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INVESTIGATING THE RELATIONSHIP BETWEEN ACTIVE LEADERSHIP AND CONSTRUCTION RISK MANAGEMENT AMONG CONTRACTORS IN KINGDOM OF SAUDI ARABIA

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ABSTRACT

Contractors have given importance to risks in the construction process as it causes time and cost overrun, delays and total desertion in activities and events present in the construction project. The uncertainty in the completion time, cost and quality during construction relates to construction risks. One important factor to deal with construction project complexities is active leadership. Present research examines the significant relation of active leadership on construction risk management associated with contractors working in Kingdom of Saudi Arabia (KSA). Based on Organization Control theory, current research (quantitative in nature) discusses the influence of active leadership on construction risk management with the moderation role of government acts, laws and policies among 303 big size company (> 250 number of employees) contractors working in Kingdom of Saudi Arabia (KSA) using PLS-SEM technique. Survey questionnaires were distributed with valid response rate of 82% using 5 point Likert scale. PLS-SEM is a composite based approach, which provides parameter estimation with high efficiency and increased statistical power for analyzing complex models. It is a causal-predictive method approach in which data distribution assumption is not taken into account for estimation of complex models which contains various constructs with variable indicators and structural paths. Results depict that government acts, laws and policies and active leadership positively influence construction risk management. In addition, moderation of government acts, laws and policies has positive relation among active leadership and construction risk management. It is difficult to control power in term of risk occurrence and low practice of government acts, laws and policies results high level of risk occurrence reducing efficiency of delivery output resulting construction risk management less effective. The reduction in risk occurrence during construction phase of project is supported by active leadership with lengthening the theory by inspecting extensive construction project risk ranges which includes equipment and labor risk, finance risk, design risk, material risk and administrative or management risk making organization effective. Organizational management can reduce risk occurrence within project by building conditions for enhancing active leadership among their employees.

Keywords: Active Leadership, Construction Management, Risk Management, Government Acts, Laws and Policies, Organization Control Theory

1. INTRODUCTION

The lack of project manager's ability and competency in dealing with project risks with effective risk management have implicated high level of cost and time overrun resulting in higher cost then planned budget and delayed time then planned schedule (Thuye et al., 2007). As construction project is complex in nature and involve numerous activities and events for completion, it is not possible to eliminate all risks associated with the construction project (Wang et al., 2004).

Moreover, substantial importance has been given to risk factors (e.g. design, material, management, labor and equipment) associated with construction project which have affected contractors resulting time delays and cost overrun (El-Sayegh, 2008).

As Kingdom of Saudi Arabia (KSA) is world's highest ranked among oil exporter, the growth of Saudi economy is increasing and hence the construction industry is booming. Kingdom of Saudi Arabia (KSA) government is inclined towards infrastructure development and construction of new housing units with the increase in the population resulting into high demand of construction scope (Husein, 2014).

According to KSA vision 2030, foreign construction companies are limited to apply for foreign investment license due to restrictive requirements imposed by KSA government to engage into development activities. Sharia-compliant finance, project finance and conventional finance are three substantial methods to finance any project in KSA. Ministry of Finance (MoF) is a state agency responsible to approve any government project which once approved is awarded to contractor after bidding process following the Saudi standards for contract. Share pledges, parent company guarantees, promissory notes and bank guarantees are major forms of investment security handed over to funders. Any fraud, deception, dishonesty, cheating or deceive from project execution to completion committed by the contractor is reported to Ministry of Finance KSA (Husein, 2014).

There is augmented growth of construction industry in KSA in the past decade because of Saudi Arabia's National Vision 2030 to develop and enhance KSA infrastructure which includes transportation system, commercial and residential buildings, sports and recreational facilities, new airports and railway constructions. Public-Private Partnership (PPP) contracts are majorly signed and executed in Kingdom of Saudi Arabia (KSA). Government of KSA is focusing on industrial, commercial and tourism activities to reduce the oil dependence (Farid et al. 2020).

There is always high risk to project success in the absence of proper management. Moreover, substantial importance has been given to risk factors associated with construction project which have affected contractors resulting time delays and cost overrun. It is important to examine conflict findings for influence of active leadership on construction risk management. Moreover, due to contextual and cultural differences from previous findings of past literature of KSA studies, active leadership and construction risk management have not been generalized.

1.1 KSA Construction sector

The strategic plan of a nation largely depends on the economic cities with the objective of expansion of life science, automotive, healthcare, IT, innovative and advance production, renewable energy and logistics sectors. The development of economic cities are gigantic construction projects, which involve huge work force, equipment and cost. One of strategic goal of KSA is to limit its economy on oil dependence and generate high demand of energy efficient buildings as 68% of total power consumption of KSA is utilized by AC systems. KSA has established Saudi Green Building Forum (SGBF) for sustainable construction (International Trade Administration, 2020).

During 2015-2018, construction activities in KSA were dropped due to low oil prices. Frail investor confidence and reduced public expenditure make KSA government to implement numerous severity actions resulting in fall in the construction division. The construction industry is expected to increase growth from 2020 onwards as oil prices become stabilize (International Trade Administration, 2020).

1.2 Risk Management

An unfavorable or loss chance outcome linked with action is termed as risk (Crane et al., 2013). Risk identification and assessment, treatment, monitoring and reporting are basic risk management processes (Ripley, 2020).

In order to implement risk management in project, it is important to start with risk management planning process, followed by identification and analysis. Identification and analysis result further initiate the process of response planning, implementation and monitoring of risks involved in the project resulting the impact or probability increase for the positive risks involved and impact or probability decrease for the negative risks involved, optimizing the project accomplishment chances (PMI, 2017).

