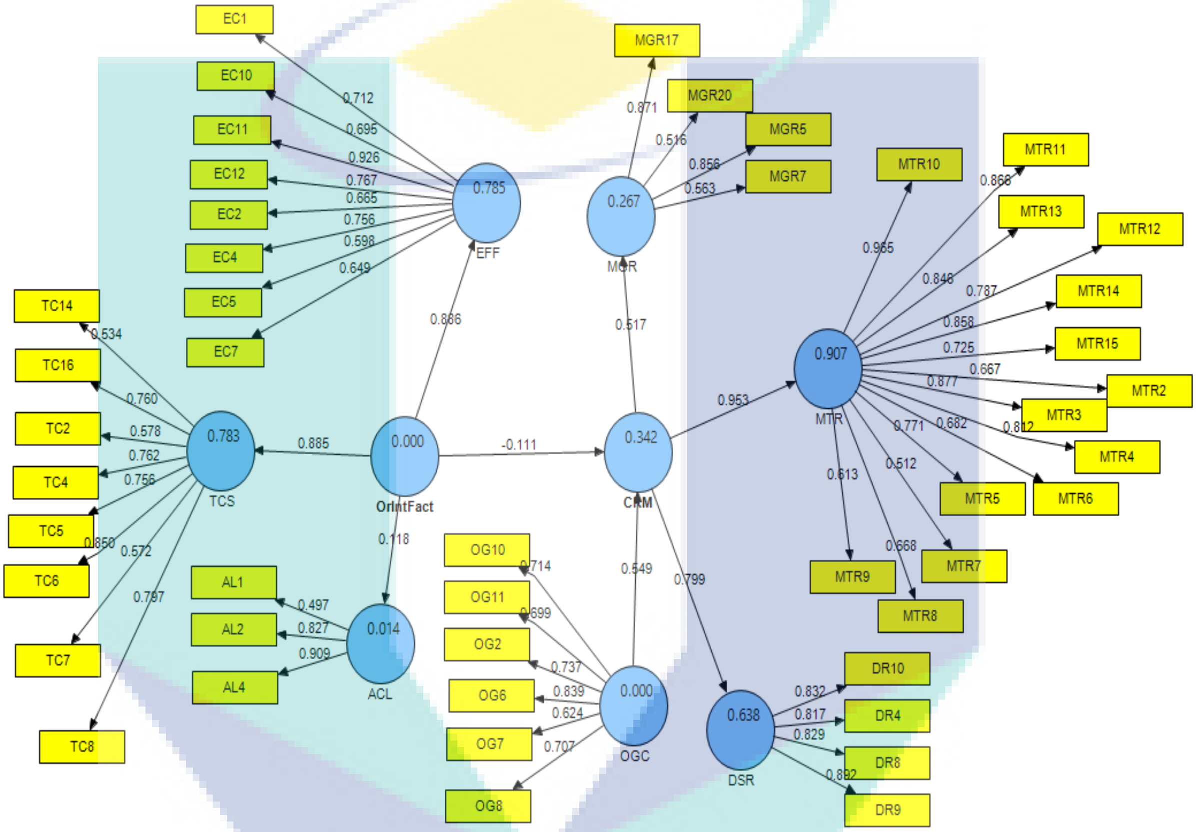

Figure 4.2: Measurement Model

4.9.1 Individual Item Reliability

Individual item reliability was measured by studying the outer loadings of each construct's measure (Duarte & Raposo, 2010; Hair *et al.* 2016; Hair *et al.* 2012; Hulland, 1999). Going by the rule of thumb for keeping items with the loadings between .40 and .70 (Hair et al., 2016), therefore out of 91 items, 44 were deleted because they established loadings lower than the threshold of 0.40. Hence, in the whole model, only 47 items were reserved as they present loadings between 0.497 and 0.965, Following Hayduk, & Littvay (2012), the authors suggested that fewer items are required to run a standard PLS analysis.

4.9.2 Internal Consistency Reliability

Internal consistency reliability relates to the degree of which all items on a specific (sub) scale are measuring the same concept (Bijttebier *et al.* 2000; Sun *et al.*, 2007). Cronbach's alpha coefficient and composite reliability coefficient are the major commonly used estimators of the internal consistency reliability of an instrument in organizational research (for example, Bacon, Sauer, & Young, 1995; McCrae, Kurtz, Yamagata, & Terracciano, 2011; Peterson & Kim, 2013). In the present study, composite reliability coefficient was selected to determine the internal consistency reliability of measures adapted.

Composite reliability coefficient was used in this study based on two grounds. Firstly, from composite reliability coefficient, less biased estimate of reliability is provided compare to Cronbach's alpha coefficient because the later presumes that all items add the same to its construct without looking at the literal contribution of individual loadings (Barclay, Higgins, & Thompson, 1995; Gotz, Liehr-Gobbers, & Krafft, 2010).

Table 4.11: *Loadings, Composite Reliability and Average Variance Extracted*

Constructs Dimensions	Items	Loadings	Composite Reliability	AVE
Effective communication	EC1	0.712	0.898	0.528
	EC2	0.665		
	EC4	0.756		
	EC5	0.598		
	EC7	0.649		
	EC10	0.695		
	EC11	0.926		
	EC12	0.767		
Team competency and skills	TC2	0.578	0.888	0.504
	TC4	0.762		
	TC5	0.756		
	TC6	0.850		
	TC7	0.572		
	TC8	0.797		
	TC14	0.534		
	TC16	0.760		
Active leadership	AL1	0.497	0.800	0.586
	AL2	0.827		
	AL4	0.909		
Management risk	MG5	0.856	0.804	0.519
	MG7	0.563		
	MG17	0.871		
	MG20	0.516		
Material risk	MT2	0.667	0.952	0.592
	MT3	0.877		
	MT4	0.812		
	MT5	0.771		
	MT6	0.682		
	MT7	0.512		
	MT8	0.668		
	MT9	0.613		
	MT10	0.965		
	MT11	0.866		
	MT12	0.787		
	MT13	0.846		

	MT14	0.858		
	MT15	0.725		
Design risk	DS4	0.817	0.908	0.711
	DS8	0.829		
	DS9	0.892		
	DS10	0.832		
Organizational culture	OG2	0.737	0.867	0.523
	OG6	0.839		
	OG7	0.624		
	OG8	0.707		
	OG10	0.714		
	OG11	0.699		

Secondly, it is possible for Cronbach's alpha to under-estimate or overestimate the scale reliability. The composite reliability assumes that indicators have dissimilar loadings which can be translated or serves as the same meaning as Cronbach's α (thus, it does not matter which specific reliability coefficient is used, because an internal consistency reliability value that is above .70 is regarded as adequate for an acceptable model, while a value below .60 shows absence of reliability).

