Moderating role of government Acts, laws and policies between team competency and skills and construction risk management among KSA contractors

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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 relate to construction risks. Project goals are achieved by classifying, investigating, and replying to risks associated with construction projects. To achieve project objectives, team competency and skills are required, which are viewed as attitude, aptitude, versatility, and knowledge. Based on organisation control theory, current research (quantitative in nature) discusses the influence of team competency and skills on construction risk management with the moderation role of government Acts, laws, and policies among 303 large-size contractors working in the Kingdom of Saudi Arabia using PLS-SEM technique. PLS-SEM is a composite-based approach that provides high efficiency parameter estimation with increased statistical power for analyzing complex models. Results depict that government Acts, laws and policies and team competency and skills positively influence construction risk management. In addition, moderation of government Acts, laws, and policies has positive relation among team competency and skills and construction risk management. Organisational management can reduce risk occurrence within a project by building conditions for enhancing team competency and skills.

KEYWORDS: Construction Management, Government Acts, laws and policies, Organisation Control Theory, Risk Management, Team Competency.

INTRODUCTION

An unfavorable or loss chance outcome linked with action is risk (Crane *et al.*, 2013). Risk identification and assessment, treatment, monitoring, and reporting are basic risk management processes (Ripley, 2020). Risk is ever-present, and no risk-free human activity exists (Szymański, 2017). Substantial importance has been given to risk factors (e.g. design, material, management, labour and equipment) associated with construction projects, which have affected contractors, resulting in delays and cost overrun (El-Sayegh, 2008).

It is important to accomplish project goals by classifying, investigating and replying to risks associated with construction projects. It can be achieved by implementing risk management processes with efficient use of available resources (Zou, Zhang, & Wang, 2007). On the contrary, poor, inadequate, and deficient risk management in construction projects have imparted cost overrun and time delay (Andi, 2006). As construction projects are 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, Dulaimi, & Aguria, 2004).

The lack of project manager's ability and competency in dealing with project risks with effective risk management has caused high cost and time overrun, resulting in higher costs than planned budget and delayed time than planned schedule (Thuye, Ogunlana, & Dey, 2007). The risk management effectiveness on construction projects has been deliberated across the globe e.g. the study of Andi (2006) in Indonesia, Hameed and Woo (2007) in the Islamic Republic of Pakistan, Gao, Ren, and Cai (2019) in the Republic of China, Kartama and Kartamba (2001) in the State of Kuwait, Ling and Hoi (2006) in the Republic of India, Sambasivan and Soon (2007) in Malaysia, Aibinu and Jagboro (2002) in Nigeria and Thuye, Ogunlana and Dey (2007) in Vietnam. Construction risk management is specific and relies on each country's economic, cultural, and political condition. A significant portion of risk management depends on the distinctive nature of construction companies practicing in specific countries (Andi, 2006).

Theoretically, Dikmen *et al.* (2008) explained the effect of construction risk factors which causes inefficient risk management employed in many construction projects of any country. Hence, cost and time overrun, scope creep, and low quality are major risk factors which on long-term basis deter the accomplishment of project objectives. However, the effectiveness and extent of risk management in terms of material, management, finance, design, equipment and labor risks have not been examined (El-Sayegh, 2008; Walker, 2015).

Alterations in project specifications, design errors, scope change, and impractical contract intervals are major risks involved in construction parties related to the Kingdom of Saudi Arabia, which require high competency of effectual risk management to be dealt with (Littlejohn & Foss, 2009).

LITERATURE REVIEW

The Kingdom of Saudi Arabia KSA Construction Sector

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

The strategic plan of a nation largely depends on the economic cities with the objective of expanding life science, automotive, healthcare, IT, innovative and advanced production, renewable energy, and logistics sectors. The development of economic cities are gigantic construction projects, which involve huge workforce, equipment, and cost. One of the strategic goals of KSA is to limit its economy on oil dependence and generate high demand of energy-efficient buildings as 68% of the 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 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 are stabilised (International Trade Administration, 2020).