1.3 Identification of risk factors in construction industry

Bajwa and Syed (2020) identified 29 construction risks factors using extensive literature review in KSA construction industry. Using quantitative approach by distributing questionnaires (distributing 126 and analyzing 115 as 11 questionnaires were incomplete), the study resulted that political and economic risks are the most critical factors affecting construction project.

Farid et al. (2020) identified 283 risk factors using extensive literature review. Qualitative approach was adopted with Relative Importance Index (RII) technique by distributing 122 questionnaires (out of which only 52 answered) to construction experts working in Pakistan. With conduction frequency analysis method, 66 (44 internal and 22 external) risks factors were used for analysis. The findings showed that poor decision making, unforeseen obstacles causing construction interruptions and delays in payments are among top three risk factors affecting construction sector.

Kowacka et al. (2019) carried out research on road construction based on expert knowledge, documentation acquired from various companies and disturbance analysis. The research identified 5 risk factors (geodetic) which are inappropriate attitude system for data development and layout of elevation of terrain, lack of GESUT data, project model or numerical terrain development and inappropriate horizontal layout.

Devi and Ananthanarayanan (2017) identified 68 risk factors based on construction professional input and extensive literature review in India. Quantitative approach was adopted with Relative Importance Index (RII) technique. Questionnaires were distributed among employees of 15 non-infrastructural projects. The findings show that construction deferments, scope creep and lowest bidder tender awarding are major causes of cost overrun.

Sharaf and Abdelwahab (2015) carried out research on highway projects in Egypt using MATLAB software for risk evaluation. 73 construction risk factors have been identified and categorized into 12 groups which are economical, force majeure, sponsor, project finance, project staff, design, standards and regulation, environmental and geotechnical, construction, subcontractor, site location and equipment.

Abusafiya and Suliman (2017) identified 45 risk factors in Bahraini construction industry based on past building data records, input from construction industry professionals and experts and literature review. Quantitative approach was adopted with Relative Importance Index (RII) technique by distributing 103 questionnaires (out of which 74 responded consisting of 11 engineers from client perspective, 21 engineers from consultant perspective and 44 engineers from contractors' perspective). The findings show that design changes, lag in planned activities and poor decision making are top three causes of cost overrun in Bahraini construction sector.

Algahtany et al. (2016) have identified 7 risk factors in KSA and introduced new model of risk management which is based on IMT and PIPS with respect to client decision making in term of construction management by owner. The findings show that adoption to new risk management model reduces management from client perspective to 80% and overall efficiency increment of 40%.

Tang et al. (2007) considered the obstruction to practice risk management system in construction industry in 6 different regions of Republic of China. Interviews and questionnaires with Dilemmas analysis method was adopted and questionnaires were distributed to examine the effect of 32 risk factors (from extensive literature review). The findings show that 6 factors (safety, lack in coordination, lack of advance technology, clashes and claims, early facility failure and management intervention) are critical factors in Chinese construction sector.

Zou et al. (2007) identified 25 construction risk factors based on literature review and ranked them according to their impact in Chinese construction sector. 32 risk factors were further categorized into contractor, sub-contractors and suppliers, client, designers, government department and external issues. Results show that client, design and supervision consultant and contractor should work together to develop risk management plan to encounter risk for effective risk management during initial stage.

1.4 Active Leadership

Great importance has been given to leadership styles, strategies and behavior as project success is largely depend on leadership. As construction project is complex in nature involving challenges which can only be tackled by active leadership. A project leader is the one who keep progressing the project even when emergency circumstances appear (Simpkins, 2009).

There are types of leaders, reactive and proactive in construction project. Reactive leaders are one who fix problem when any unforeseen event happens and proactive leaders are the one who provide information to project team. Proactive leaders are preferred in active leadership as they deliver the project within time and budget. Proactive leadership is considered to be firelight and reactive leadership is considered to be firefight. It is essential to adopt proactive leadership style for project to be delivered successfully (Barber & Warn , 2005).

The person who holds authority to encourage project team to achieve project goals is called leader.

Generally, construction and project managers are considered as leaders and members of project team are considered as followers. The main quality of a leader is to guide followers, give them directions, tackle traumatic situation and flexible to tackle risk incidents (Greenberg & Baron, 2007).

1.5 Construction risk management

Risk factors related to construction industry are categories into various ways e.g. design, financial, material, client, subcontractor, internal and external risk factors (Jarkas & Haup, 2015; Stephen & Raftery, 1992; El-Sayegh, 2008) Based on extensive literature review, following are five highly exposed risk factors related to construction risk management:

1. Equipment and labor risk factor
2. Financial risk factor
3. Design risk factor
4. Material risk factor
5. Administrative or Management related risk factor

1.6 Government Acts, Laws and Policies

Government acts, laws and policies indicates the construction material cost regulations, contractor licensing rules and clauses, labor safety and health related contracts and regulations of tendering process. Taofeeq et al., (2020) have studied the moderation role of government acts, laws and policies among Malaysian G7 contractors. It was found through application of structural equation modelling (SEM) that government acts, laws and policies support positive relation among contractor risk attitudes and physical health, contractor risk attitudes and working experience and contractor risk attitudes and professional competence.

Maina et al., (2017) have studied the influence of moderator government acts, laws and policies (rules and regulations) among financial hydrology investment and recovery (cost) in Kenya. The application of structural equation modelling (SEM) with descriptive and inferential analysis shows that investment profile of metropolitan hydro is characterised by less recovery (cost) discouraging investors to invest in the project .

In construction industry of Nigeria, Adeleke et al. (2016) have estiblished significant relation of government acts, laws and policies between active leadership and construction risk management. Gibb (2011) studied the housing policies and perform policy analysis of housing units in Scotland. The housing policies in Scotland has high impact on rental values as government lacks in social housing clarity of long-term goals.

