FWU Journal of Social Sciences, Spring 2022, Vol. 16, No.1, 69-94
DOI: *http://doi.org/10.51709/19951272/Spring2022/5*

Moderation role of government policies, laws and Acts between cultural factors and risk management among Saudi Arabian contractors

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Projects are delayed due to lack of construction risk management practice. One of the important factor for project success is organisation culture. Organisation culture is the combination of system of shared norms and values that defines characteristics and behavior. This study is grounded on organisation control theory and based on Kingdom of Saudi Arabia (KSA) 303 largest contractor (> 250 number of employees). This study quantitatively focused on impact of cultural factors on management of risks in construction sector of Kingdom of Saudi Arabia (KSA) moderated by government policies, laws and Acts using PLS-SEM approach. Parameter calculations in SmartPLS (PLS-SEM technique) is efficient having higher statistical power making it appropriate approach for analysing composite model for this study. Cultural factors and government policies, laws and Acts positively affect the management of risks in construction sector of Kingdom of Saudi Arabia (KSA) with addition to moderating role of government policies, laws and Acts. Current research helps project team for project success to develop good culture within client, consultant and contractor, which makes project team members, construction and project manager towards project commitment. It is essential for every organisation to practice strong culture for project accomplishment which greatly influence the project team behavior compared with weak culture affecting project team effectiveness .

Keywords: Organisation control theory, cultural factors, government policies, laws and Acts, risk management, construction management

An unfavourable and undesired consequence and result of activity performed is called risk (Crane et al., 2013). Identifying, evaluating, treating, monitoring and responding are five risk management processes in construction sector (Ripley, 2020). Risk is always present in all human activities (Szymański, 2017). Workforce, resources, administration, materials and drawings of project are main risk factors which causes delaying in construction projects with increased budget (El-Sayegh, 2008).

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Project objectives are fulfilled by efficiently managing construction risks which include identifying, examining and responding to risks involved in the project (Zou et al., 2007). Lack of proper management of risks causes project budget to increase resulting in project delays (Andi, 2006). Eliminating all risks from the construction project is not possible due to intricacy and ramification of nature of project (Wang et al., 2004). Ineptitude and incompetency of project manager in responding to project risks causes delaying in the accomplishment of project with augmented budget (Thuye et al., 2007).

In the world, the effective and appropriate management of risks in construction sector has been of great concern. It can be witnessed by the research in Vietnam by Thuye et al., (2007), in Nigeria by Aibinu and Jagboro (2002), in Malaysia by Sambasivan and Soon (2007), in India by Ling and Hoi (2006), in Kuwait by Kartama and kartamaba (2001), in China by Gao et al. (2019), in Pakistan by Hameed and Woo (2007) and in Indonesia by Andi (2006). The practice of management of risks is country-specific and depends on many factors e.g. the conditions of politics, culture and finance (Andi, 2006).

Theoretically, Dikmen et al., (2008) introduced a new approach of effectively managing various construction risk factors by developing a tool, which is based on learning approach of risk occurrence from previous projects in reducing risk. The construction project goals are not fulfilled due to inferior and substandard quality, requirement creep, unexpected time delays and incurred costs, but they all were not able to examine the risk management ineffectiveness and extent from material, management, finance, design, equipment and labour (El-Sayegh, 2008; Walker, 2015).

The key construction risk factors in kingdom of Saudi Arabia (KSA) are contractual duration, eccentricities in project scope, mistakes and frequent changes in project drawings, and specification changes in project, which can effectively be cover with appropriate implementation of management of risks in construction sector (Littlejohn & Foss, 2009).

Any country’s growth relies on construction projects. The basic facilities e.g. health, food and education can only be provided to the people with proper infrastructure development which are built by construction companies. KSA construction companies contributes 23.27% of Gross Fixed Capital Formation in the third quarter of 2020. GDP (from Construction) in Saudi Arabia increased in the third quarter to 30.163 billion Saudi Riyals of 2020 from 27.204 billion Saudi Riyals in the second quarter of 2020 (Satistics, 2021). However, risk management is ineffective because of poor construction quality in term of economy based on certain construction risks e.g. materials, management, design, labor, finance and equipment risks.

Literature Review

KSA construction sector

Construction industry in KSA is linked with economic development. KSA is among few countries, which exports the highest quantity of oil to the world. The economic condition of KSA is growing which boom the construction industry. Construction of new housing schemes, factories and infrastructure development makes high scope of construction in KSA (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 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).