Indication of Risk Factors

Bajwa and Syed (2020) identified 29 construction risks factors using an extensive literature review in the KSA construction industry. Farid *et al.* (2020) identified 283 risk factors using extensive literature review. Also, Kowacka *et al.* (2019) researched road construction based on expert knowledge, documentation acquired from various companies and disturbance analysis. The research identified five risk factors (geodetic) which are: inappropriate attitude system for data development and layout of elevation of the 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 professional construction input and extensive literature review in India. Sharaf and Abdelwahab (2015) researched highway projects in Egypt using MATLAB software for risk evaluation. Seventy-three construction risk factors have been identified and categorised into 12 groups: economic, 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 the Bahraini construction industry based on past building data records, input from construction industry professionals and experts and literature review. Also, Algahtany *et al.* (2016) identified seven risk factors in KSA and introduced a new model of risk management which is based on IMT and PIPS with respect to client decision making in terms of construction management by the owner.

Tang *et al.* (2007) considered the obstruction to practice risk management systems in the construction industry in six different regions of the Republic of China. Zou *et al.* (2007) identified 25 construction risk factors based on literature review and ranked them according to their impact on the Chinese construction sector. Rostami (2016) studied the construction industry of the UK, focusing on SMEs and identified risk identification tools and techniques as documentation review, judgment from experts, analysis for checklist, gathering of information, SWOT, assumption analysis, and diagramming techniques for improving risk management process.

Dinu (2012) has identified risk identification techniques as SWOT analysis, flowchart method, brainstorming, risk questionnaires, and risk surveys. Garrido *et al.* (2011) studied the Brazilian construction industry and identified risk identification techniques as nominal group technique, interview/expert judgment, brainstorming, Delphi technique, influence diagram, checklist, flow charts, scenario building, pondering, root cause identification, cause-and-effect diagrams, case-based approach, questionnaire, electronic brainstorming, SWOT analysis, Synectics, what if? SWIFT structure and business impact analysis

Kansal and Sharma (2012) have identified risk identification techniques using the risk significant index method: flowcharts, checklists, interview/expert judgment, Delphi technique, brainstorming, influence diagram, and cause-and-effect diagrams. For the development of risk assessment modeling, Bakr *et al.* (2012) introduced a heuristic approach to Risk Breakdown Structure (RBS), making risk management effective.

Team Competency and Skills

To achieve project objectives, team competency and skills are vital variables as it is important for the project team, project and construction manager, and contractors to gain technical knowledge and skills. Team competency and skills are viewed as attitude, aptitude, versatility and knowledge. Team competency is linked with team dynamics (team's performance which is influenced by team behaviour). Every company's prime concern is to train, instruct and educate employees (project team, construction and project manager) for dealing with urgent matters with appropriate actions (Simpkins, 2009). The project is delivered successfully only with a competent, trained and skilled project team (Moe & Pathranarakul , 2006).

If any unfavourable event happens on the construction site, the project team, construction and project manager, and contractor should be equipped with abilities and skills to tackle it successfully. A project team is working to achieve project goals and objectives within time, cost and quality, which can only be possible by equipping them with appropriate skills (Greenberg & Baron, 2007).

Construction Risk Management

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

1. Equipment and labour risk factor
2. Financial risk factor
3. Design risk factor
4. Material risk factor
5. Administrative or management-related risk factor

Government Acts, Laws and Policies

Taofeeq *et al.* (2020) studied the moderating role of government Acts, laws, and policies (rules and regulations) among Malaysian G7 contractors. Their study found through the application of structural equation modelling (SEM) that government Acts, laws and policies support positive relations among contractor risk attitudes and physical health, contractor risk attitudes and working experience and contractor risk attitudes and professional competence.

Maina, Geoffrey *et al.* (2017) also 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 modeling (SEM) with descriptive and inferential analysis shows that the investment profile of metropolitan hydro is characterised by less recovery (cost), discouraging investors from investing in the project.

In the construction industry of Nigeria (Adeleke, Bahaudin, & Kamaruddeen, 2016) have established significant relation of government Acts, laws and policies between team competency and skills and construction risk management. Gibb (2011) studied the housing policies and performed policy analysis of housing units in Scotland. The housing policies in Scotland have a high impact on rental values as the government lacks clarity of long-term goals for social housing.

Niu (2008) studied problems and difficulties in housing policies of the Republic of China using the Cobb-Douglas utility function. It was found that changes in housing policies have a deep impact on the affordable housing programme in the Republic of China. It is in line with the study of Ismail, Yusuwan and Baharuddin (2012) that shows a positive relationship exists between government Acts, laws and policies (rules and regulations), and construction risk management in the Malaysian housing industry. It was recommended to adopt industrialised building system (IBS) over traditional building practices to reduce cost, save time and improve construction quality (Mydin, Sani, & Taib, 2014).

