

# The Influence of Different Factors on the Iraqi Construction Industry Using Organizational Culture: An Intelligent Measurement Model Assessments in AMOS-Based SEM

<sup>1</sup>Alhamza Yassin Flaih Maeni, <sup>2</sup>Faridahanim Ahmad

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**Abstract:** The positive impact of the construction industry's efficiency on cost reduction, economic growth, and overall national economies is a widely recognized phenomenon across the globe. The implementation of construction projects is often impeded by various limitations and hazards that impede the progress of project operations, ultimately resulting in a significant adverse impact on the overall performance of the projects. Prior studies have assessed the impact of different factors pertaining to a company or project while disregarding the present study aims to address the research gap by incorporating organizational culture as a moderating variable and assessing the impact of different factors, namely stakeholders, communication, cost, technology, top management support, and local authority support, on the performance of the construction industry in Iraq. The research data was collected through a survey questionnaire with several construction practitioners in Iraq. The AMOS Software is used to analyze the data and develop the measurement model. A survey instrument was utilized to obtain information for the research from a multitude of construction companies in Iraq. The data have been subjected to analysis, and a measurement model has been constructed using AMOS 26 to test the results of the hypotheses. The results reveal that the model fits the nature of the data and the research variables. Investigating the effect of these factors will help the construction industry to prevent or mitigate risks, control expenditures, and achieve competitive advantages. Measuring the Effects of Different Factors on the Iraqi Construction Industry Using Organizational Culture.

**Keywords:** Measurement Model, Stakeholders, Iraqi Construction Industry, Communication, Cost, Technological Factors, Top Management Support, Local Authorities Support, Organizational Culture

## 1. Introduction

At present, construction enterprises are endeavoring to enhance their competitive edge by adjusting to a dynamic commercial milieu and allocating resources towards initiatives aimed at fostering organizational culture and development (1). The labor has disseminated globally in contemporary times. In order to showcase the investment, it is crucial to furnish proof that the stakeholders' worth is appropriately acknowledged to guarantee that it produces the intended outcomes and substantially enhances performance, as per the works (2), (3) and (4). The significance of stakeholders in fostering the professional competencies and expertise of workers is increasingly recognized within the construction sector. According (5), there is a need for construction companies to incorporate additional factors from new labor market stakeholders in order to enhance the skill level of their workforce. Additionally, the existing workers in the industry are already exhibiting a higher level of skill. The construction industry is notably impacted by technological advancements, as evidenced by recent studies conducted by (6) and (7). The construction organizational culture

directorate (2021) conducted a study on the organizational culture needs of stakeholders in the construction industry. The study revealed that the management level lacks the necessary skills to improve quality and productivity levels. (8) and (9) have suggested that the implementation of further organizational culture is necessary to address the skills gap. Stakeholders represent a crucial resource for organizations, particularly those operating in low-skilled sectors and the construction field. The technology in the construction industry of (10) and (11), the quality of an organization is frequently attributed to its shareholder factors (12) argues that shareholder factors are crucial for organizations to attain their objectives and that continuing education is an effective means of fostering new growth and enhancing the performance of workers in the construction industry.

### 1.1. Statement of the Problem

According to (13) and (14), a crucial aspect of project management involves the identification of stakeholders and the recognition of pressing concerns and potential anxieties that may impact the project. During a project, it is crucial to adhere to the stakeholder management process as the impact of stakeholders is subject to dynamism and evolution over time (15). It is advisable to conduct an analysis and management of pre-existing research solely at the inception of a project or upon initial

<sup>1</sup>Faculty of Engineering, Faculty of Civil Engineering, Universiti Teknologi Malaysia, Johor Bahru

<sup>2</sup>Fakulti Kejuruteraan Awam, Universiti Teknologi Malaysia  
Corresponding Author Email: faridahanim@utm.my

encounter with the project. According to (16), (17) the fluid nature of stakeholders' strengths and interests necessitates effective liquidity management for project success. The utilization of simulation and related techniques recent experimental research indicates that there is a need to explore the effects of stakeholder management on behavior from a novel perspective, given the lack of investigation into the dynamic behavior of stakeholders. According to (18) the selection and utilization of an actor's method or a combination of methods should be meticulously evaluated due to the dynamic nature of actors. One limitation of contemporary participatory research is that alterations in the impact of one or more partners necessitate a complete overhaul and reconfiguration of the analysis and management procedures. (19) conducted a study that revealed that the impact of stakeholders was not a fixed entity but rather a fluid and evolving phenomenon. They suggested that there should be a circular scale on the stakeholders' side. According (20), the significance and influence of participation may vary across different periods. Hence, it is crucial to oversee the stakeholders and their interests in each project and solicit their dynamic feedback to avert any adverse consequences. Several scholars have devised distinct tools for partner analysis; however, they have not yet incorporated them into a planning framework capable of charting project phases.