During 2015-2018, construction sector suffered low growth in KSA due to crude oil prices collapse. Lower crude oil prices cause major concern for investors resulting KSA government to impose various steps (e.g. cutting major budget for defense, education, healthcare and removing fuel subsidies) to sustain economy, which causes major reduction in construction activities in KSA. Due to major reforms in KSA and crude oil stability, the construction activities are predictable to rise from 2020 onwards (ITA, 2020).

Overview of Project Management

According to Larson (2010), meeting the owner needs by non-repetition of events, which are limited to time, specifications and resources is called project. According to Project Management Institute (PMI) (2008), a project is defined as interim venture to produce a distinctive product, result or service.

Utilizing of available resources in a meticulous, planned and organised way for archiving well-defined goals in the presence of constraints set is termed as Project Management. Defining (objectives and goals of project, risks involved, scope and cost, time duration and methods and techniques), initializing (declaration of business case, decision on project scope, setting of expectations of stakeholders), executing, monitoring, control and closure are six phases of project (Haughey, 2014).

Risk Management

An unpredicted and unforeseen consequences and effects of action completed is called risk (Crane et al., 2013). Categorising, estimating, handling, monitoring and responding are five risk management processes in construction sector (Ripley, 2020).

For implementation of management of risks in project, it is important to start 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).

Identification of Risk Factors

In Pakistani construction industry, Bajwa and Syed (2020) ranked 29 construction risk factors. 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.

Using extensive literature review, Farid et al., (2020) examined 283 risk factors in Pakistani construction companies. 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.

Using extensive literature review and construction expert input from Indian construction companies, Devi and Ananthanarayanan (2017) examined 68 construction risk factors in India. The findings show that construction deferments, scope creep and lowest bidder tender awarding are major causes of cost overrun in Indian construction sector.

Utilising MATLAB application, Sharaf and Abdelwahab (2015) evaluated 73 highway risk factors in Egyptian construction companies. By examining the data collection from building records, project experts feedback and past literature reviews, Abusafiya and Suliman (2017) specified 45 construction risks in Bahrian. 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 examined 7 risk factors (scope change, lacking of experience from client' employees, change order, design errors, changes in project specifications, alternations in drawings by client or consultant and unrealistic time duration of completion of project) in KSA. The findings show that adoption to new risk management model (IMT and PIPS) reduces management from client perspective to 80% and overall efficiency increment of 40%.

Tang et al., (2007) examined the ineffective management of risks in chinese construction sector. 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) quantified and ranked 25 risk factors in Chinese construction industry. 32 risk factors were further categorised 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.

Cultural factors

Organisation cultural is external adaptation and internal integration among people of society to treat problem and communicate to new individuals for perseveration (Schein & Schein, 2016). The effects of culture can be viewed among community for a specific activity (Walker, 2015). It is essential for every organisation to practice strong culture for project accomplishment as it greatly influence the project team behavior compared with weak culture as it affects project team effectiveness (Schein & Schein, 2016).

Organisation culture is the combination of system of shared norms and values that defines characteristics and behavior (Schein & Schein, 2016). Hartog and Verburg (2004) recommended that culture of organisation acts as powerful tool to deal with construction risks, which is linked with team members, contractor or project manager's attitude and behavior. Employee commitment is positively connected with organisational development (Gul, 2015). Knowledge management practices are directly linked with organisational performance (Ahmed et al., 2015). Culture plays an important role in improving financial policy of any organisation (Khan & Sultana, 2021).

Basic assumptions (e,g. nature of human being, relationship between management and enviornemtn) is first level, shared values (e.g. standard regulations for judging employees, circumstances and actions etc.) is second level and artefacts (e.g. dress code and organisation structure design etc.) is third level of cultural practices in organisation (Schein & Schein, 2016). It is important for project success to develop good culture within client, consultant and contractor which makes project team members, construction and project manager towards project commitment (Schraeder & Tears, 2004; Barbosa & Cardoso, 2007).

Construction Risk Management

Based on extensive literature review, five dimensions of construction risk management factors in KSA includes material risk, administrative or management risk, design risk, equipment and labor risk, and finance risk (Rehman & Ishak, 2021; El-Sayegh, 2008; Jarkas & Haup, 2015).