Construction is an industry that has high safety and health risks. Labours are more exposed to chemicals and biological substances, sound pollution, and temperature variations. Government Acts, laws, and policies are developed to safeguard the workers' contracts which have significant effect on construction risk management and project performance (Sivaprakash & Skanchana, 2018)

Conceptual Framework and Hypothesis Development

Conceptual model for the current research is shown in Figure 1. Team competency and skills is the independent variable, while construction risk management is the dependent variable and government Acts, laws and policies as moderator.

Hypothesis 1: Team competency and skills have significant relation with construction risk management associated with contractors working in the KSA.

Hypothesis 2: Government Acts, Laws and Policies have significant relation with construction risk management associated with contractors working in the KSA.

Hypothesis 3: Moderating effect of government Acts, laws, and policies on the relation between team competency and skills and construction risk management associated with contractors working in the KSA.

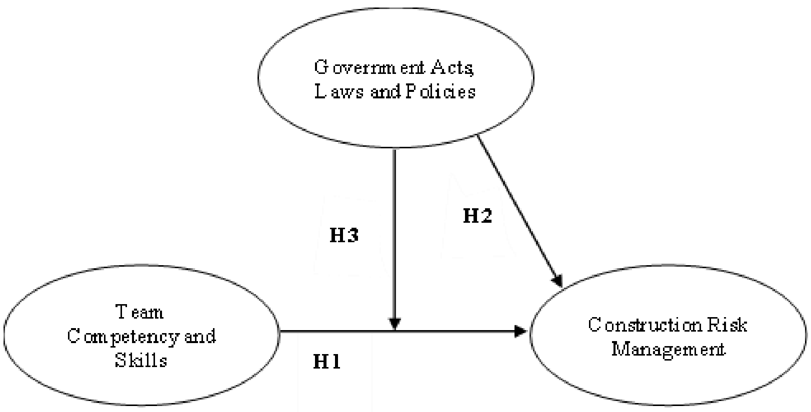

Figure 1: Conceptual Model

METHODOLOGY

Epistemology and Nature of Present Study

Positivism philosophy is the foundation of the current research, that is quantitative in nature. Empirical approaches and statements adopted in social surveys underpin quantitative research.

Analysis is performed on numerical data using a statistical approach in quantitative research (Apuke, 2017; Creswell & Creswell, 2018; Creswell, Fetters, & Ivankova, 2004).

Sampling

There are a total of 361 big-size contractors that account for 8.87% of total contractors in KSA (SCA, 2021). The current research adopted probability sampling techniques (simple random sampling) so that every group present in the population has a definite and discrete probability. The minimum sample size is calculated using G*Power 3.1.9 software, Krejcie and Morgan (1970) formula, Yamane (1967) formula, Cochran (1963) formula and Hair *et al.* (2018). Thus the minimum sample size determined for the present study is 190 for the population size of 361 (Aarons, 2021).

Data Collection

A total of 370 questionnaires were distributed among large-sized company contractors working in the Kingdom of Saudi Arabia who were the target respondents. 322 questionnaires were returned, and 303 questionnaires were used for the analysis, as 19 were incomplete because the participants did not fill substantial parts of the questionnaire. Thus 82% response realised is a valid response rate (overall) for the current study.

Variable Measurement and Operationalisation

The research adopted a 5-point Likert scale following Moshood *et al.* (2020), for the extent of occurrence of risks. Table 1 represents constructs, variables, scale, indicators and source of each measurement instrument used for the current study.

Statistical Analysis

SmartPLS v3.3.3 is used as a statistical tool for the present study. A statistical technique, which iteratively maximises the endogenous constructs, explained variance, is called Partial Least Square-Structural Equation Modelling (PLS-SEM) (Hair Jr *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). Partial Least Square-Structural Equation Modelling (PLS-SEM) is a composite-based approach compared with Covariance-based Structural Equation Modelling (CB-SEM), a common factor approach in which indicators set covariation scores of common factors are not required for model parameters estimation. PLS-SEM also provides parameter estimation with high efficiency with increased statistical power and is applied to complex models compared with Covariance-based Structural Equation Modelling (CB-SEM) used for the circular relationship of structural models (Hair Jr *et al.*, 2014). Partial Least Square-Structural Equation Modelling (PLS-SEM) also permits the flexible handling of advanced model elements, including moderator variables, hierarchical component models or nonlinear relationships, making it a versatile approach to structural equation modelling (Sarstedt *et al.*, 2014).