1.7 Organizational Control Theory

Previous literature results in establishing conceptual framework based on theoretical gap and empirical findings. Present research is enlightened, affirmed and linked with organizational control theory’s theoretical grounds. Relationship confirmation between government acts, laws and policies, construction risk management and active leadership can be explained theoretically by organization control theory. According to organization control theory, establishment and implementation of proper control must theoretically moderate occurrence of risk on project (construction) in connection with proper monitoring, controlling and compensating team players, project managers and organization itself assuming that occurrence of risk can be reduced through government acts, laws and policies (Jaworski, 1988; Ouchi, 1979; Flamholtz et al., 1985).

Risks within organization can be reduced by adopting organization control procedures. The study of Adeleke et al., (2017) found that active leadership have positive effect on construction risk. Likewise, Lai et al. (2005) found that risk occurrence is reduced on construction projects through proper controlling by rules and regulations.

1.8 Conceptual framework and hypothesis development

In this research, active leadership is independent variable. Government acts, laws and policies is moderator and construction risk management (equipment and labor risk factor, design risk, financial risk, material risk, management risk) is dependent variable. The arrow direction indicates that independent variable (active leadership) has influence on dependent variable (construction risk management) with moderator (government acts, laws and policies). The conceptual framework diagram is showed in figure 1.

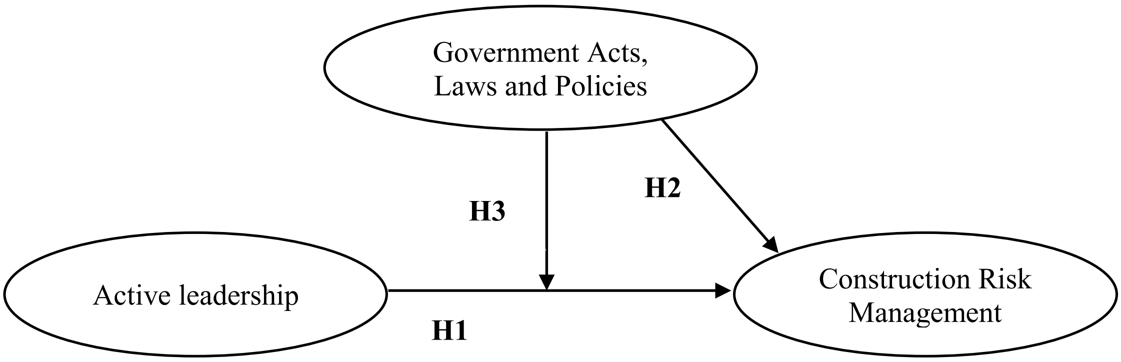

Figure 1: Conceptual Model

Hypothesis 1: Active leadership have significant relation with construction risk management associated with contractors working in Kingdom of Saudi Arabia (KSA).
Hypothesis 2: Government Acts, Laws and Policies have significant relation with construction risk management associated with contractors working in Kingdom of Saudi Arabia (KSA).
Hypothesis 3: Moderating effect of government acts, laws and policies on relation between active leadership and construction risk management associated with contractors working in Kingdom of Saudi Arabia (KSA).

2. METHODOLOGY

2.1 Epistemology and Nature of Present Study

Positivism philosophy is the foundation of current research i.e. quantitative in nature. In positivist paradigm approach, true knowledge is obtained by observation and experiment based on empiricism, determinism, generality and parsimony using scientific method application. Observation, experimentation, measurement, control, reliability and validity are basic process of positivist paradigm approach. Positivist paradigm is quantification approach which generalize the knowledge process vital to boost and discernment parameter description precision and relationship between them using statistical analysis. Empirical approaches and statements are adopted in social survey is the underpinning of quantitative research. Analysis is performed on numerical data using statistical approach in quantitative research (Creswell & Creswell, 2018; Apuke, 2017; Creswell et al., 2004).

2.2 Population

There are total 361 big company size contractors which contributes 8.87% of total contractors. There are 4 categories of contractor based on number of employees working which are very small company size (1 to 5 number of employees), small company size (6 to 49 number of employees), medium company size (50 to 249 number of employees) and big company size (greater than 250 number of employees) ((SCA), 2021). 361 (consisting of corporations, limited liability company, general partnership and sole proprietorship) registered big size companies (contractors) have been chosen in this research because small business companies possess a basic form of risk and lower market value whereas the bigger business companies are in the higher rate of risk. Unit of analysis is big size contractors (> 250 number of employees) working in Kingdom of Saudi Arabia. Population consist of CEO, project managers, construction managers, engineers, supervisors. foremen and others.

2.3 Sampling

The present research has adopted probability sampling techniques (simple random sampling) as every group present in the population have a definite and discrete probability. Application of G*Power 3.1.9, Krejcie and Morgan formula, Yamane formula, Cochran formula and following Hair et al. (2018), the minimum sample size required for present study is 190 for population size of 361 (Aarons, 2021; Krejcie and Morgan, 1970; Yamane, 1967; Cochran, 1963).

2.4 Data Collection

The researcher is responsible for administering the questionnaire to the targeted participants. There are minimum 190 duly filled questionnaires required for quantitative data analysis. Responding to any inquiry from participant and achieve good response rate, physical questionnaire distribution among KSA contractors is selected resulting into time saving through immediate response.

Total 370 questionnaires were distributed among big size company contractors working in Kingdom of Saudi Arabia to the target respondents. 322 questionnaires were returned and 303 questionnaires were used for analysis as 19 questionnaires were incomplete, as participants have not filled the substantial part of the questionnaire. 82% is valid response rate (overall) for the current study.