Equipment and labor risk

Different categories of people are required to work for completion of projects in construction industry. The project success is largely depending on coordination among client, design consultant, supervision consultant, contractor, sub-contractor and material suppliers as they are vital components of construction industry. Construction cost of a project largely depends on labors, which are considered as most influential portion of construction industry (Gunduz & Hijleh, 2020).

Design Risk

Deficient and inadequate design is one of the reason of time overrun in construction project. Delays in construction project takes place due to slow response time from designer and incomplete project drawings. Designs in the construction project are frequently changing during implementation phase (Banobi & Jung, 2019).

Financial Risk

Instability of economic and politics of a country, recession, inflation, credibility of client and inadequate cost plan are financial risks of great importance (Szymański, 2017). All factors related with difficulties in finance and cost during execution and construction of project are directly falling under financial category (Alaghbari et al., 2007). Finance risk is the main cause of any construction delay as project performance and success is largely depending on it (Alaghbari et al., 2007; Sweis et al., 2008).

Material Risk

Project performance and success are greatly affected by the material risks involved during construction. Delay and shortage of materials to be supplied on the construction site is one of the most critical risk faced worldwide. Material availability or origin, varying demand, poor quantity surveying and lack of good workmanship are major reasons of material shortage in the market. Labor efficiency, trade restrictions imposed by government, intemperate weather, lack of decision making ability, inadequate planning and logistics are major reasons of delay of material supply on the site (Rahman, et al., 2017).

Administrative or Management Risk

Management related risks in construction projects are of great importance as project performance and completion within time and cost depends on it. Lack of human resource and management skills are critical construction delay causes in KSA as it negatively influences the project process and performance resulting heavy loses. It was recommended to apply computer software systems (e.g. ACMS) to enhance project management within construction (Sidawi, 2012). It is crucial and vital for construction and project manager to apply management techniques to prevent risk occurrence on the construction site (Iqbal et al., 2015). This is in line with the study of Dmaidi et al., (2016) that shows management and administrative risk have high influence on construction industry of Jordan.

GOVERNMENT POLICIES, LAWS AND ACTS

Government Policies, Laws and Acts

In G7 Malaysian contractors, Taofeeq et al., (2020) highlighted the moderating effect of government policies, standards and acts which positively affect attitudes of risk with expert competency, employee experience and workforce fitness.

In hydrological projects of Kenya, Maina et al., (2017)) highlighted the moderating effect of government policies, standards and Acts which positively affect investment with recovery.

Adeleke et al., (2016) confirmed the moderating effect of government policies, standards and acts which positively affect culture factors with management of risks in Nigerian contractors. In Scotland, government regulations and standards highly influence rental cost (Gibb, 2011).

According to Niu (2008), frequent alternations in construction policies highly influence housing programmes in Chinese development sectors. Government standards in the housing schemes postively influence management of risks in construction industry of Malaysia (Ismail et al., 2012). Installation of industrialised building system (IBS), which requires approval from government sector, helps in improving the quality of construction, saving time and money (Mydin et al., 2014).

Government sector is largely impacted by the political forces (Shafiq et al., 2017). Workforce health and safety programs in construction sectors, which are exposed to hazad chemicals and tough enviromental conditions, are enforced by the government which positively impact the performance of construction project (Sivaprakash & Skanchana, 2018).

Organisation Control Theory

Relationship confirmation between government policies, standards, laws and Acts on managing risks in construction industry and cultural risk factors can be described theoretically by organisation control theory. Rendering to organisation 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 organisation itself assuming that occurrence of risk can be reduced through government policies, standards, laws and Acts (Jaworski, 1988; Ouchi, 1979; Flamholtz et al., 1985).

Risks within organisation can be reduced by adopting organisation control procedures. The study of Adeleke et al., (2018) inferred that cultural factors positively affect management of risks in construction sector. Occurrence of risks is reduced on construction projects through proper controlling implemented by rules and regulations (Lai et al., 2005).