Table 1: Constructs Variables, Scale, Indicators and Source

CONSTRUCTS	VARIABLES	SCALE	INDICATORS	SOURCE
Team competency and skills	Team competency and skills	5-Point	4	(Adeleke, Bahaudin, & Kamaruddeen, 2018)
Construction Risk Management	Administrative or management risk	5-Point	3	(Adeleke, Bahaudin, & Kamaruddeen, 2016)
	Equipment and labour risk	5-Point	6	(Adeleke, Bahaudin, & Kamaruddeen, 2016)
	Design risk	5-Point	4	(Adeleke, Bahaudin, & Kamaruddeen, 2016)
	Financial risk	5-Point	3	(Adeleke, Bahaudin, & Kamaruddeen, 2016)
	Material risk	5-Point	4	(Adeleke, Bahaudin, & Kamaruddeen, 2016)
Government Acts, Laws and Policies	Rules and regulations	5-Point	5	(Adeleke, *et al.*, 2018)

Table 2: 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
Company Specialty	Mining support services	22	7.3
	Waste collection, treatment and disposal activities	27	8.9
	Construction of buildings	131	43.2
	Civil Engineering	26	8.6
	Specialised construction activities	31	10.2

ANALYSIS AND RESULTS

Demographic Profile

Table 2 presents the demographic profile of participants and companies from which the current research collected data.

Assessment of the Measurement Model

The constructs measure reliability and validity is done through measurement model assessment. Measurement model assessment includes individual item reliability, internal consistency reliability, convergent validity, and discriminant validity. Figure 2 presents the measurement model for the current study. Table 3 represents the Composite Reliability (CR) and Cronbach's Alpha values for all constructs. For the 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. Hence, the present research satisfies the quality criteria for Internal Consistency Reliability (Hair *et al.*, 2019).