Likewise, the rendition of internal consistency reliability with the use of composite reliability coefficient was grounded on the rule of thumb proposed by Bagozzi and Yi (1988) and also Hair *et al.* (2011), who recommended that the composite reliability coefficient must be at least .70 or more than. Table 4.11 described the composite reliability coefficients of the latent constructs. As depicted in Table 4.11, the composite reliability coefficient of each of the latent constructs ranged from .800 to .952, with each of them exceeded the acceptable benchmark value of .70, signifying satisfactory internal consistency reliability of the indicator used in this present study (Bagozzi & Yi, 1988; Hair *et al.* 2011).

4.9.3 Convergent Validity

The magnitude to which items truly constitute the aimed latent construct and really correlate with other measures of the same latent construct is referred to as convergent validity (Hair *et al.* 2006). As suggested by Fornell and Larcker (1981), convergent validity was measured by studying the Average Variance Extracted (AVE) of each of the latent construct. To achieve enough convergent validity, Chin (1998) proposed that the AVE of each of the latent construct must be above .50. Going by Chin (1998), the AVE values for the present study (see Table 4.11) presented high loadings (> .50) on individual construct respectively which signify acceptable convergent validity.

4.9.4 Discriminant Validity

According to Duarte and Raposo (2010), the magnitude to which a particular latent construct is different from other latent constructs is regarded as discriminant validity in the current study. The discriminant validity was determined using the AVE, as proposed by Fornell and Larcker (1981). This was attained by equating the correlations between the latent constructs with the square roots of average variance extracted (Fornell & Larcker, 1981). Likewise, discriminant validity was ascertained following Chin's (1998b) criterion by equating the indicator loadings with other reflective indicators from the cross loadings table. To evaluate discriminant validity with the rule of thumb, Fornell and Larcker (1981) propose the use of AVE with a score of .50 and above. In the process of achieving satisfactory discriminant validity, Fornell and Larcker (1981) further propose that the square root of the AVE must be higher than the correlations between latent constructs.

As presented in Table 4.11, the measures of the average variances extracted rate between .504 and .710, proposing satisfactory values. In Table 4.12, the correlations between the latent constructs were equated with the square root of the average variances extracted (measures in bold face). Table 4.12 also shows that the square root of the average variances extracted were all higher than the correlations between the latent constructs, proposing sufficient discriminant validity (Fornell & Larcker, 1981).

Table 4.12: *Latent Variable Correlations and Square Roots of Average Variance Extracted*

	ACL	DSR	EFF	MGR	MTR	OGC	TCS
ACL	0.77						
DSR	0.00	0.84					
EFF	0.11	-0.13	0.73				
MGR	-0.12	0.45	-0.43	0.72			
MTR	0.08	0.65	-0.22	0.32	0.77		
OGC	0.32	0.35	-0.29	0.20	0.58	0.72	
TCS	0.04	-0.06	0.58	-0.32	0.08	-0.17	0.71

Note: Values displayed in bold denote the square root of the average variance extracted.

Similarly, as mentioned earlier that discriminant validity can be determined by equating the indicator loadings with cross-loadings (Chin, 1998a). To attain satisfactory discriminant validity, Chin (1998a) proposes that all the indicator loadings must be greater than the cross-loadings. Table 4.13 equates the indicator loadings with other reflective indicators. All the indicator loadings were higher than the cross loadings, proposing satisfactory discriminant validity for further analysis.

Table 4.13: *Cross Loadings*

	AL	DR	EC	MGR	MTR	OG	TC
AL1	0.497	0.205	0.011	0.029	0.343	0.450	-0.010
AL2	0.827	-0.113	0.154	-0.145	-0.038	0.098	-0.034
AL4	0.909	0.044	0.055	-0.100	0.085	0.354	0.101
DR10	0.017	0.832	-0.012	0.543	0.635	0.276	0.055
DR4	-0.100	0.817	-0.006	0.395	0.456	0.128	0.217
DR8	0.121	0.829	-0.402	0.368	0.597	0.461	-0.407
DR9	-0.069	0.892	0.022	0.184	0.485	0.262	-0.014
EC1	0.013	0.226	0.712	0.109	-0.085	-0.127	0.279
EC10	-0.028	0.158	0.695	-0.380	-0.143	-0.230	0.291
EC11	0.028	-0.328	0.926	-0.488	-0.418	-0.391	0.514
EC12	0.186	-0.429	0.767	-0.489	-0.139	-0.149	0.576
EC2	0.095	0.248	0.665	0.058	0.343	0.055	0.583
EC4	0.174	-0.010	0.756	-0.612	-0.098	-0.251	0.539
EC5	-0.026	-0.256	0.598	0.022	-0.652	-0.536	0.310
EC7	0.118	-0.344	0.649	-0.656	-0.254	-0.164	0.074
MGR17	-0.149	0.366	-0.395	0.871	0.309	0.137	-0.208
MGR20	0.049	0.466	-0.186	0.516	0.041	0.067	-0.167
MGR5	-0.115	0.225	-0.365	0.856	0.266	0.195	-0.331
MGR7	0.010	-0.163	-0.229	0.563	-0.099	-0.140	-0.101
MTR10	0.099	0.631	-0.303	0.474	0.965	0.582	-0.059
MTR11	0.039	0.632	0.041	0.244	0.866	0.476	0.290
MTR12	0.064	0.445	-0.324	0.067	0.787	0.521	0.149
MTR13	0.108	0.457	-0.437	0.191	0.846	0.530	-0.104
MTR14	0.160	0.429	-0.044	0.155	0.858	0.407	0.365
MTR15	0.086	0.578	-0.064	0.498	0.725	0.413	-0.218
MTR2	-0.052	0.493	-0.490	0.469	0.667	0.471	-0.215
MTR3	-0.041	0.784	-0.047	0.469	0.877	0.472	0.001
MTR4	0.111	0.294	-0.328	-0.021	0.812	0.452	0.237
MTR5	-0.085	0.304	-0.395	0.132	0.771	0.437	0.184
MTR6	0.033	0.356	-0.489	-0.076	0.682	0.468	-0.051
MTR7	0.268	0.408	0.557	0.029	0.512	0.187	0.337
MTR8	0.004	0.727	0.054	0.497	0.668	0.351	-0.198
MTR9	0.213	0.341	0.293	-0.062	0.613	0.344	0.495
OG10	0.549	0.072	0.072	0.049	0.322	0.714	-0.035
OG11	-0.029	0.122	-0.193	0.106	0.263	0.699	-0.183
OG2	0.099	0.274	-0.031	0.043	0.495	0.737	0.065
OG6	0.142	0.290	-0.360	0.172	0.532	0.839	-0.203
OG7	0.219	0.311	-0.316	0.215	0.443	0.624	-0.212
OG8	0.474	0.313	-0.312	0.232	0.323	0.707	-0.150
TC14	0.119	0.107	0.211	0.288	0.089	-0.035	0.534
TC16	0.107	-0.125	0.316	-0.266	0.045	-0.128	0.760
TC2	-0.241	0.033	0.466	-0.053	0.038	-0.139	0.578