Conceptual Framework and Hypothesis Development

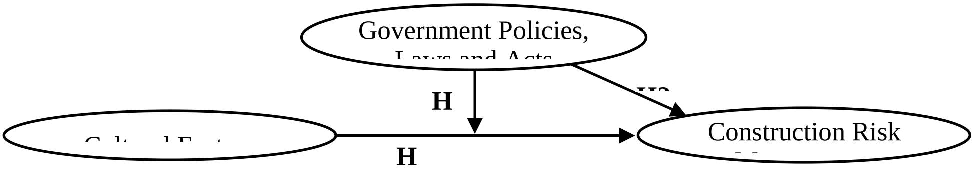

Figure 1 Conceptual Framework

Hypothesis 1: Cultural factors significantly affect management of risks in Kingdom of Saudi Arabia construction industry.

Hypothesis 2: Government Policies, Laws and Acts significantly affect management of risks in Kingdom of Saudi Arabia construction industry.

Hypothesis 3: Government Policies, Laws and Acts significantly moderate cultural factors on management of risks in Kingdom of Saudi Arabia construction industry.

Method

Epistemology and Nature of Present Study

Individual ideas, emotions and views independently provide empirical facts (evidence are collected through value free manner), nature of investigation is statistical, cause and effect laws provide evidence which are empirical in nature, assumption of structured methodology with the provision of repetition, constant certainty patterns and additive knowledge are basic characteristics of positivist paradigm approach. 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).

Population

There are total 361 big company size contractors which contributes 8.87% of total contractors (SCA, 2021). 361 (consisting of corporations, Limited Liability Company, general partnership and sole proprietorship) registered big size companies (contractors with number of employees greater than 250) 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. Population consist of CEO, project managers, construction managers, engineers, supervisors. foremen and others.

Sampling

For this study, simple random probability sampling method is employed as discrete and definite likelihood exists in every group of population. The minimum required sampling size is 190 for 361 population size (Aarons, 2021). This sampling size is in line with the calculation of G*Power software and Krejcie and Morgan (1970) formula.

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.

In order to serve the purpose of present research, a single respondent from each big size contractor company is sufficient. Collection of data from CEO, project manager, construction manager, engineer, supervisor and foreman through questionnaire help in assisting the clarity of relationship between cultural factors that influence on construction risk management.

370 questionnaires were circulated among the selected companies in the KSA as the target participant. 303 completed questionnaires were used for evaluation of extent of construction risk management as 19 were partial or unfinished survey responses. Therefore, 81.9% is a valid completion rate for this study.

Variable Measurement and Operationalisation

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	Indicators	Source
Cultural Factors	Cultural factors	6	(Rehman & Ishak, 2021)
Construction Risk Management	Administrative or management risks	4	(Adeleke et al., 2016)
	Equipment and labor risks	5	(Rehman & Ishak, 2021)
	Finanical risks	4	(Adeleke et al., 2016)
	Design risks	4	(Rehman & Ishak, 2021)
	Material risks	4	(Adeleke et al., 2016)
Government Policies, Laws and Acts	Rules and regulations	5	(Adeleke et al., 2018)

Statistical Analysis

This study utilises SmartPLS v3.3.3 software (underpinning of PLS-SEM) for performing statistical analysis. In PLS-SEM, explained variation of endogenous variable have maximum iterations (Hair Jr et al., 2014). Also, assumption of distribution of data is not require for intricate and complicated modeling, which makes it causal prediction approach (Hair et al., 2019). Common factor method (assessing structural modelling's circular relationships) is the underpinning of CB-SEM whereas PLS-SEM is composite based approach for handling intricate and complicate modeling efficiently (Hair Jr et al., 2014).

Intricate and complicate modeling is efficiently and accommodatingly handled in smartPLS v3.3.3 including nonlinearity in relations, second-order models and moderating effect, which makes smartPLS v3.3.3 appropriate tool for this study (Sarstedt et al., 2014).

Results

Table 2
Demographic Profile of Participants

Variables	Classification	Occurrence	Percent (%)
Gender	Male	215	71
	Female	88	29
Position in the Company	CEO	7	2.3 (100% Male)
	Project Manager	16	5.3 (100% Male)
	Construction Manager	27	8.9 (100% Male)
	Engineer	109	36 (90% Male and 10% Female)
	Supervisor	25	8.3 (100% Male)
	Foreman	34	11.2 (100% Male)
	Others	85	28.1 (10% Male and 90% Female)
Working Experience	< 1 year	24	7.9 (25% Male and 75% Female)
	1 to 5 years	42	13.9 (50% Male and 50% Female)
	6 to 10 years	141	46.5 (79% Male and 21% Female)
	11 to 15 years	56	18.5 (82% Male and 18% Female)