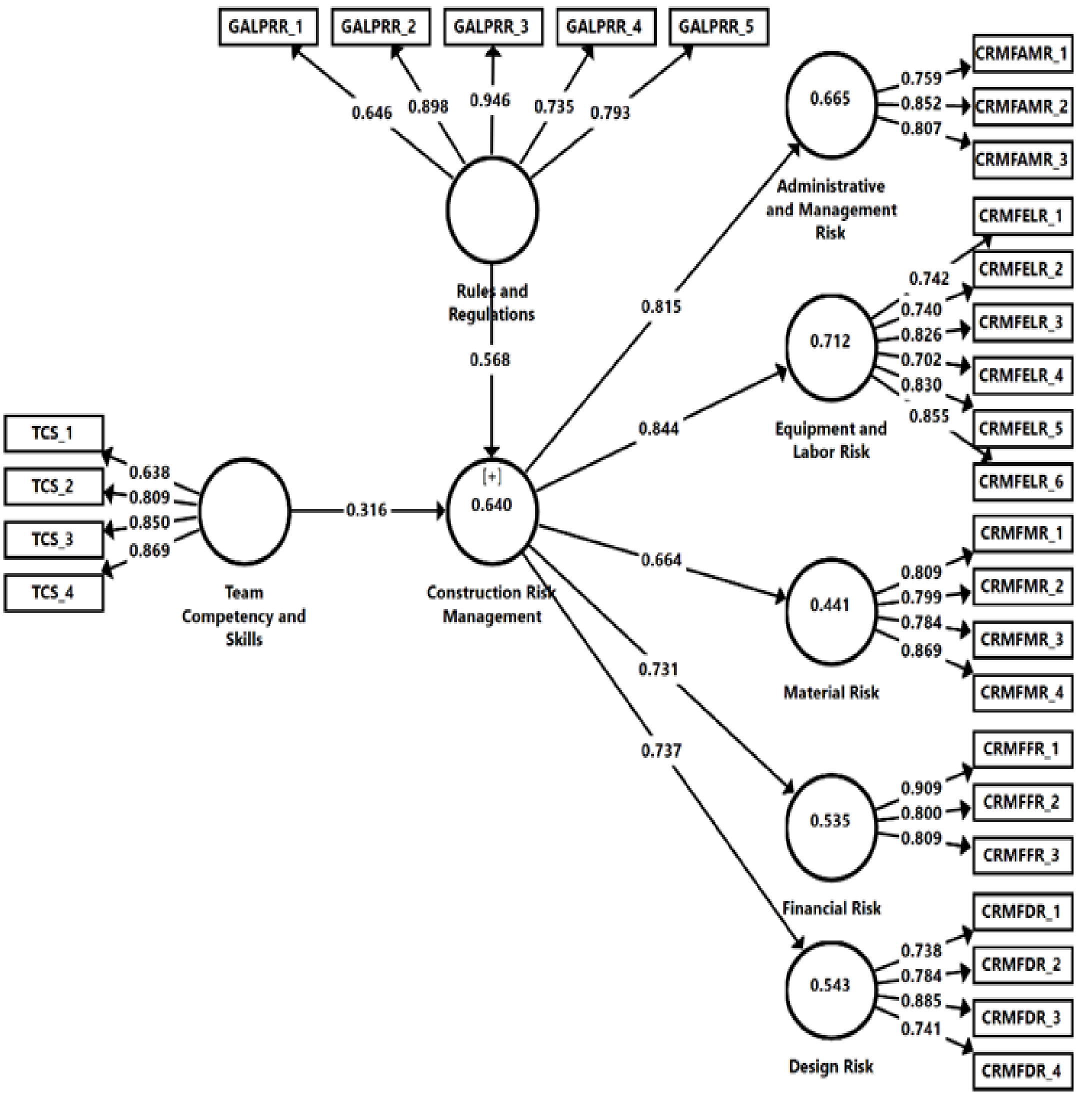

Figure 2: Measurement Model

Table 3: Loadings, Cronbach's Alpha, CR and AVE

Constructs	Items	Loadings	Cronbach's Alpha	CR	AVE
Team Competency and Skills	TCS1	0.638	0.807	0.873	0.635
	TCS2	0.809			
	TCS3	0.850			
	TCS4	0.869			
Administrative and Management Risk	CRMFAMR_1	0.759	0.732	0.848	0.651
	CRMFAMR_2	0.852			
	CRMFAMR_3	0.807			
Equipment and Labour Risk	CRMFELR_1	0.742	0.874	0.905	0.616
	CRMFELR_2	0.740			
	CRMFELR_3	0.826			
	CRMFELR_4	0.702			
	CRMFELR_5	0.830			
	CRMFELR_6	0.855			
Material Risk	CRMFMR_1	0.809	0.833	0.888	0.665
	CRMFMR_2	0.799			
	CRMFMR_3	0.784			
	CRMFMR_4	0.869			
Financial Risk	CRMFFR_1	0.909	0.792	0.878	0.707
	CRMFFR_2	0.800			
	CRMFFR_3	0.809			
Design Risk	CRMFDR_1	0.738	0.798	0.868	0.623
	CRMFDR_2	0.784			
	CRMFDR_3	0.885			
	CRMFDR_4	0.741			
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			

Convergent Validity

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

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 structural 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 strongly correlate with their indicators (Hair *et al.*, 2017).

There are three criteria for establishing discriminant validity i.e. Fornell-Larcker criterion (Fornell & Larcker, 1981), Cross loading (Mora *et al.*, 2012) (Chin, 1998), and Heterotrait-Monotrait ratio of correlations (HTMT) (Henseler, Ringle, & Sarstedt, 2015).

Table 4: Fornell-Larcker Criterion

CONSTRUCTS	CRMFAMR	CRMFDR	CRMFELR	CRMFFR	CRMFMR	GALPRR	TCS
CRMFAMR	0.807						
CRMFDR	0.552	0.789					
CRMFELR	0.619	0.462	0.785				
CRMFFR	0.500	0.522	0.504	0.841			
CRMFMR	0.482	0.337	0.417	0.362	0.816		
GALPRR	0.669	0.564	0.606	0.555	0.501	0.811	
TCS	0.633	0.520	0.483	0.448	0.463	0.606	0.797

Table 4 represents the achievement of discriminant validity according to Fornell-Larcker criterion. It provides a comparison between values of AVE square roots with the correlation of latent variables. The 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 4 fulfills discriminant validity according to Fornell-Larcker criterion.