TC4	0.158	-0.527	0.658	-0.632	-0.306	-0.350	0.762
TC5	0.197	0.012	0.659	-0.603	-0.122	-0.245	0.756
TC6	-0.095	-0.197	0.434	-0.199	0.036	-0.130	0.850
TC7	-0.078	0.534	0.005	0.233	0.722	0.296	0.572
TC8	-0.023	0.327	0.206	0.041	0.526	0.107	0.797

4.10 Assessment of Significance of the Structural Model

Having determined the measurement model, the current study measured the structural model. The current study also used the standard bootstrapping process with a number of 500bootstrap samples and 87 cases to measure the path coefficients significance, following (Hair *et al.* 2014; Hair *et al.*, 2011; Hair *et al.* 2012; Henseler *et al.* 2009). Figure 4.3 and Table 4.13 consequently depict the approximations of the full structural model, which comprises the moderating variable (for example, organizational culture).

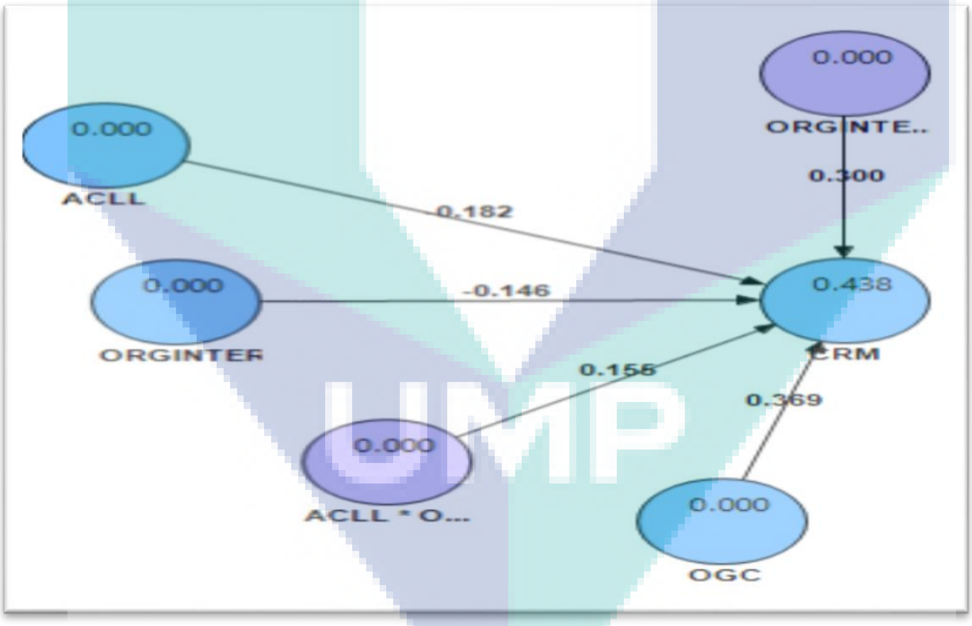

Figure 4.3: Structural Model with Moderator (Full Model)

Hypothesis 1 predicted that active leadership have a significant relationship with construction risk management. Result (Table 4.14 and Figure 4.3) opined a significant positive relationship between active leadership as a sub-dimension of organizational internal factors and construction risk management (β = -0.182, t = 2.490, p<.05), supporting Hypothesis 1.

Table 4.14: *Structural Model Assessment with Moderator (Full Model)*

Hypothesis	Relation	Beta	SE	T-Value	Findings
H1	Active leadership ->Construction risk management.	-.182	.073	2.490***	Supported
H2	Organizational internal factors ->Construction risk management.	.246	.138	1.057	Supported
H3	Organizational culture ->Construction risk management.	.369	.131	2.830***	Supported
H4	Active leadership * Organizational culture ->Construction risk management.	.155	.109	1.424 *	Supported
H5	Organizational internal factors * Organizational culture ->Construction risk management.	.300	.127	2.370 ***	Supported

Note: ***Significant at 0.01 (1 -tailed), **significant at 0.05 (1 -tailed), *significant at 0.1 (1 -tailed).

In the same vein, Hypothesis 2 predicted that organizational internal factors have a significant relationship with construction risk management. Result (Table 4.14 and Figure 4.3) revealed that internal factors have a positive relationship with construction risk management (β = .246, t = 1.057).

Similarly, hypothesis 3 predicted that organizational culture has a significant relationship with construction risk management. Result (Table 4.14 and Figure 4.3) indicated that organizational culture possess a positive relationship with construction risk management ($\beta = .369$, $t = 2.830$, $p < .5$).

Hypothesis 4 predicted that organizational culture moderates the relationship between active leadership and construction risks management. Result (Table 4.14 and Figure 4.3) pointed that organizational culture possesses a positive relationship with active leadership and construction risk management ($\beta = .155$, $t = 1.424$, $p <.1$).