	> 15 years	40	13.2 (78% Male and 23% Female)

Table 3

Companies Demographic Profile

Variables	Classification	Occurrence	Percent (%)
Company Specialty	Mining support services	22	7.3
	Waste management	27	8.9
	Building constructions	131	43.2
	Consultancy	26	8.6
	Specialised construction works	31	10.2
	Landscaping works and building maintenance	66	21.8
Company Existence	< 1 year	8	2.6
	1 to 3 years	30	9.9
	4 to 6 years	77	25.4
	7 to 10 years	95	31.4
	Greater 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

Measurement Model Assessment

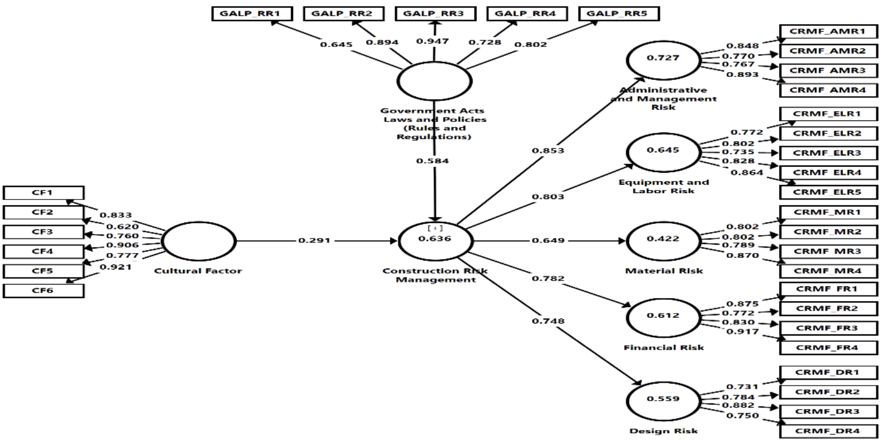

Figure 2 Measurement Model

Table 4 is the fulfillment of Internal Consistency Reliability quality criteria i.e. Composite Reliability (CR) is higher than 0.60 and lower than 0.95 along with Cronbach's Alpha, which is higher than 0.70 (Hair et al., 2019).

Table 4
PLS Algorithm Result

Constructs	Items	Loadings	Cronbach's Alpha	CR	AVE
Cultural Factors	CF1	0.833	0.891	0.918	0.655
	CF2	0.620			
	CF3	0.760			
	CF4	0.906			
	CF5	0.777			
	CF6	0.921			
Administrative and Management Risk	CRMF_AMR1	0.848	0.839	0.892	0.674
	CRMF_AMR2	0.770			
	CRMF_AMR3	0.767			
	CRMF_AMR4	0.893			
Equipment and Labor Risk	CRMF_ELR1	0.772	0.861	0.899	0.642
	CRMF_ELR2	0.802			
	CRMF_ELR3	0.735			
	CRMF_ELR4	0.828			
	CRMF_ELR5	0.864			

Material Risk	CRMF_MR1	0.802	0.833	0.888	0.666
	CRMF_MR2	0.802			
	CRMF_MR3	0.789			
	CRMF_MR4	0.870			
Financial Risk	CRMF_FR1	0.875	0.871	0.912	0.723
	CRMF_FR2	0.772			
	CRMF_FR3	0.830			
	CRMF_FR4	0.917			
Design Risk	CRMF_DR1	0.731	0.798	0.868	0.623
	CRMF_DR2	0.784			
	CRMF_DR3	0.882			
	CRMF_DR4	0.750			
Rules and Regulations	GALP_RR1	0.645	0.864	0.904	0.657
	GALP_RR2	0.894			
	GALP_RR3	0.947			
	GALP_RR4	0.728			
	GALP_RR5	0.802			

Convergent Validity

The extent of measure of latent variable in relation to other measure of variables is confirmed by convergent validity (Cheah et al., 2018). For this study, convergent validity is confirmed when AVE has larger value than 0.50 and CR has larger value than 0.60 (Fornell & Larcker, 1981).

Discriminant Validity

The dissimilarity of two or more variables can be accessed by discriminant validity (Rönkkö & Cho, 2020). The core goal of attaining discriminant validity is to establish the uniqueness of variables having robust connection with the indicators (Hair Jr. et al., 2017).