## **2. Literature Review and Theoretical Background**

### **2.1. The construction industry in Iraq**

The construction sector in Iraq encompasses activities involved in erecting infrastructure, residential, commercial, and industrial buildings within the nation. This sector significantly influences the country's progress by fostering economic growth, generating employment, and enhancing living standards. Nonetheless, it confronts various obstacles such as management, political instability, security issues, deficient infrastructure, bureaucratic complexities, and a shortage of skilled workforce. Despite these impediments, there exist prospects for expansion and investment in the construction domain, propelled by endeavors in reconstruction, urbanization trends, and governmental initiatives aimed at modernizing infrastructure. Addressing these hurdles is crucial to unleashing the full potential of Iraq's construction industry and promoting the nation's sustainable development. These research backgrounds provide a comprehensive overview of the Iraqi construction industry, covering various dimensions that contribute to its development, challenges, and prospects for growth and sustainability. The reconstruction process will lead to a sustained demand for construction machinery, equipment, and building

materials, with a particular emphasis on cement and reconstruction in the years to come. As per the Iraqi Ministry's proposal, the estimated expenditure for the reconstruction of Iraq (21) approximately \$10.710 billion. The successful completion of this extensive project necessitates a consistent supply of diverse construction materials. The insufficiency of domestic production to meet the demand for basic materials will result in a significant scarcity for the construction industry. (22) posit that the project context comprises various external factors that impact the execution of construction activities, including political, social, and technical systems. According (23), the assessment of these variables is crucial for the formulation of tactics aimed at mitigating their influence on the accomplishment and efficacy of a project. Numerous studies have focused on analyzing internal factors related to a specific company or project, while external factors have been overlooked (21). The completion of construction projects requires consideration of various factors such as the business environment, political and economic stability, as well as the quality of management and financial, technical, and administrative performance (24). External factors are beyond the control of the system and pose a challenge in terms of detection. Assert that external factors, including political, economic, social, and cultural factors, exert a significant influence on construction projects(25). Argue that in light of heightened environmental uncertainty and increased liquidity, a comprehensive understanding of business strategies and management processes utilizing PESTLE technology is imperative for effective consideration of the external environment(26). The text lacks context and specificity. It would benefit from further elaboration and clarification to facilitate a more thorough analysis. Observed that external challenges can be categorized into distinct groups known as PESTLE factors(27). The approach pertains to strategic management and can be efficiently employed within an external identification system. The acronym PESTLE pertains to the factors that influence an organization's external environment, specifically the political (P), economic (E), social (S), technological (T), legal (L), and environmental (E) aspects. The impact of external factors on the performance of construction projects is a crucial area of study, as these factors are often unpredictable and can result in adverse effects that may be mitigated or prevented without causing significant damage. Comprehending the impacts holds significance in the construction sector with regards to cost regulation, risk mitigation, and gaining a competitive edge(27). The present investigation pertains to the examination of Iraq, focusing on a noteworthy political and economic predicament that has impacted all stakeholders, particularly after the US invasion in 2021(28). These studies have explored various

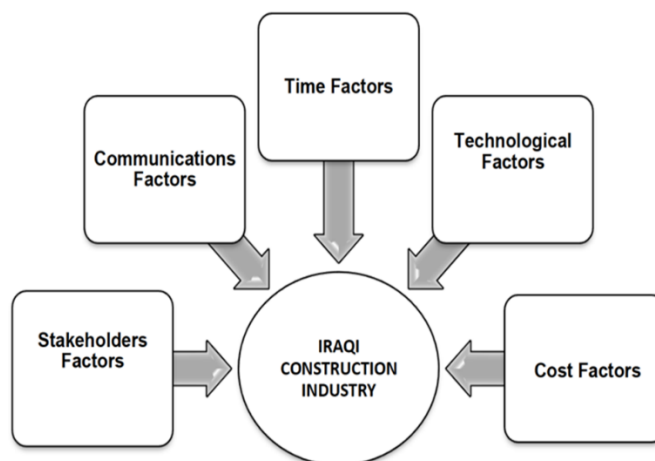
architectural features in Iraq. For instance, examined the use of arches in traditional Iraqi architecture, while investigated the role of courtyards in Iraqi residential buildings(29). These studies shed light on the significance of architectural elements in Iraqi culture and provide valuable insights for architects and researchers interested in this field. The significance of technology in the construction industry of Iraq in 2020 has been overlooked, possibly due to the unfavorable political, economic, and social circumstances, including foreign intervention. The objective of this study is to employ the PESTLE analytical framework to examine the effects of foreign substances on construction endeavors in Iraq about temporal, financial, and qualitative aspects. The utilization of this methodology is due to its all-encompassing structure and its efficacy in the identification, examination, and differentiation of variables within the macroenvironment (30).