Lastly, hypothesis 5 predicted that organizational culture moderates the relationship between organizational internal factors and construction risks management. Result (Table 4.14 and Figure 4.3) revealed that organizational culture possesses a positive relationship with organizational internal factors and construction risk management ($\beta = .300$, $t = 2.370$, $p < .05$).

4.10.1 Assessment of Variance Explained in the Endogenous Latent Variables

Another essential criterion for measuring structural model in the PLS-SEM is the use of *R*-squared values or the coefficient of determination (Hair et al., 2011; Hair et al., 2012; Henseler et al., 2009). The values of the *R*-squared stands for the ratio of variation in the criterion variable(s) which can be explicated with one or more predictor variable (Elliott & Woodward, 2007; Hair *et al*. 2010; Hair *et al.* 2006). Though the tolerable level of *R2* value depends on circumstances of the research (Hair *et al*. 2010), Falk and Miller (1992) suggest an R-squared value of 0.10 as the minimum level of acceptance. While, Chin (1998b) proposes that value of *R*-squared with 0.67, 0.33, and 0.19 in PLS-SEM can be regarded as substantial, moderate, and weak, respectively. Table 4.15 depicts the *R*-squared values of the endogenous (construction risk management) latent variable.

Table 4.15: *Variance Explained in the Endogenous Latent Variable*

Latent Variable	Variance Explained (R2)
Construction risk management	44%

As depicted in Table 4.15, the research model explicates 44% of the total variance in construction risk management. This proposes that the three sets of exogenous latent variables (i.e., active leadership, internal factors and organizational culture) jointly explain 44% for the variance of the construction risk management. Therefore, following Falk and Miller's (1992) and Chin's (1998) standard, the endogenous latent variable presented acceptable levels of *R*-squared values, which were regarded as moderate.

4.10.2 Assessment of the Effect Size (f2)

Effect size shows the relative effect of a specific exogenous latent variable on the endogenous latent variable(s) through the means of changes in the *R*-squared (Chin, 1998). It is computed as the increase in *R*-squared of the latent variable of which is connected with the path, proportional to the latent variable's ratio of unexplained variance (Chin, 1998). Therefore, the effect size can be calculated with the following formula (Cohen, 1988; Selya, Rose, Dierker, Hedeker, & Mermelstein, 2012; Wilson, Callaghan, Ringle, & Henseler, 2007):

$$\text{Effect size: } f^2 = \frac{R^{2Included-}R^{2Exlcuded}}{1 - R^{2Included}}$$

Cohen (1988) draws *f2* values of 0.35, 0.15 and 0.02 as having strong, moderate and weak effects respectively. Table 4.16 depicts the respective effect sizes of the latent variables of the structural model.

Table 4.16: *Effect Sizes of the Latent Variables on Cohen's (1988) Recommendation*

R-squared	Included	Excluded	f-squared	Effect Size
Active leadership	0.438	0.386	0.09	Weak
Internal factors	0.438	0.370	0.12	Moderate

As depicted in Table 4.16, the effect sizes for the active leadership and internal organizational factors, were 0.09 and 0.12, respectively. Therefore, following Cohen's (1988) recommendation, the effects sizes of these two exogenous latent variables on construction risk management can both be considered weak and moderate effects respectively.

4.10.3 Assessment of the Predictive Relevance (Q^2)

The current study also employed the Stone-Geisser test of predictive relevance for the research model using blindfolding processes (Geisser, 1974; Stone, 1974). The Stone-Geisser test of predictive relevance is commonly used as an additional measurement of goodness-of-fit in PLS-SEM (Duarte & Raposo, 2010). Although this study makes use of the blindfolding to determine the predictive relevance of the research model, according to Sattler, Völckner, Riediger and Ringle (2010) "blindfolding processes is only employed to endogenous latent variables that possess a reflective measurement model operationalization" (p. 320). However, following McMillan and Conner (2003), reflective measurement model “defines that a latent or unperceivable concept causes difference in a set of observable indicators”. Therefore, since all the endogenous latent variables in current study were all reflective in nature, a blindfolding processes was employed mainly to the endogenous latent variables.

To be specific, a cross-validated redundancy measure (*Q²*) was employed to determine the predictive relevance of the research model (Chin, 2010; Geisser, 1974; Hair *et al.* 2013; Ringle, Sarstedt, & Straub, 2012b; Stone, 1974). The *Q²* is a standard to evaluate how good a model predicts the data of excluded cases (Chin, 1998; Hair *et al.*2014). A research model with *Q2*statistic (s) that is larger than zero is regarded to have predictive relevance (Henseler *et al.*2009). In addition, a research model with larger positive *Q2* values proposes more predictive relevance. Table 4.17 depicts the outcomes of the cross-validated redundancy *Q²* test for the present study.

Table 4.17: *Construct Cross Validity Redundancy*

Total	SSO	SSE	1-SSE/SSO
Construction risk management	261.0	195.15	0.2522

As depicted in Table 4.17, the cross-validation redundancy measure *Q²* for the endogenous latent variables are above zero, proposing the present research model predictive relevance (Chin, 1998; Henseler et al., 2009).

4.10.4 Testing Moderating Effect

The current study employed a product indicator approach with the use of PLS-SEM to discover the strength of the moderating effect of organizational culture on the relationship between organizational internal factors, with construction risk management in Kuantan

Malaysian construction industries (Chin *et al.* 2003; Helm, Eggert, & Garnefeld, 2010; Henseler & Chin, 2010a; Henseler & Fassott, 2010b). The product term method is regarded appropriate in present study because the moderating variables are continuous (Rigdon, Schumacker, & Wothke, 1998). Henseler and Fassott (Henseler & Fassott, 2010a) "stated that the results of the product term method are normally superior or equal to the group comparison method, the authors always recommend the use of product term method" (p. 721). To employ the product indicator method in trying out the moderating effects of organizational culture on the relationship between organizational internal factors, with construction risk management, the product terms between the indicators of the latent predictor variable and the indicators of the latent moderator variable need to be established, thus, the product terms would serve as the indicators of the interaction term for the structural model (Kenny & Judd, 1984). Likewise, to determine the strength for the moderating effects, the current study employed Cohen's (1988) recommendation in ascertaining the effect size. Figure 4.2 and Table 4.14 therefore depict the approximations after the application of the product indicator method to ascertain the moderating effect of organizational culture on the relationship between the exogenous and endogenous latent variables.