Table 5 represents the cross-loadings for the current study. Each construct's indicator outer loading should be more than its cross loadings/correlation on other constructs. Each indicator's value outer loading is more than cross-loadings, so the criteria for cross-loading for establishing discriminant validity is fulfilled (Chin, 1998; Henseler, Ringle, & Sarstedt, 2015; Mora *et al.*, 2012).

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, Ringle, & Sarstedt, 2015)

Table 5: Cross Loading

ITEMS	TCS	CRMFAMR	CRMFDR	CRMFELR	CRMFFR	CRMFMR	GALPRR
TCS_1	**0.638**	0.289	0.281	0.242	0.356	0.304	0.491
TCS_2	**0.809**	0.418	0.371	0.335	0.286	0.340	0.408
TCS_3	**0.850**	0.508	0.386	0.338	0.351	0.349	0.409
TCS_4	**0.869**	0.696	0.551	0.544	0.422	0.452	0.598
CRMFAMR_1	0.635	**0.759**	0.561	0.556	0.425	0.461	0.575
CRMFAMR_2	0.486	**0.852**	0.440	0.465	0.415	0.364	0.572
CRMFAMR_3	0.329	**0.807**	0.305	0.463	0.361	0.323	0.456
CRMFDR_1	0.305	0.426	**0.738**	0.357	0.352	0.146	0.312
CRMFDR_2	0.222	0.335	**0.784**	0.198	0.292	0.135	0.326
CRMFDR_3	0.584	0.574	**0.885**	0.513	0.447	0.340	0.540
CRMFDR_4	0.442	0.362	**0.741**	0.323	0.520	0.386	0.547
CRMFELR_1	0.312	0.465	0.266	**0.742**	0.275	0.361	0.579
CRMFELR_2	0.341	0.523	0.457	**0.740**	0.483	0.364	0.420
CRMFELR_3	0.312	0.426	0.304	**0.826**	0.347	0.228	0.462
CRMFELR_4	0.301	0.309	0.343	**0.702**	0.334	0.196	0.295
CRMFELR_5	0.461	0.532	0.364	**0.830**	0.453	0.380	0.542
CRMFELR_6	0.507	0.606	0.417	**0.855**	0.445	0.398	0.529
CRMFFR_1	0.339	0.499	0.488	0.487	**0.909**	0.258	0.455
CRMFFR_2	0.352	0.308	0.381	0.329	**0.800**	0.314	0.336
CRMFFR_3	0.439	0.436	0.439	0.440	**0.809**	0.349	0.594
CRMFMR_1	0.325	0.467	0.213	0.494	0.284	**0.809**	0.334
CRMFMR_2	0.433	0.381	0.306	0.288	0.280	**0.799**	0.424
CRMFMR_3	0.323	0.233	0.224	0.206	0.236	**0.784**	0.350
CRMFMR_4	0.424	0.448	0.350	0.332	0.365	**0.869**	0.514
GALPRR_1	0.362	0.588	0.447	0.279	0.301	0.306	**0.646**
GALPRR_2	0.448	0.419	0.434	0.489	0.442	0.451	**0.898**
GALPRR_3	0.628	0.655	0.557	0.576	0.522	0.483	**0.946**
GALPRR_4	0.343	0.369	0.295	0.541	0.455	0.409	**0.735**
GALPRR_5	0.611	0.657	0.527	0.527	0.497	0.364	**0.793**

Table 6: HTMT Criteria

	CRMFAMR	CRMFDR	CRMFELR	CRMFFR	CRMFMR	GALPRR	TCS
CRMFAMR							
CRMFDR	0.688						
CRMFELR	0.754	0.523					
CRMFFR	0.642	0.638	0.591				
CRMFMR	0.589	0.389	0.465	0.444			
GALPRR	0.831	0.656	0.685	0.658	0.585		
TCS	0.761	0.589	0.537	0.558	0.554	0.704	

Structural Model Assessment

After measurement model assessment, the next step is structural model assessment which includes the significance of Path Coefficients, Coefficient of Determination (R^2), Effect Size (f^2), Predictive relevance (Q^2) and Moderating Effect (Hair *et al.*, 2017). Figure 3 represents the structural model with government Acts, laws, and policies as moderator.