Heterotrait-Monotrait ratio (HTMT), cross loadings and Fornell-Larcker criterion are three methods in which discriminant validity can be accessed (Henseler et al., 2015; Chin, 1998; Fornell & Larcker, 1981; Mora et al., 2012).

The criteria of cross loadings are satisfied in table 5. Cross loadings are lower corresponding to outer loadings of each variable respectively (Chin, 1998; Mora et al., 2012).

Table 5
Cross Loading

	CF	CRMF_AMR	CRMF_DR	CRMF_ELR	CRMF_FR	GALP_RR	CRMF_MR
CF1	**0.833**	0.414	0.408	0.395	0.342	0.389	0.286
CF2	**0.620**	0.277	0.383	0.268	0.318	0.300	0.298
CF3	**0.760**	0.482	0.460	0.387	0.454	0.593	0.366
CF4	**0.906**	0.541	0.469	0.453	0.491	0.589	0.352
CF5	**0.777**	0.455	0.323	0.421	0.281	0.458	0.219
CF6	**0.921**	0.646	0.444	0.501	0.398	0.592	0.379
CRMF_AMR1	0.510	**0.848**	0.560	0.568	0.441	0.579	0.460
CRMF_AMR2	0.402	**0.770**	0.442	0.291	0.404	0.517	0.388
CRMF_AMR3	0.442	**0.767**	0.439	0.449	0.422	0.574	0.362
CRMF_AMR4	0.579	**0.893**	0.492	0.612	0.546	0.640	0.431
CRMF_DR1	0.268	0.420	**0.731**	0.375	0.333	0.315	0.146
CRMF_DR2	0.291	0.327	**0.784**	0.202	0.297	0.327	0.134
CRMF_DR3	0.486	0.596	**0.882**	0.526	0.447	0.543	0.340
CRMF_DR4	0.520	0.463	**0.750**	0.328	0.519	0.547	0.389
CRMF_ELR1	0.447	0.483	0.458	**0.772**	0.465	0.417	0.361
CRMF_ELR2	0.407	0.372	0.302	**0.802**	0.375	0.464	0.225
CRMF_ELR3	0.266	0.305	0.341	**0.735**	0.308	0.293	0.194
CRMF_ELR4	0.418	0.524	0.363	**0.828**	0.479	0.543	0.378
CRMF_ELR5	0.459	0.643	0.418	**0.864**	0.459	0.532	0.395
CRMF_FR1	0.380	0.500	0.489	0.501	**0.875**	0.455	0.256
CRMF_FR2	0.278	0.344	0.382	0.358	**0.772**	0.336	0.314
CRMF_FR3	0.468	0.498	0.442	0.444	**0.830**	0.596	0.349
CRMF_FR4	0.480	0.527	0.448	0.483	**0.917**	0.552	0.343
GALP_RR1	0.369	0.538	0.446	0.240	0.308	**0.645**	0.305
GALP_RR2	0.440	0.444	0.437	0.449	0.447	**0.894**	0.452
GALP_RR3	0.605	0.670	0.558	0.544	0.548	**0.947**	0.484
GALP_RR4	0.403	0.373	0.299	0.536	0.432	**0.728**	0.408
GALP_RR5	0.617	0.764	0.529	0.500	0.549	**0.802**	0.366
CRMF_MR1	0.277	0.450	0.212	0.470	0.292	0.332	**0.802**
CRMF_MR2	0.338	0.400	0.306	0.295	0.299	0.425	**0.802**

CRMF_MR3	0.295	0.307	0.228	0.198	0.248	0.351	**0.789**
CRMF_MR4	0.379	0.456	0.355	0.313	0.357	0.512	**0.870**

The criteria of Fornell-Larcker is satisfied in table 6. The largest correlations of other variables are lower than the AVE square of each variable (Fornell & Larcker, 1981).

Table 6
Fornell-Larcker Criterion

Constructs	CRMF_AMR	CF	CRMF_DR	CRMF_ELR	CRMF_FR	GALP_RR	CRMF_MR
CRMF_AMR	0.821						
CF	0.595	0.809					
CRMF_DR	0.591	0.515	0.789				
CRMF_ELR	0.598	0.507	0.474	0.801			
CRMF_FR	0.555	0.478	0.520	0.529	0.850		
GALP_RR	0.705	0.617	0.569	0.571	0.577	0.810	
CRMFMR	0.501	0.396	0.340	0.400	0.370	0.500	0.816

The criteria of HTMT is satisfied in table 7. The HTMT value of all variables in this study is less than 0.85 (Henseler et al., 2015).