2.5 Variable measurement and operational

Research adopted 5 point Likert scale from the study of Moshood et al. (2020) for extent of occurrence of risks.

Table 1: Constructs Variables, Scale, Indicators and Source

Constructs	Variables	Scale	Indicators	Source
Active leadership	Active leadership	5-Point	4	(Adeleke et al., 2017)
Construction Risk Management	Administrative or management risk	5-Point	3	(Adeleke et al., 2016)
	Equipment and labor risk	5-Point	6	Adeleke et al., 2016)
	Design risk	5-Point	4	(Rehman & Ishak, 2021)
	Financial risk	5-Point	3	Adeleke et al., 2016)
	Material risk	5-Point	4	(Rehman & Ishak, 2022)
Government Acts, Laws and Policies	Rules and regulations	5-Point	5	(Adeleke, et al., 2018)

2.6 Statistical analysis

SmartPLS v3.3.3 is used as statistical tool for the present study. Statistical technique, which iteratively maximizes the endogenous constructs, explained variance is termed as Partial Least Square-Structural Equation Modelling (PLS-SEM) (Hair et al., 2014). It is a causal-predictive method approach in which data distribution assumption is not taken into account for estimation of complex models, which contains various constructs with variable indicators and structural paths (Hair et al., 2019).

3. RESULTS

3.1 Participants demographic profile

Participants demographic profile is represented in table 2. There are 215 (71%) men and 88 (29%) women who participated in the current study. Out of 303 participants, 7 (2.3%) are Chief Executive Officer (CEO), 16 (5.3%) are Project Managers (PM), 27 (8.9%) are Construction Managers (CM), 109 (36%) are engineers, 25 (8.3%) are supervisors, 34 (11.2%) are foremen and 85 (28.1%) are others. 24 (7.9%) have less than 1 year of working experience, 42 (13.9%) have working experience between 1 to 5 years, 141 (46.5%) have working experience between 6 to 10 years, 56 (18.5%) have working experience between 11 to 15 years and 40 (13.2%) have working experience of more than 15 years.

Table 2: Participants Demographic Profile

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	215	71
	Female	88	29
Position in the Company	CEO	7	2.3
	Project Manager	16	5.3
	Construction Manager	27	8.9
	Engineer	109	36
	Supervisor	25	8.3

	Foreman	34	11.2
	Others	85	28.1
Working Experience	< 1 year	24	7.9
	1 – 5 years	42	13.9
	6 – 10 years	141	46.5
	11 – 15 years	56	18.5
	More than 15 years	40	13.2

3.2 Companies demographic profile

Companies demographic profile is represented in table 3. Based on big size company (> 250 number of employees) contractors' specialty, 22 (7.3%) big size company contractors belong to mining support services, 27 (8.9%) are linked with waste collection, treatment and disposal activities; materials recovery, 131 (43.2%) provide services related to construction of buildings, 26 (8.6%) are specialized in civil engineering, 31 (10.2%) are specialized in construction activities and 66 (21.8%) provide services to building and landscape activities.

Based on company ownership, 52 (17.2%) are sole proprietorship, 61 (20.1%) holds general partnership, 159 (52.5) are Limited Liability Companies (LLCs) and 31 (10.2%) represents Corporations. Based on company existence, there are 8 (2.6%) big size company contractors which has less than 1 year of existence, 30 (9.9%) have 1 to 3 years of existence, 77 (25.4%) have 4 to 6 years of existence, 95 (31.4%) have 7 to 10 years of existence and 93 (30.7%) have more than 10 years of existence.

Based on fulltime employees, 35 (11.6%) ranges between 250 to 275 employees, 82 (27.1%) ranges between 276 to 300 employees, 75 (24.8%) ranges between 301 to 325 employees, 72 (23.8%) ranges between 326 to 350 employees and 39 (12.9%) have more than 350 employees.

Table 3: Companies Demographic Profile

Demographic Variable	Category	Frequency	Percentage (%)
Company Specialty	Mining support services	22	7.3
	Waste collection, treatment and disposal activities; materials recovery	27	8.9
	Construction of buildings	131	43.2
	Civil Engineering	26	8.6
	Specialized construction activities	31	10.2
	Services to buildings and landscape activities	66	21.8
Company Ownership	Sole Proprietorship	52	17.2
	General Partnership	61	20.1
	Limited Liability Company	159	52.5
	Corporation	31	10.2
Company Existence	< 1 year	8	2.6
	1 – 3 years	30	9.9
	4 – 6 years	77	25.4
	7 – 10 years	95	31.4
	More than 10 years	93	30.7
Fulltime Employees	250 – 275	35	11.6
	276 – 300	82	27.1
	301 – 325	75	24.8
	326 – 350	72	23.8
	> 350	39	12.9

3.3 Measurement model assessment

The constructs measure validity and reliability is done through measurement model assessment. Measurement model assessment includes individual item reliability, internal consistency reliability, convergent validity and discriminant validity. Figure 2 represents measurement model for the current study.