It could be recalled that Hypothesis 4 stated that organizational culture significantly moderates the relationship between active leadership and construction risk management. Although, the relationship is negative but instead of the rules and regulations to strengthen the relationship between the organizational internal factors and construction risk management; it dampens the relationship. The result is however statically significant for individuals with high obedience to rules and regulations than for individuals with low compliance to rules and regulations.

As predicted, the results shown in Table 4.14, showed that the interaction terms playing the active leadership x organizational culture (β = .155 t = 1.43, $p < .1$) was positively significant. Therefore, Hypothesis 4 was supported, that is for individuals with high compliance to organizational culture than it is for individuals with low compliance to the organizational culture.

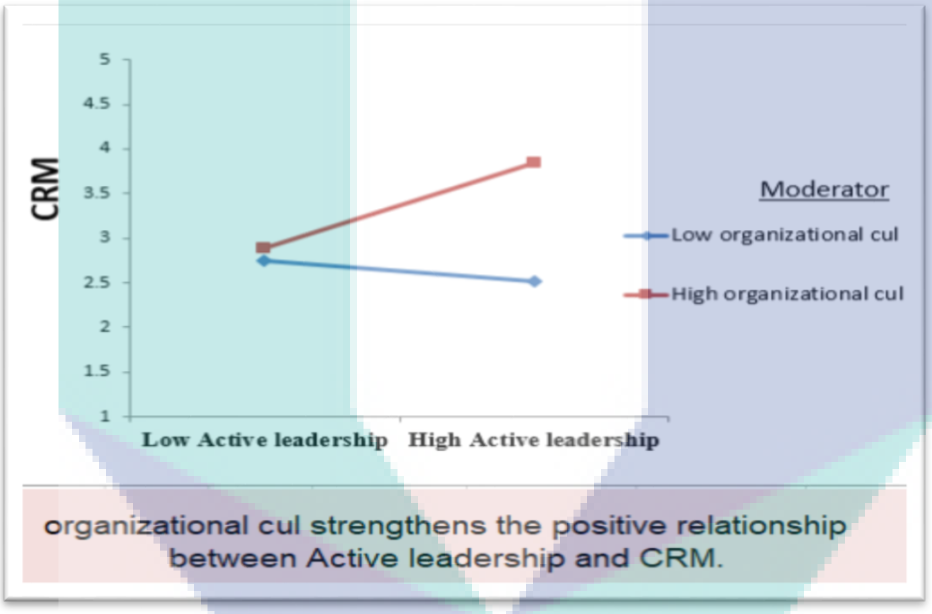

Figure 4.4 *Interaction Effect of Active Leadership and Organizational Culture on Construction Risk Management.*

Likewise, the results depicted in Table 4.14 and Figure 4.3 confirmed the Hypothesis 5, which stated that organizational culture significantly moderate the relationship between internal organizational factors and construction risk management, such that the relationship is stronger (i.e. more positive) for individuals with high compliance to organizational culture than it is for individuals with low compliance to the organizational culture (β = .0300, t = 2.37, p < .05). The moderating effect of organizational culture on the relationship between organizational internal factors and construction risk management is shown in Figure 4.5, which depicts a stronger positive relationship between organizational internal factors and construction risk management.

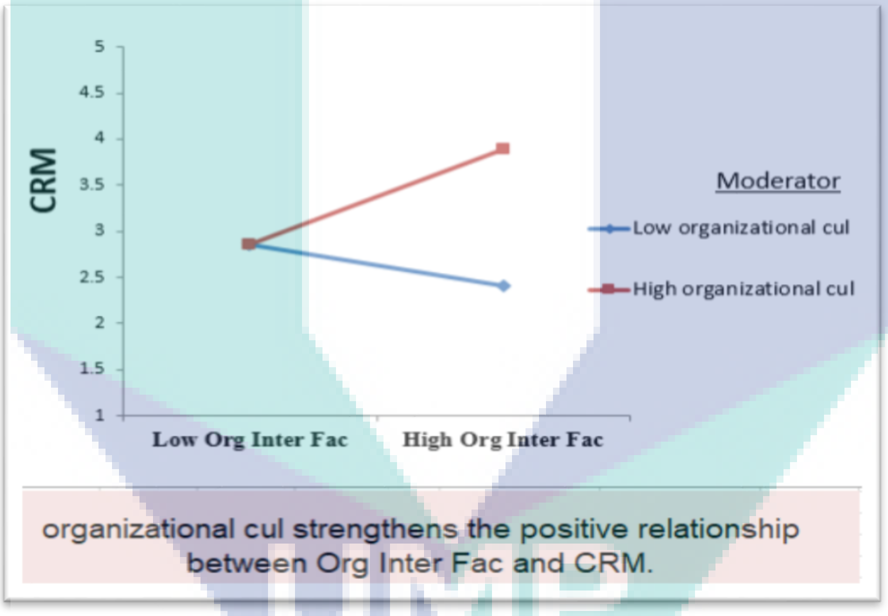

Figure 4.5: *Interaction Effect of Internal Factors and Organizational Culture on Construction Risk Management.*

4.10.5 Determining the Strength of the Moderating Effects

To ascertain the strength of the moderating effects of organizational culture on the relationship between organizational internal factors with construction risk management, Cohen's (1988) effect sizes were computed. Likewise, the moderating effects strength can be measured by equating the coefficient of determination (*R*-squared value) of the actual effect model together with the *R*-squared value of the full model that comprises both the exogenous latent variables with the moderating variable (Henseler & Fassott, 2010a; Wilden, Gudergan, Nielsen, & Lings, 2013). Hence, the moderating effects strength could be determined with the use of the following formula (Cohen, 1988; Henseler & Fassott, 2010a):

$$\text{Effect size: } f^2 = \frac{R^{2 model\ with\ moderator} - R^{2 model\ without\ moderator}}{1 - R^{2 model\ with\ moderator}}$$

According to (Cohen, 1988; Henseler & Fassott, 2010a), moderating effect sizes (*f2*) values of 0.35, 0.15 and 0.02 can be considered as strong, moderate and weak respectively. Nevertheless, according to Chin *et al.* (2003), effect sizes with low values does not essentially mean that the moderating effect is insignificant. "Even a small interaction effect can be significant under utmost moderating conditions, if the resulting beta changes are significant, then it is paramount to take these conditions into consideration" (Chin et al., 2003). Output of the strength for the moderating effects of rules and regulations is depicted in Table 4.18.