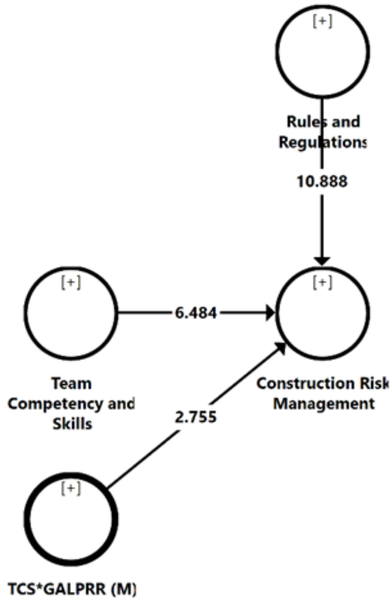

Figure 3: Structural Model

Significance of path coefficients

Table 7 represents the estimation of the significance of path coefficients and hypothesis testing using bootstrapping technique (5000 bootstrapping samples with 303 cases). The Two-tailed test's critical T-statistics value is 1.96 at the significant level of 5% (0.05) (Hair *et al.*, 2017).

Table 7: Hypothesis Testing

Relationship	Original Sample (O)	Sample Mean (M)	Std Dev	T Statistics	P Values
Team Competency and Skills → Construction Risk Management	0.32	0.31	0.05	6.48	0.00
Rules and Regulations → Construction Risk Management	0.55	0.55	0.05	10.89	0.00
Team Competency and Skills * Government Acts, Laws and Policies → Construction Risk Management	0.14	0.14	0.05	2.75	0.01

Hypothesis 1 is supported ($\beta = 0.32$, T-statistics = 6.38 > 1.96 and $p < 0.05$) that team competency and skills have significant positive relation with construction risk management associated with contractors working in KSA.

Hypothesis 2 is supported (β = 0.55, T-statistics = 10.89 > 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 KSA.

Hypothesis 3 is supported (β = 0.14, T-statistics = 2.75 > 1.96 and $p < 0.05$) that moderating effect of government Acts, laws and policies has significant positive relation between team competency and skills and construction risk management associated with contractors working in KSA.

Variance explained endogenous variable

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

According to Chin (1998), the 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 the current study, the coefficient of determination (R^2) value of 0.679 of construction risk management has substantial predictive power, i.e., team competency and skills and government Acts, laws, and policies (rules and regulations) mutually explain 67.9% variance in construction risk management.

Table 7: Cross-Validated Redundancy

Total	SSO	SSE	Q^2 = 1-(SSE/SSO)
Construction Risk Management	6060	4595.4	0.242

Testing moderating effect

Figure 4 represents government Acts, laws and policies positively strengthen the relation among team competency and skills and risk management related to construction.

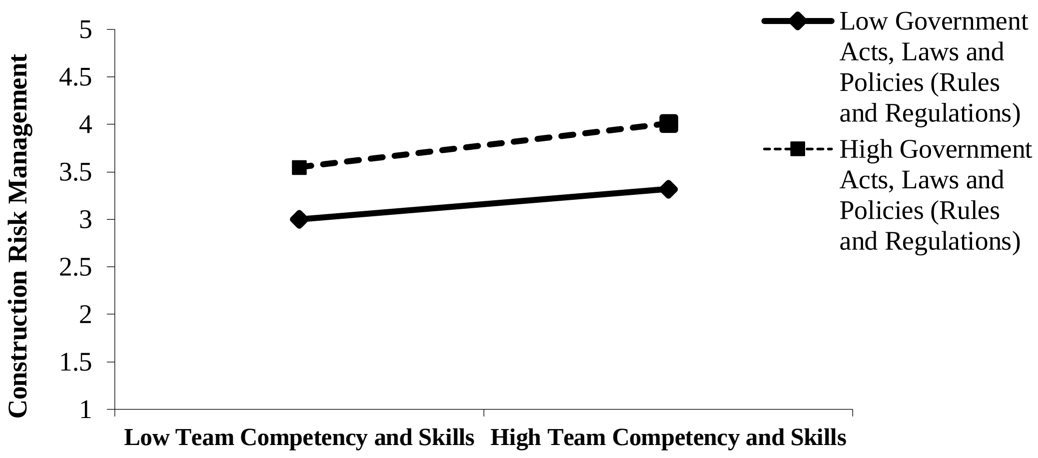

Figure 4: Moderation Effect

Strength of the moderating effects

For the current study, the following formula is employed to determine the strength of moderating effect. This follows Cohen (1988) and Henseler, Ringle, and Sinkovics (2009)

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

According to Chin (1998), an effect size of 0.35 is considered strong, 0.15 is considered moderate, and 0.02 is considered weak. Table 9 exhibits the strength of moderating effect. The effect size value of the endogenous latent variable (construction risk management) is 0.059, which lies in the medium category.