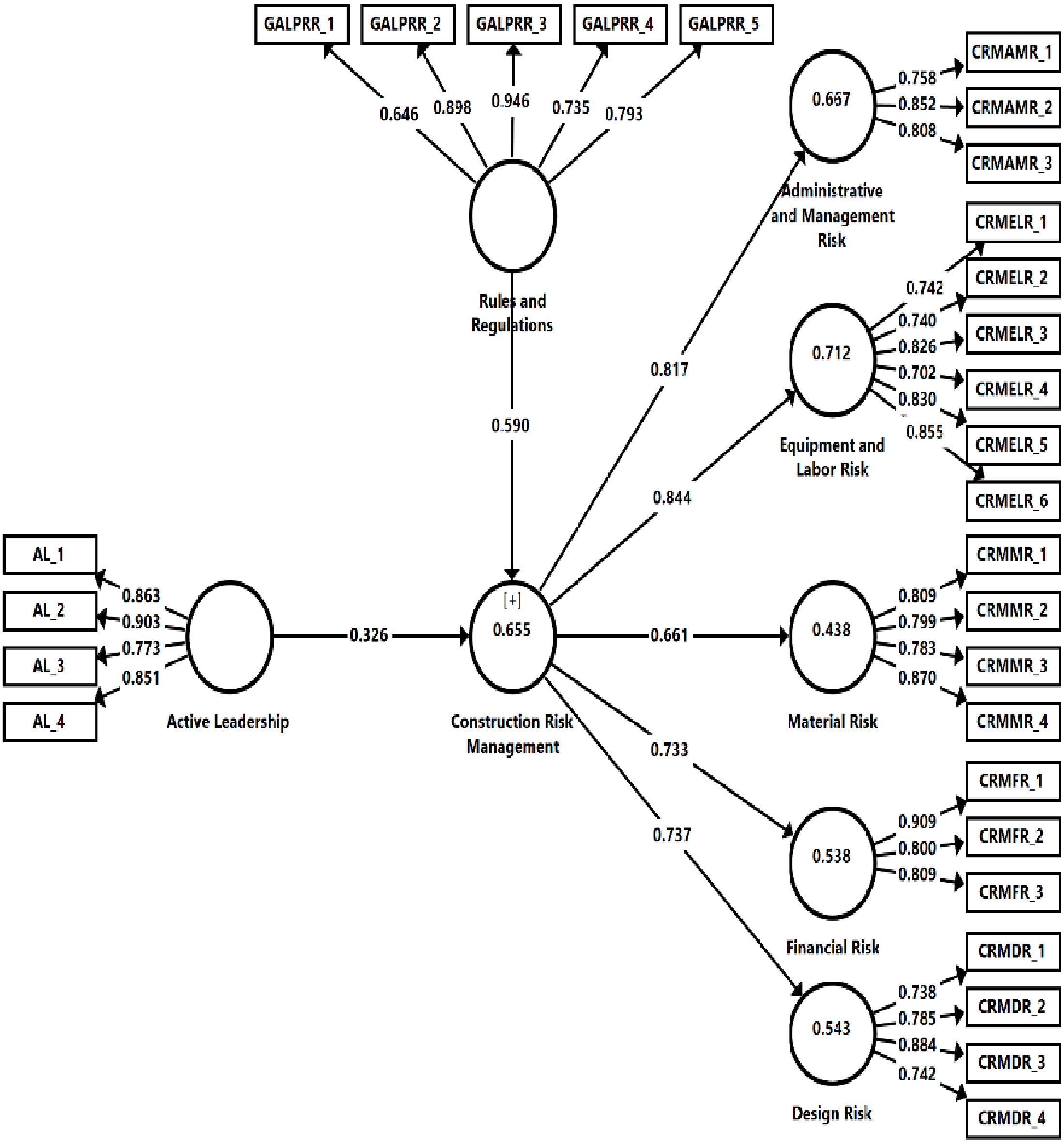

Figure 2: Measurement Model

Table 4 represents the Composite Reliability (CR) and Cronbach's Alpha values for all constructs. For current study, Cronbach's Alpha value is greater than 0.7 for all constructs and Composite Reliability (CR) value is greater than 0.6 and less than 0.95, so the present research satisfies the quality criteria for Internal Consistency Reliability (Hair et al., 2019).

Table 4: Loadings, Cronbach's Alpha, CR and AVE

Constructs	**Items**	**Loadings**	**Cronbach's Alpha**	**Composite Reliability**	**Average Variance Extracted (AVE)**
Active Leadership	AL_1	0.863	0.870	0.911	0.721
	AL_2	0.903			
	AL_3	0.773			
	AL_4	0.851			
Administrative and Management Risk	CRMAMR_1	0.758	0.732	0.848	0.651
	CRMAMR_2	0.852			
	CRMAMR_3	0.808			

Equipment and Labor Risk	CRMELR_1	0.742	0.874	0.905	0.616
	CRMELR_2	0.740			
	CRMELR_3	0.826			
	CRMELR_4	0.702			
	CRMELR_5	0.830			
	CRMELR_6	0.855			
Material Risk	CRMMR_1	0.809	0.833	0.888	0.665
	CRMMR_2	0.799			
	CRMMR_3	0.783			
	CRMMR_4	0.870			
Financial Risk	CRMFR_1	0.909	0.792	0.878	0.707
	CRMFR_2	0.800			
	CRMFR_3	0.809			
Design Risk	CRMDR_1	0.738	0.798	0.868	0.623
	CRMDR_2	0.785			
	CRMDR_3	0.884			
	CRMDR_4	0.742			
Rules and Regulations	GALPRR_1	0.646	0.864	0.904	0.658
	GALPRR_2	0.898			
	GALPRR_3	0.946			
	GALPRR_4	0.735			
	GALPRR_5	0.793			

3.3.1 Convergent Validity

One supporting segment parameter of construct validity is convergent validity. It is degree at which latent variable measures are related to other measures of the same latent variable (Cheah et al., 2018). Value of CR and AVE. AVE is the construct variance amount captured with respect to measurement error variance amount. For the current research, convergent validity is attained when composite reliability value is more than 0.6 and AVE is greater than 0.5 (Fornell & Larcker, 1981).

3.3.2 Discriminant validity

When two or more constructs are distinguished empirically from each other is termed as discriminant validity i.e. latent variables involved in the structure equation modeling (SEM) are distinct and dissimilar from one another (Rönkkö & Cho, 2020). The main objective of establishing discriminant validity is to confirm that constructs are unique and have strong correlation with its indicators (Hair Jr. et al., 2017).