Table 7
HTMT Criteria

Constructs	CRMF_AMR	CF	CRMF_DR	CRMF_ELR	CRMF_FR	GALP_RR	CRMF_MR
CRMF_AMR							
CF	0.668						
CRMF_DR	0.698	0.588					
CRMF_ELR	0.668	0.566	0.541				
CRMF_FR	0.640	0.533	0.605	0.598			
GALP_RR	0.814	0.677	0.656	0.643	0.648		
CRMFMR	0.589	0.455	0.389	0.448	0.432	0.585	

Structural Model Assessment

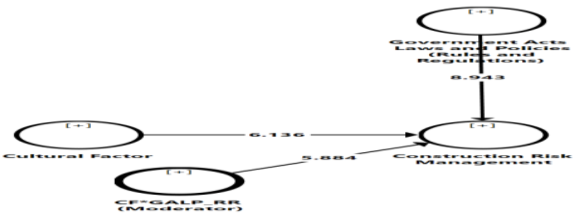

Figure 3 Structural Model

Path Coefficients

Non-parametric method is engaged for this study. 303 cases with 5000 sub samples are run in smartPLS v3.3.3 bootstrapping (Hair Jr. et al., 2017). Bootstrapping result with two tailed test (statistical significance at 5%) is shown in table 8.

Table 5

Bootstrapping result

	Original Sample (O)	Sample Mean (M)	STDEV	t Statistics	p Values
CF →CRMF	0.371	0.370	0.060	6.136	0.000
GALP_RR → CRMF	0.491	0.488	0.055	8.943	0.000
CF * GALP_RR → CRMF	0.257	0.259	0.044	5.884	0.000

Hypothesis 1 is accepted (P value is less than 0.05) that cultural factors positively affect management of risks in Saudi Arabian construction industry.

Hypothesis 2 is accepted (P value is less than 0.05) that government policies, laws and Acts positively affect management of risks in Saudi Arabian construction industry.

Hypothesis 3 is accepted (P value is less than 0.05) that government policies, laws and Acts positively moderate cultural factors on management of risks in Saudi Arabian construction industry.

Explained Variance of Endogenous Construct

According to Hamilton et al., (2015) and Lewis-Beck and Lewis-Beck (2016), the empirical prediction of variance portion of independent construct (or constructs) from dependent construct (or constructs) is referred as coefficient of determination (R^2). According to Rigdon (2012), it is empirical number which represents the prediction power within the sample. R^2 value higher than 0.67 represents higher predictive power, 0.33 to 0.67 represents medium predictive power, 0.19 to 0.33 represents lower predictive power and less than 0.13 represents very low predictive power. R^2 value of management of risks in Saudi Arabian construction industry is 0.703 referring to predictive power lying in medium category.

Effect Size of Latent Variable

The robustness of relation between constructs is governed empirically by effect size (Selya et al., 2012). Effect size value 0.02 refers to lower relation strength, 0.15 refers to moderate relation strength and 0.35 refers to higher relation strength (Cohen, 1988). Cultural factors have effect size of 0.27 referring to moderate strength of relation on management of risks in Saudi Arabian construction industry.

Predictive Relevance (Q^2)

For calculation of research model's predictive relevance, the current research has applied blindfolding procedures using Stone-Geisser test (Stone, 1974; Geisser, 1974). It is out of sample prediction (Hair Jr. et al., 2017). In PLS-SEM, it acts as measure of goodness of fit (Sarstedt et al., 2014; Rigdon, 2012). It is of great concern if the value of Q^2 (empirically out of sample relevance) is lesser than zero (Chin, 2010). Management of risks in Saudi Arabian construction industry is 0.259 (represented in table 9) which is higher than zero, so this study satisfies predictive relevance criteria.

Table 6
Cross-Validated Redundancy

Total	SSO	SSE	Q^2 = 1-(SSE/SSO)
CRMF	6363	4714.861	0.259

Testing Moderating Effect

The present research has utilised the product indicator technique with PLS-SEM for estimation of moderation role of government policies, laws and Acts on the relationship among cultural factors with risk management related to construction among KSA contractors. Product Indicator technique utilises all indicators possible pair combinations interaction of latent variable and latent moderator (Becker et al., 2018; Hair Jr. et al., 2017). The positive moderation strength of relationship is highlighted in Figure 4.