Table 4.18: *Strength of the Moderating Effects Following Cohen's (1988) and Henseler and Fassott's (2010) Guidelines*

Endogenous Latent Variable	R-squared		f-squared	Effect Size
	Included	Excluded		
Construction risk management	0.438	0.165	0.49	Strong

4.11 Summary of Findings

Having displayed all the results comprising the moderating and the main effects in preceding sections, the results of the hypotheses tested are summarized in Table 4.19.

Table 4.19: *Summary of Hypotheses Testing*

Hypothesis	Statements	Findings
HI:	There is a significant relationship between active leadership and construction risk management among Kuantan Malaysia construction industries.	Supported
H2:	There is a significant relationship between organizational internal factors and construction risk management among Kuantan Malaysia construction industries.	Supported
H3	There is a significant relationship between organizational culture and construction risks management among Kuantan Malaysia construction industries.	Supported
H4	Organizational culture moderate the relationship between active leadership and construction risks management among Kuantan Malaysia construction industries	Supported
H5	Organizational culture moderate the relationship between organizational internal factors and construction risks management among Kuantan Malaysia construction industries	Supported

4.12 Summary

In this chapter, the descriptive analysis was carried out and also the interpretations of the PMBOK (2000) and Ahmed *et al.* (1999) Likert scale risk management categories which suggest that the extent of construction risk management among Kuantan Malaysia construction industries is at high level.

Similarly, the bases for employing PLS path modelling which is to examine the theoretical model was demonstrated in the study. However, going by measuring the significance of the path coefficients, the main findings of the research were demonstrated. In general, self-report methods have rendered substantial support for the moderating effects of organizational culture on the relationship between organizational internal factors on construction risk management.

Lastly, regarding the moderating effects of organizational culture on the relationship between the two predictor variables and the criterion variable, PLS path coefficients showed that all the formulated hypotheses was significant. The following chapter (Chapter 5) further discussed the findings, the implications, the limitations, hypnotism for future research directions and lastly, the conclusion of the whole research.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The research findings presented in the preceding chapters are discussed in this chapter by connecting them to the theoretical views and the previous researches associated to construction risk management.

5.2 Summary of the Research Findings

The main objective of the study is to assess the extent of construction risk management among Kuantan construction industries and to determine the influences between the organizational internal with the relationship to construction risk management, including the moderating effect of organizational culture in Kuantan construction industries. In general, this study has succeeded in determining the extent of construction risk management among Kuantan construction industries by rendering answers to the following research objectives:

1. To assess the extent of construction risk management among construction industries operating in Kuantan Malaysia.
2. To examine the significant relationship between the organizational internal factors and construction risk management among construction industries operating in Kuantan Malaysia.
3. To examine the moderating effect of organizational culture on the relationship between organizational internal factors on construction risk management among construction industries operating in Kuantan Malaysia.

4) To develop a risk management framework for the Kuantan Malaysian construction industries.

5.3 Discussions

This section talks about the study findings based on applicable theory and previous research findings. The subheadings for the discussion part are framed following the research objectives.

5.3.1 Extent of construction risk management

In the present study, the extent of construction risk management among Kuantan construction industries was assessed through descriptive analysis to determine the mean score of how construction risk management is effective within the kuantan industries. The result shows that the mean score of extent of construction risk management is 3.8118 with a standard deviation of 0.268. PBOOK (2000) Likert scale interpretation was used to interpret the 5-point Likert scale in the questionnaire with the categories of risk management such as: very low, low, medium, high and very high (in ascending order and medium being the level) are used to distinguish the level which the mean scores belong. The reason for using these categories is because the criterion for the categorization is risk management (PMBOK, 2000).

Extent of construction risk management mean score (3.8118) is within the “High” category. Likewise, the findings of the current study proposed that the extent of construction risk management among Kuantan construction industries falls under the category of “High.” High category signifies that risk management is highly implemented within Kuantan construction industries. Although the assertion declared by CIDB Malaysia 2018 is targeting the highest level of risk management in every phases of construction projects.

Methodologically, the extent of construction risk management among construction industries determined in the current study is in line with previous risk management studies in Malaysia and Nigeria respectively (Yusuwan et al., 2008; Aibinu and Odeyinka, 2006; Adeleke et al. 2018). Assessed the level of risk management within Kuantan construction industries which the authors regarded it to be high.

Theoretically, the extent of construction risk management among Kuantan construction industries found in this study is consistent with Ibrahim, Price and Dainty (2006) that examined the ability of construction industries to implement risk management. The authors proposed that construction industries are ready to implement risk management by exhibiting a slightly high level of "*control*" within the organization. This is also grounded on organizational control theory (Flamholtz et al., 1985; Jaworski, 1988; Ouchi, 1979; Snell, 1992).

In summary, this study proposed that the extent of construction risk management among Kuantan construction industries is at high level. This construction risk management is explained by three dimensions: management risk, material risk and design risk. This result however does not agree with the assertions that construction industries in the developing countries generally lag behind in terms of risk management because this study proved Kuantan Malaysian construction industries to be at high level in term of risk management effectiveness (Yusuwan et al., 2008).

5.3.2 The Influence of Dimensions in Organizational Internal Factors on Construction Risk Management

Organizational internal factors refer to intangible resources because they cannot be seen physically by any organizations. However, for every successful organization there must be a resources behind it. Therefore, these intangible resources as they are used in this study (i.e., effective communication, team competency and skills and active leadership) while tangible resource which are organization assets (i.e., land, equipment, capital and labour) which on the long run, it would help in detecting, monitoring and minimizing the occurrence of risk during the construction process within the company (Kumaraswamy & Chan 1998; Inmyxai & Takahashi, 2009). Hence, this study hypothesized that organisational internal factors are significantly related to construction risk management. To achieve this end, one research hypothesis is developed and tested with the use of PLS path modelling.