There are three criteria for establishing discriminant validity i.e. Fornell-Larcker criterion (Fornell & Larcker, 1981), Cross loading (Hair et al., 2017) and Heterotrait-Monotrait ratio of correlations (HTMT) (Henseler et al., 2015).

Table 5 represents achievement of discriminant validity according to Fornell-Larcker criterion. It provides a comparison between values of AVE square roots with correlation of latent variable. Value of each construct AVE square root should be larger than other construct's highest correlation. Alternatively, the square of each latent construct's Average Variance Extracted (AVE) should be larger than the other latent constructs correlations (Fornell & Larcker, 1981).

Table 5: Fornell-Larcker Criterion

	Active Leadership	**Administrative and Management Risk**	**Design Risk**	**Equipment and Labor Risk**	**Financial Risk**	**Material Risk**	**Rules and Regulations**
Active Leadership	0.849						
Administrative and Management Risk	0.626	0.807					
Design Risk	0.459	0.552	0.789				
Equipment and Labor Risk	0.475	0.619	0.462	0.785			

Financial Risk	0.522	0.501	0.522	0.504	0.841		
Material Risk	0.362	0.482	0.337	0.418	0.362	0.816	
Rules and Regulations	0.520	0.669	0.564	0.606	0.555	0.501	0.811

The new criteria of establishing discriminant validity in PLS-SEM is Heterotrait-Monotrait ratio of correlations (HTMT). Table 6 represents HTMT criteria for Discriminant Validity. The threshold value of HTMT is 0.85. For the current study, all constructs depict value of HTMT less than 0.85, so $HTMT_{.85}$ criteria for discriminant validity is fulfilled (Henseler et al., 2015).

Table 6: HTMT Criteria

	Active Leadership	**Administrative and Management Risk**	**Design Risk**	**Equipment and Labor Risk**	**Financial Risk**	**Material Risk**	**Rules and Regulations**
Active Leadership							
Administrative and Management Risk	0.759						
Design Risk	0.539	0.688					
Equipment and Labor Risk	0.529	0.754	0.523				
Financial Risk	0.621	0.642	0.638	0.591			
Material Risk	0.416	0.589	0.389	0.465	0.444		
Rules and Regulations	0.587	0.831	0.656	0.685	0.658	0.585	

Table 7 represents the cross loadings for current study. Each construct's indicator outer loading should be more than any of its cross loadings/correlation on other construct. Value of each indicator outer loading more than cross loadings, so the criteria for cross loading for establishing discriminant validity is fulfilled (Hair et al., 2017; Henseler et. al., 2015).

Table 7: Cross Loading

	Active Leadership	**Administrative and Management Risk**	**Design Risk**	**Equipment and Labor Risk**	**Financial Risk**	**Material Risk**	**Rules and Regulations**
AL_1	**0.863**	0.517	0.395	0.408	0.375	0.314	0.421
AL_2	**0.903**	0.514	0.329	0.456	0.451	0.275	0.477
AL_3	**0.773**	0.371	0.462	0.318	0.430	0.299	0.326
AL_4	**0.851**	0.689	0.383	0.420	0.509	0.336	0.521
CRMFAMR_1	0.616	**0.758**	0.561	0.556	0.425	0.461	0.575
CRMFAMR_2	0.454	**0.852**	0.440	0.465	0.415	0.364	0.572
CRMFAMR_3	0.420	**0.808**	0.305	0.463	0.361	0.323	0.456
CRMFDR_1	0.272	0.426	**0.738**	0.357	0.352	0.146	0.312
CRMFDR_2	0.279	0.335	**0.785**	0.198	0.293	0.135	0.326
CRMFDR_3	0.450	0.573	**0.884**	0.513	0.447	0.340	0.540
CRMFDR_4	0.406	0.362	**0.742**	0.323	0.520	0.386	0.547
CRMFELR_1	0.326	0.465	0.266	**0.742**	0.275	0.361	0.579
CRMFELR_2	0.437	0.523	0.457	**0.740**	0.483	0.364	0.420
CRMFELR_3	0.267	0.426	0.304	**0.826**	0.347	0.228	0.462
CRMFELR_4	0.229	0.309	0.343	**0.702**	0.334	0.196	0.295
CRMFELR_5	0.425	0.532	0.364	**0.830**	0.453	0.380	0.542
CRMFELR_6	0.492	0.605	0.417	**0.855**	0.445	0.398	0.529
CRMFFR_1	0.480	0.499	0.488	0.487	**0.909**	0.258	0.455
CRMFFR_2	0.350	0.308	0.381	0.329	**0.800**	0.314	0.336
CRMFFR_3	0.474	0.436	0.439	0.440	**0.809**	0.349	0.594
CRMFMR_1	0.288	0.467	0.213	0.494	0.284	**0.809**	0.334
CRMFMR_2	0.319	0.380	0.306	0.289	0.280	**0.799**	0.424

CRMFMR_3	0.194	0.233	0.224	0.206	0.236	**0.783**	0.350
CRMFMR_4	0.356	0.448	0.350	0.332	0.365	**0.870**	0.514
GALPRR_1	0.374	0.588	0.447	0.279	0.301	0.306	**0.646**
GALPRR_2	0.328	0.419	0.434	0.489	0.442	0.451	**0.898**
GALPRR_3	0.514	0.655	0.556	0.576	0.522	0.483	**0.946**
GALPRR_4	0.313	0.369	0.295	0.541	0.455	0.409	**0.735**
GALPRR_5	0.539	0.657	0.527	0.527	0.497	0.364	**0.793**

3.4 Structural Model Assessment

After assessment of measurement model, assessment of structural model is done which includes significance of path coefficients, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2) and moderating effect (Hair, Jr. et al. 2017). Figure 3 represents structural model with government acts, laws and policies (rules and regulations) as moderator.