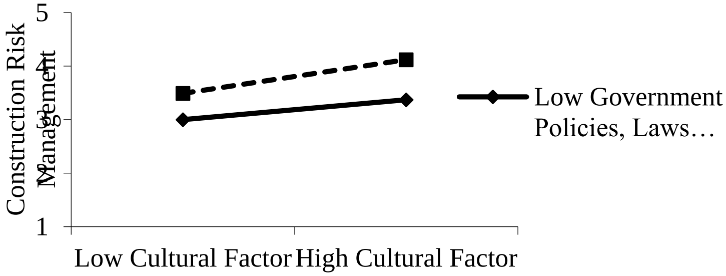

Figure 4 Moderation Effect

Effect Size of Endogenous Variable

The effect size of management of risks in Saudi Arabian construction industry (endogenous variable) is calculated to ascertain the moderating interaction strength of government policies, laws and Acts (Cohen, 1988).

The effect size (strength of moderation) of management of risks in Saudi Arabian construction industry (endogenous variable) is determined using R^2 value with and without moderating variable in the model (Henseler et al., 2009).

Effect size value 0.02 refers to lower relation strength, 0.15 refers to moderate relation strength and 0.35 refers to higher relation strength (Cohen, 1988). Table 10 shows the effect size of management of risks in Saudi Arabian construction industry is 0.182 referring to moderate strength.

Table 7
Effect Size of Endogenous Variable

Endogenous Latent Variable	R^2 (Included)	R^2 (Excluded)	f^2	Effect Size
CRMF	0.703	0.649	0.182	Moderate

Discussion

Cultural factors positively impact management of risks in Saudi Arabian construction sector which aligns with the study of Adeleke et al., (2018) for construction sector in Nigeria and Omer el al., (2021) for construction sector in Malaysia. For projects to be completed with allotted budget and timeframe, culture factors within organisation depends on high aptitude required for monitoring activities, concentration to minor details and strong competency for managing programmes. Theoretically, organisation control theory elaborates precise, right and accurate controlling of available resources, this study demonstrates the environmental aspect where people adapt for featuring the operation of different activities involved in construction project.

In construction business, relying only on large profits and big financial returns is not sufficient for being successful in the market without considerating the importance of cultural factors where misunderstandings and conflicts can cause higher damage to reputation. The construction projects are delayed or failed when lack of attention, importance or mismanagement of cultural factors takes place. This study has filled the gap (theoretical) based on inconsistent results from past studies of management of risks imposing high need of moderation required among relationships (Dikmen et al., 2008; Niu, 2008; Oyegoke et al., 2009; Lee et al., 2010; Kawesittisankhun & Pongpeng, 2019).

Conclusion and Recommendations

Current study contributed to growing body of knowledge theoretically, practically and methodologically with an additional evidence of moderating role of government policies, laws and Acts on relation among cultural factors and management of risks in Saudi Arabian construction sector. As practical perception, this study guides to escalate the risk management within KSA contractors. The current framework might establish benchmarking in managing performance based on construction risk management degree among KSA contractors serving as realistic motivation of transformation towards risks in KSA environment.

Cultural factors positively affect management of risks in Saudi Arabian construction industry. Government policies, laws and Acts positively affect management of risks in Saudi Arabian construction industry and government policies, laws and Acts positively moderate cultural factors on management of risks in Saudi Arabian construction industry.

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The contracts are culturally influenced and signed without proper documentation. The outcomes of this study improve the practices within negotiation, time, safety, communication, knowledge and human resource management. Lack of proper documentation in the contract grows the seed of misunderstanding and misconception among parties which are the results of neglecting cultural awareness.

The implication of current research assists strategic planners, establishments and scholars based on risk factors, model proposed and expansion of organisational control theory to befit contractors. Current research helps project team for project success to develop good culture within client, consultant and contractor, which makes project team members, construction and project manager towards project commitment.

For this study, quantitative cross-sectional research is employed. Data collection for current research is subjective which establishes a valid and reliable result for construction risk management. However subjective aspects result into various judgmental biases. Therefore, objective data collection is recommended for future aspect for fortification of results on construction risk management.

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