Therefore, positive relationship between organizational internal factors and construction risk management is consistent with the findings from Greenberg & Baron (2008); Geraldi, Lee-Kelley & Kutsch (2010) who proved that when employees perceive that an organization efficaciously enforced monitoring and control through effective communication, team competency with skills and active leadership during construction project, they are less likely risk recorded during the construction process which are likely to occur from the management, material, design, finance and labour and equipment aspects. Thus, on the long run it will improve construction risk management within the organization.

5.3.4 Moderating Effects of Organizational Culture on the Relationship between Organizational Internal Factors and Construction Risk Management

As stated in the research objectives and formalized hypothesis that organizational culture moderates the relationship between organizational internal factors and construction risk management. Specifically, positive relationship exists among these variables.

In the same vein, the results regarding the moderating effect of organizational culture moderate the relationship between organizational internal factors and constructions risk management which appear to follow the organizational control theory. Going by the view of organizational culture, it helps the employees in the organization to duly follow all the lay down culture guiding the organization, which include how the employee will communicate, their activeness and their competency that needs to follow what exactly the organization required from them. These would lessen risk occurrence on construction project and make risk management to be more effective (Yusuwan eta., 2009).

However, organizational culture plays a positive relationship between organizational internal factors and construction risk management that is for individual with high obedience to organizational culture as opposed to individuals with low obedience to organizational culture. This suggests that organization employees that duly imbibe organizational culture in all their activities are likely to make risk management in the organization to be more effective. According to organizational control theory, organizations who adopt advancement focus have a tendency to regulate their employees conduct by involving in positive manners when it comes to project execution which requires all the three dimensions of the organizational internal factors (i.e., effective communication, team competency and skills, and active leadership) which bring up a good output when it comes to the project closure (Abd El-Razek, 2008). This study suggests that organizational culture operated as a buffer between organizational control theory and construction risk management, such that individuals with high obedience to organizational culture are less likely to reduce risk on construction projects than individuals with low obedience to organizational culture implementation.

5.3.5 Unique Contributions to Knowledge

Since 1990s, the drive towards risk management in construction industries has assembled various strength and has started to reveal itself globally. This research has made several contributions to theory, practical and methodological to this field. This research for the first time to assess the extent of risk management among construction industries in Kuantan Malaysia, thereby rebutting the impression that the construction industries mostly lagging when it comes to risk management (Odeyinka *et al.*, 2008; Yusuwan et a., 2008). This research has succeeded in placing the construction industries in Kuantan to their level of risk management. However, following Table 4.7, it is shown that Kuantan construction industries fall within "High" level of risk management with the mean score of 3.8118 as also presented in Table 5.1 below.

Table 5.1: *Extent of Construction Risk Management among Kuantan Malaysia construction industries*

Construction risk management extent	Frequency	Percentage	Mean	Median	Mode	SD
Very low	_	_				
Low	_	_				
Medium	6	6.9				
High	77	88.3	3.8118	3.7680	3.60	0.268
Very high	4	4.6				

Secondly, the present research focuses on factors influencing construction risk management. While majority of studies in construction industries either focused on the roadblocks towards implementing risk management (El-Sayegh, 2008); delays to construction projects (Sambasivan & Soon, 2007; Ali *et al.*, 2012); organizational internal factors (Kumaraswamy & Chan, 1998), the present research examined organizational internal factors and its influence to construction risk management among Kuantan construction industries, as presented in Figure 5.1, 5.2, and 5.4.

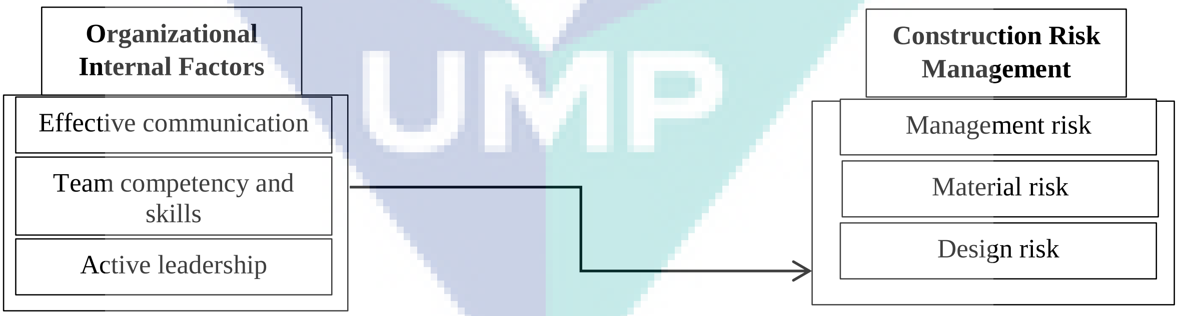

Figure 5.1 *Organizational Internal Factors on Construction Risk Management as a unique contribution.*

Lastly, the present research also introduced organizational culture as a moderator with organizational internal factors on construction risk management to buffer or strengthen the relationship which has been affirmed by the previous studies, which all forms a solid framework that might serve as the accurate motivation of change towards risk in Malaysian construction projects, as presented in Figure 5.2.