## 2.2. Conceptual Framework and Hypotheses

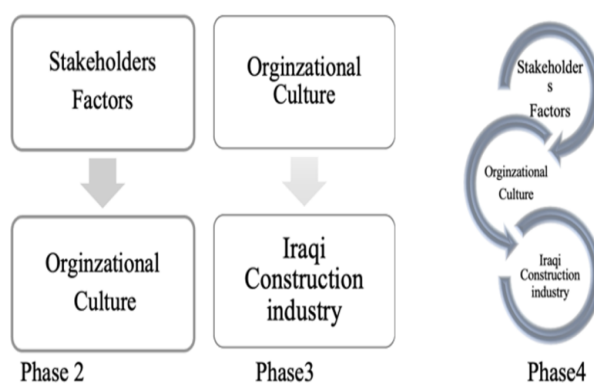
organizational culture is a prevalent method of structuring work within distinct organizational units and the critical factors for success in project management that have been examined include managerial backing, effective communication, active participation, and sound decision-making(31). These elements are all worthy of consideration. This study examines the cultural factors that influence stakeholder behavior in the Iraqi construction industry, particularly during the project submission process. Additionally, the study explores the impact of technology on stakeholder attitudes. The decisions regarding the establishment of an organizational culture have been identified in both the management and ethical literature of the organization, as well as in the aforementioned factors. The present investigation has opted for a work-centric methodology to delineate the project's organizational culture, which are explicated below(32). The examination of technology utilization within the Iraqi construction sector, as well as the attitudes and actions of project stakeholders, is a prevalent practice. Concepts can be advantageous in elucidating or resolving issues in the workplace(33). The culture of a project organization is significantly influenced by the conduct of project stakeholders, as per this cultural interpretation. It is widely believed that cultural tensions can have a significant impact on the behavior of stakeholders involved in a construction project. This can result in

misunderstandings and ultimately lead to conflict and resentment between the parties involved. Hence, it is anticipated that the ethical norms of project stakeholders will be evaluated in the measurement of cultural art objects. The utilization of measures to depict an organization's culture is prevalent due to their ability to gauge the adaptability of the values being evaluated. To ascertain the organizational culture of each project, it is imperative to conduct an inquiry into the origins of these values.

The identification and resolution of fundamental problems within a group of individuals can be attributed to cultural factors has identified four distinct ways in which organizational culture impacts project management(34). Initially, it has an impact on the way it is interconnected and contributes toward the attainment of project goals. Culture plays a significant role in shaping the level of staff commitment towards project objectives and other competitive goals(35). The project planning process is influenced by organizational culture, specifically in terms of the expected allocation of work or resources to a given project. Culture plays a significant role in shaping the way project team performance is assessed by managers and how project outcomes are communicated. Thus, in evaluating the degree of organizational culture within construction projects, it can be posited that the preliminary evaluations to which project stakeholders are subjected during project initiation constitute a valuable data resource. Subsequently, the organizational structure of the entity underwent a revision process aimed at enhancing the catalog of cultural artifacts. The proposal suggests defining the culture of a project organization by observing the conduct of the parties involved in the project process through technical structures, with the aim of ascertaining the organization's cultural characteristics. The creation of artistic artwork involves collaboration among various project stakeholders, including owners, users, clients, designer consultants, managers, and contractors. However, the primary contributors to the intended artwork are key members such as clients, managers, and contractors, who engage in ongoing collaboration. This occurrence is inevitable. Thus, the present investigation involved the identification of three pivotal project partners by the project organization who were deemed instrumental in driving cultural transformation at the project level.



**Fig 1.** Phase 1. Impact of IV on DV



Phase 2. Impact of IV on Mod V, Phase 3. Impact of Mod V on DV and Phase 4. Impact of IV on DV in the presence of Mod V (35).

The effective project management can be achieved through the management of project stakeholders, which can help limit collaborative activities that may negatively impact the project and aid in achieving project goals(36). Stakeholder managers aim to access different perspectives on various partners, improve communication between partners, and articulate their needs(37). Ultimately leading to increased stakeholder satisfaction defines stakeholder management as "effective working relationships discusses different forms of participatory management that both prioritize managing stakeholder factors(38, 39).