Table 9: Effect Size of Construction Risk Management

Endogenous Latent Variable	R^2 (Included)	R^2 (Excluded)	Effect Size (f^2)
Construction Risk Management	0.679	0.660	0.059

DISCUSSION

The significant positive relation between team competency and skills and construction risk management among KSA contractors is line with the study of Omer *et al.* (2021) for the Malaysian construction industry and Adeleke, Bahaudin, and Kamaruddeenn (2018) for Nigerian construction companies. During the construction process, the likelihood of risk occurrence is low when team members are equipped with relevant skills and desire for competency improvement. Theoretically, organisation control theory states that appropriate control within construction projects can be done through monitoring and controlling. The current research recommends motivating and compensating team players at every stage of construction for improvement in construction risk management. This approach will enhance free communication flow among them, resulting in playing their role effectively along with boosting their competencies and consequently organisational development (Flamholtz, Das, & Tsui, 1985; Jaworski, 1988; Ouchi, 1979).

The theoretical significance of the present study has been rendered in the organisational control theory field by providing extra empirical ground. During construction, employees' behavior and conduct within an organisation are shaped theoretically based on proper control and by introducing government Acts, laws, and policies system for reward, direction and monitoring. Reduction in risk occurrence during the construction phase of projects is supported by team competency and skills and extending the theory by inspecting extensive construction project risk ranges, including equipment and labour risk, finance risk, design risk, material risk and administrative or management risks, thus making organisations more effective. The current research has shown that there is a direct relationship between government Acts, laws and policies and construction risk management. Therefore, there exists a significant positive relationship between government Acts, laws and policies and construction risk management. This conclusion adds to risk management literature and theories.

The poor implementation of government Acts, laws and policies results in high level of risk occurrence, which reduces the efficiency of project delivery output. Therefore, the moderating effect is introduced for the current study to evaluate the effectiveness of construction risk management (Dikmen *et al.*, 2008; Niu, 2008).

Previous empirical research has positive and negative inconsistent results highlighting the need for moderating variables within relationships (Kawesittisankhun & Pongpeng, 2019; Lee, Kim, & Lee, 2010; Oyegoke *et al.*, 2009). The current research has covered this theoretical gap.

CONCLUSION AND RECOMMENDATIONS

The current study contributes to developing a body of knowledge with extra proof of the moderating effect of government Acts, laws, and policies on the relationship between team competency and skills and construction risk management. This supports the main theoretical Postulations made in the study. There are three unique contributions from the current research. Firstly, team competency and skills have significant positive relations with construction risk management. Secondly, government Acts, laws and policies have significant positive relations with construction risk management. Thirdly, the moderating effect of government Acts, laws and policies has significant positive relation between team competency and skills and construction risk management. This study provides practical insight within the context of KSA contractors for escalation in the performance of construction risk management. The finding also proposes a scheme towards improving construction risk management through compensation and motivation in every stage of the construction process. We anticipate this will enhance the free flow of communication within contractors and allow project team members to be more active and boost their competencies with skills, which will serve as an additional advantage to contractors. Proper implementation of KSA government Acts, laws, and policies on the buoyant construction market in the KSA results in less significant financial difficulties being experienced, particularly of restricted cash flow, which positively influences construction businesses. The amendments to implementing regulations of the Saudi Building Code Application Law focus on improving the current maintenance and risk settings in the Building Code to achieve positive social, economic, and environmental outcomes for KSA. The present research has employed a cross-sectional design instead of a longitudinal design, which does not draw causal illations from the population study. There is a need for longitudinal design adopted for future assessment of constructs. For future studies, it is recommended to consider medium, small, and very small company size contractors associated with the Kingdom of Saudi Arabia (KSA) to understand risk management practices better.

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