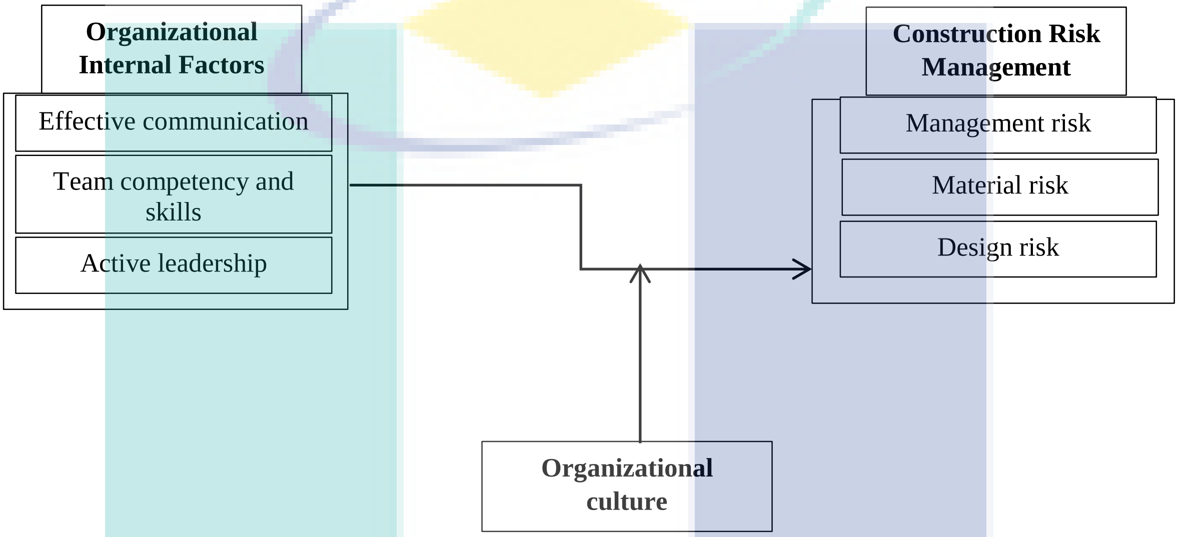

Figure 5.2: *The Research Empirical Model linking Supported Organizational Internal Factors Dimensions, with Construction Risk Management and Moderating effect of Organizational Culture as a unique contribution.*

5.3.6 Theoretical Implications

The conceptual framework for this research is established on the previous empirical findings and theoretical gaps discovered from the previous literatures. It is also affirmed and enlightened from the theoretical grounds of organizational control theory (Flamholtz *et al.* 1985; Jaworski, 1988; Ouchi, 1979; Snell, 1992). The current research incorporated organizational culture as a moderating variable to better understand the relationship between organisational internal factors and construction risk management. Going by the findings and discussions of the research, the current research has made various theoretical contributions in the research on organisational internal factors, organizational culture, and construction risk management.

5.3.7 Practical Implications

Following the research findings, the present research has added various practical implications in terms of project management practices in the setting of Malaysian construction industries practices. Firstly, it is proposed by the results that sensing of thorough control and monitoring within the organization are important in managing construction risk management. Construction industries can make substantial efforts in reducing risk occurrence on construction project by enhancing employee's perceptions towards proper monitoring during project execution. For example, by compensating and motivating those employees in every milestone of construction projects, it would enhance proper control within the organization and once there is proper control, then, there would be less likely of risk to occur on the project within Malaysian construction industries.

Likewise, the research findings examined that organization internal factors variables are related to risk occurrence on construction project. In particular, the three dimensions of the variables (i.e., effective communication, team competency with skills, active leadership,) were found to be positively related to construction risk management in the whole sample. Consequently, management of the construction industries could reduce the likelihood of risk occurrence on project by improving conditions that contribute to positive group interactions among the employees (Heerkens, 2001). For example, management of the industries may establish training, workshop and symposium which will handle or discuss more on construction risk management among Malaysian construction industries.

5.3.8 Methodological Implications

Foregoing risk management studies have applied the use of analytical tools including the SPSS and SEM AMOS to reveal results (Aibinu & Jagboro, 2002; Aibinu & Odeyinka, 2006). This research has explored a relatively new tool of analysis (i.e. PLS) to explicate the structural relationship among the constructs of this study. The PLS tool is a general model that constitutes canonical correlation, multiple regression, principal components techniques, multivariate analysis of variance between others. Therefore, the current study makes use of this comparatively new tool of analysis which has some significant methodological implications.

Another methodological contribution from this research is related with the use of PLS path modeling to measure the properties of each latent variable. Precisely, the present research has come through in measuring the properties of the latent variables such as the convergent validity and discriminant validity. The properties studied are the individual item reliability, average variance explained (AVE) and composite reliability for each latent variable. Convergent validity was measured by checking the value of AVE for the latent variables. Likewise, the discriminant validity was assessed by making comparison to the correlations between the latent variables and the square roots of AVE. The outputs for the cross loadings matrix were also assessed to support the discriminant validity in the conceptual model. Therefore, this research has proven to use the best vigorous approaches (PLS path modeling) to determine the properties of the latent variables demonstrated in the conceptual model of this research.

5.3.9 Limitations and Future Research Directions

Although this research has affirmed support for some number of hypothesized relationships among the exogenous and endogenous variables, the findings need to be interpreted with condition to the study limitations. Firstly, the current study employed a cross-sectional design that does not give room for causal illations to be made from the study population. Hence, a longitudinal design needs to be considered in the future for assessing the theoretical constructs at a dissimilar point in time to ascertain the findings of the current study.

In the same vein, the present research employs proportionate stratified random sampling, (i.e. selected from each cluster) that is all the population elements were picked randomly within one state in Malaysia, as such, the degree to which sample size represents the whole population were selected randomly (Sekaran, 2006). The use of random sampling has reduced the level of which the findings of the research can be vulgarized to the population. Hence, future study needs to go further than covering one state in Malaysia. Therefore, one sample frame was found from CIDB Malaysia 2017, which can be vulgarized to the whole construction industries operating in Kuantan Malaysia.

Subsequently, this research model revealed 44% of the total variance in construction risk management, which indicates that there are other latent variables that can importantly explain the variance in construction risk management. Therefore, the remaining 56% of the total variance for construction risk management can be explained by other factors. Therefore, future research is required to consider other likely factors that can make risk management to be more effective within Malaysian construction industries.

5.4 CONCLUSIONS

To this point, very little attention has been given to study the extent of construction risk management among Kuantan Malaysian construction industries, which the present study has determined the level of risk management practices within Kuantan Malaysian construction industries as the first research gap.

In general view, the present research has provided an extra prove to the developing body of knowledge regarding the moderating role of organizational culture on the relationship between organizational internal factors and construction risk management. Results from this study contributed more support to the main theoretical proposals. To be specific, the present study has successfully provided answers to all the research questions and objectives in spite of some of its limitations. Likewise, there have been many research investigating the underlying causes of construction risk management, however, the current study covered the theoretical gap by integrating organizational culture as an important moderating variable.

In summary, the present study meets all the following applicable quality requirements of a thesis (Hart 1998, p. 24). Firstly, this research is an empirically based which has not been done before. Second, this research makes use of already known practice and idea but with a new rendition. Thirdly, this research proofs new evidence to bear on the view about risk management in the Kuantan Malaysian construction industries with different tools (PLS-SEM) of analysis compared to what has been used in the previous literatures like SPSS and Excel. Fourthly, this research appears at areas that previous experts in construction industries have not looked at before.

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