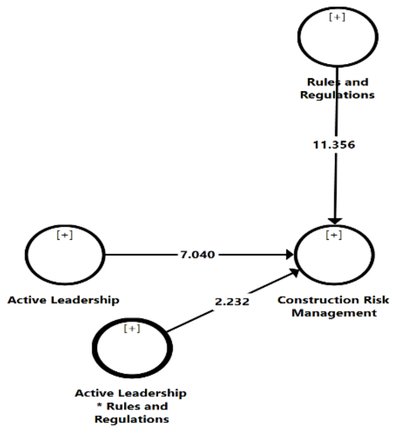

Figure 3: Structural Model

3.4.1 Significant of path coefficients

Current study has employed non-parametric procedure i.e. Bootstrapping with 5000 subsamples and 303 cases for statistical significance of relation between active leadership on construction risk management with moderator government acts, laws and policies (Hair, Jr. et al., 2017).

Table 8 represents the estimation of significance of path coefficients and hypothesis testing using bootstrapping technique (5000 bootstrapping samples with 303 cases). Two tailed test's critical T-statistics value is 1.96 at significant level of 5% (0.05) (Hair, Jr. et al., 2017).

Table 6: Hypothesis Testing

	Original Sample (O)	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values***
Active Leadership → Construction Risk Management	0.371	0.374	0.053	7.040	0.000
Government Acts, Laws and Policies (Rules and Regulations → Construction Risk Management	0.553	0.551	0.049	11.356	0.000
Active Leadership * Government Acts, Laws and Policies (Rules and Regulations) → Construction Risk Management	0.144	0.143	0.065	2.232	0.026

* two tailed (0.05)

Hypothesis 1 is supported ($\beta = 0.371$, T-statistics = 7.04 > 1.96 and $p < 0.05$) that active leadership have significant positive relation with construction risk management associated with contractors working in Kingdom of

Saudi Arabia (KSA). The research finding using PLS-SEM specifies active leadership is positively connected with construction risk management. The significant positive relation among active leadership and construction risk management is in line with the study of Omer et al. (2021) reporting a positive significant relation among active leadership and construction risk management associated with Malaysian construction industry and Adeleke et al. (2017) reporting a positive significant relation among active leadership and construction risk management associated with Nigerian construction companies.

Hypothesis 2 is supported ($\beta = 0.553$, T-statistics = $11.354 > 1.96$ and $p < 0.05$) that government acts, laws and policies have significant positive relation with construction risk management associated with contractors working in Kingdom of Saudi Arabia (KSA). Government acts, laws and policies positively connected with construction risk management among contractors associated i.e. modification in the government acts, laws and policies will affect construction management in term of project drawings and design, selection of type of construction materials, financial affairs, equipment and labors. The research findings indicate that the proper implementation of government acts, laws and policies within Kingdom of Saudi Arabia (KSA) contractors improve the effectiveness of construction risk management practice. The risk level within organization is reduced by practicing government acts, laws and policies which is in line with the study of Sabodin and Adeleke (2020) who reported significant positive connection of government acts, laws and policies on construction management (waste related category) on G7 construction companies operating in Malaysia.

Hypothesis 3 is supported ($\beta = 0.144$, T-statistics = $2.232 > 1.96$ and $p < 0.05$) that moderating effect of government acts, laws and policies has significant positive relation between active leadership and construction risk management associated with contractors working in Kingdom of Saudi Arabia (KSA). The outcome of the present research findings is consistent with organizational control theory i.e. the risk occurrence is controlled or limited following protocols before construction project execution. Practicing high level of government acts, laws and policies within organization results in low risk occurrence making construction risk management effective.

3.4.2 Variance explained endogenous variable

The use of coefficient of determination (R^2) is another vital criterion for assessing structural model. It is statistical measure of dependent variable variance proportion predicted from independent variable (or variables) (Lewis-Beck & Lewis-Beck, 2016; Hamilton et al., 2015). Coefficient of determination (R^2) is also referred as in-sample predictive power (Rigdon, 2012). It ranges from 0 to 1 and minimum acceptable value is 0.1 (Hair et al., 2019).

According to Chin (1998), coefficient of determination (R^2) value of 0.19 is considered very weak, 0.33 is considered weak, 0.67 is considered moderate and above 0.67 is considered substantial. For current study, coefficient of determination (R^2) value of 0.69 of construction risk management has substantial predictive power i.e. active leadership and government acts, laws and policies (rules and regulations) mutually explain 69% variance in construction risk management.

3.4.3 Effect size of Latent variable

Effect size is related to statistical measurement of relationship strength among variables numerically. Effect size is representation of influence of exogenous variable on endogenous variable in term of coefficient of determination (R^2) (Selya et al., 2012). According to Cohen (1998), effect size of 0.35 is considered as strong, 0.15 is considered as medium and 0.02 is considered as weak.

The effect size of active leadership is 0.301 which lies in the medium category i.e. active leadership have moderate effect on construction risk management.

3.4.4 Predictive Relevance (Q^2)

The current research has applied blindfolding procedures using Stone-Geisser test for predictive relevance on research model (Geisser, 1974; Stone, 1974). This test is an indicative measure of predictive relevance or out-of-sample predictive power (Hair Jr. et al., 2017). It is an additional goodness of fit measure for PLS-SEM (Rigdon, 2012; Sarstedt et al., 2014).

According to Chin (2010), the cut off value of Q^2 is 0 i.e. Q^2 smaller than zero represents lacking of predictive relevance while Q^2 larger than zero represents the predictive relevance of endogenous construct. The result of cross-validated redundancy Q^2 test depicts value of $0.247>0$, therefore the present research model has predictive relevance.

Table 7 : Cross-Validated Redundancy

Total	SSO	SSE	Q² = 1-(SSE/SSO)
Construction Risk Management	6060	54562.336	0.247

3.4.5 Testing moderating effect

The present research has utilized the product indicator technique with PLS-SEM for estimation of moderation effect of government acts, laws and policies (rules and regulations) on the relation among active leadership with risk management related to construction among KSA contractors. Product Indicator technique utilizes all indicators possible pair combinations interaction of latent variable and latent moderator (Becker et al., 2018; Hair, Jr et al., 2017).

Figure 4 represents government acts, laws and policies positively strengthen the relation among active leadership and risk management related to construction. The moderating effect is proposed as it is difficult to control power in term of risk occurrence and low practice of government acts, laws and policies results high level of risk occurrence reducing efficiency of delivery output resulting construction risk management less effective.

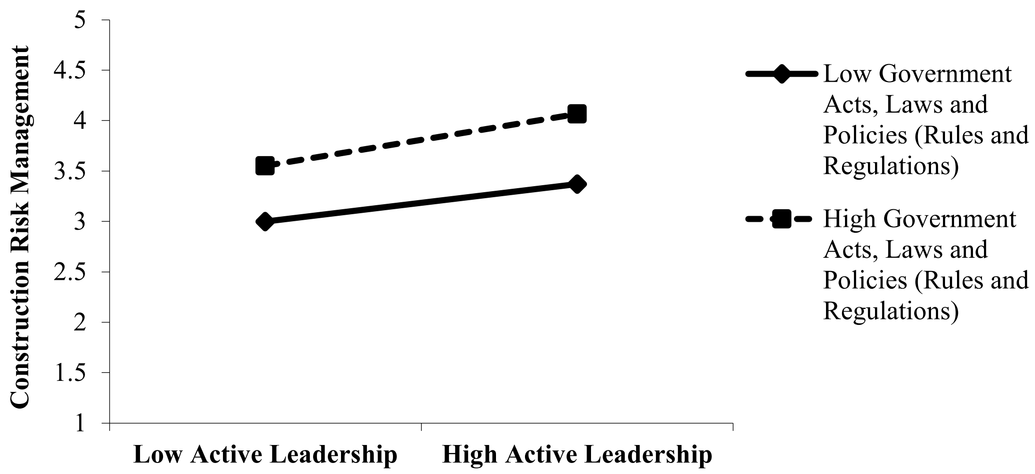

Figure 4: Moderation Effect

3.4.6 Strength of the moderating effects

The effect size of endogenous variable (construction risk management) was calculated to ascertain the moderating interaction strength of government acts, laws and policies on relation among active leadership (Cohen, 1988). Effect size (f^2) of endogenous latent variable (construction risk management) is calculated based on coefficient of determination (R^2) when moderator (government acts, laws and policies) is included and excluded from the structural model (Henseler et al., 2009).

For the current study, following formula is employed to determine the strength of moderating effect (Henseler et al., 2009; Cohen, 1988).

$$Effect\ size\ (f^2) = \frac{R^2\ (Model\ with\ Moderator) - R^2\ (Model\ without\ Moderator)}{1 - R^2\ (Model\ with\ Moderator)} \quad (1)$$

According to Cohen (1998), effect size of 0.35 is considered as strong, 0.15 is considered as moderate and 0.02 is considered as weak. Table 10 exhibit strength of moderating effect. The effect size value of endogenous latent variable (construction risk management) is 0.062, which lies in medium category.

Table 8 : Effect Size of Construction Risk Management

Endogenous Latent Variable	**R^2 (Included)**	**R^2 (excluded)**	**f-squared**	**Effect Size**
Construction Risk Management	0.690	0.671	0.062	Moderate

4. DISCUSSION

The core goal of the current research is to examine significant relationship of active leadership on construction risk management with moderation role of government acts, laws and policies among KSA contractors. All three hypotheses are supported.

Lack of active leadership results in majority of the construction projects cost and time overrun. Relationship confirmation between government acts, laws and policies, construction risk management and active leadership can be explained theoretically by organization control theory. According to organization control theory, establishment and implementation of proper control must theoretically moderate occurrence of risk on project (construction) in connection with proper monitoring, controlling and compensating team players, project managers and organization itself assuming that occurrence of risk can be reduced through government acts, laws and policies (rules and regulations).

Government acts, laws and policies are procedures and standards that regulates the country's internal and external affairs. These are regulations planned and adopted by the organization before execution of the project taking into account processes and steps involved for adopting safety and different kinds of construction materials in the construction phase. Modification in the government acts, laws and policies will affect construction risk management i.e. the project drawings and design, selection of type of construction materials, financial affairs, equipment and labors. The risk level within organization is reduced by practicing government acts, laws and policies

5. CONCLUSION AND RECOMMENDATION

Current study contributed to developing body of knowledge with an extra prove of moderation effect of government acts, laws and policies on relationship between active leadership and construction risk management supporting main theoretical proposal. There are three unique contributions from the current research. Active leadership has significant positive relation with construction risk management. Government acts, laws and policies has significant positive relation with construction risk management. Moderating effect of government acts, laws and policies has significant positive relation between active leadership and construction risk management. Present research has employed cross sectional design instead of longitudinal design, which does not provide causal illations drawn from the population study. There is need of longitudinal design adopted for future assessment of constructs. For future aspect, it is recommended to take into consideration medium, small and very small company size contractors associated with Kingdom of Saudi Arabia (KSA) for better understanding of risk management practices.

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