H1 Stakeholders have a positive influence on Iraqi construction industry. Communication works best when the recipient understands the information provided by the sender. At each stage of the structural life cycle, information (by diagrams, features, notes, books, notes, models, catalogs, instructions for use and images) should be stored, retrieved, and transmit technology in

construction industry of Iraqi. The Iraqi manufacturing sector operates and excels in policy formulation and implementation. Stakeholders play a constructive role in Iraq's construction sector through diverse avenues(40). Their investments, regulatory guidance, and advocacy for modern technologies improve productivity and safety. Initiatives for skill development foster a more competent workforce, and infrastructure projects along with public-private partnerships stimulate economic growth and community involvement. International partnerships also contribute, promoting sustainable development and societal advancement in Iraq's construction industry(41).

H2 Communication has a positive influence on Iraqi construction industry. Answer the question "why can construction companies focus on technology transfer (technology in construction industry of Iraq)?" it was previously found that technology in construction industry of Iraq could increase the company's competitive

advantage (42). In addition, technology in construction industry of Iraq is an important component of economic development and social development and social protection is important. Efficient communication significantly benefits Iraq's construction sector by enabling smooth coordination among stakeholders, ensuring clear understanding of project objectives and needs, and promoting collaboration among various project participants(43). This results in enhanced efficiency, minimized mistakes, and streamlined project implementation, ultimately driving the industry's advancement and progress.

H3 Technology has a positive influence on Iraqi construction industry. The cost management in the construction industry is less efficient than time management and the project cost management categories include project resource planning, cost budgeting, cost management, and cost estimation(44, 45). The two most important aspects of cost management are financial management and project accounting. Technological advancements have a beneficial effect on Iraq's construction sector by boosting efficiency, enhancing safety, and improving project management. These innovations streamline operations, lower expenses, and enhance productivity in construction endeavors, thereby fostering the industry's overall advancement and expansion

H4 Cost has a positive influence on Iraqi construction industry. Time in the construction industry is a complex economic sector that includes many stakeholders' factors and broad links to other areas of work such as manufacturing, construction, energy, finance, labor, and equipment(46). Cost efficiency benefits Iraq's construction sector by optimizing resource allocation, improving project feasibility, and boosting competitiveness. Effective cost management results in improved project delivery, financial sustainability, and overall industry expansion

H5 Time has a positive influence on Iraqi construction industry. The results of research into senior management support show conflicting relationships, as senior managers play a key role in project implementation and project objectives(47). Time significantly impacts the Iraqi construction sector, influencing project schedules, economic factors, regulations, technological progress, infrastructure growth, and global patterns. Efficient time management is crucial for fostering the industry's expansion, adaptability, and contribution to national development endeavors.

H6 Top management has a positive influence on the Iraqi Construction industry. The top management takes the major decisions in the organization. These managers shape the company's goals, strategies, objectives, and

projects. The decisions they make affect everyone in the organization and are ultimately responsible for the failure or success of the business. Ahmed et al. of. (2020) pointed out that the phenomenon of top management support refers to the material, financial, intellectual, documentary, human and other resources provided to the team for the successful completion and delivery of the project(48). Involvement and participation of senior management in the company's project activities is considered support for senior management(49). In fact, the lack of support from senior management is one of the most frequently reported obstacles to project success. Top executives in traditional organizations have resources controlled by senior executives.

H7 Local authorities have a positive influence on Iraqi construction industry. The importance of economic structure has led governments to focus on sector efficiency by regulating markets, related markets (including financial markets) and policies (such as energy policy). The financial sector contributes significantly to the economy by financing construction investments within debt needs (this was the purpose of the financial crisis that began in 2021). Local authorities have a substantial impact on the Iraqi construction sector, exerting influence in areas such as regulatory structures, infrastructure advancement, and investment encouragement(50). Through the enactment of efficient measures and helping, these local authorities play a crucial role in bolstering the growth and resilience of the construction industry, which in turn stimulates economic progress and employment opportunities in the nation. Moreover, their engagement guarantees adherence to safety protocols and advocates for sustainable methods, thus elevating the standard of construction endeavors throughout Iraq(51).

H8 Organizational culture has a positive influence on moderating the relationship between the Iraqi construction industry and stakeholders (consultants, clients, contractors, and employees). Organizational culture is a unique research topic in management science, and the field of study never loses its reputation, in terms of its influence on the differences in different positions within the organizational structure. Organizational culture has always been considered an important factor in organizational life that requires study and research that enhances its impact in achieving organizational goals(52). A construction project organization can be defined as an organization, and thus one of the relationships, authorities, and responsibilities between stakeholders (e.g., clients, managers and contractors) to achieve the goals of construction clients(53). For example, it is advisable to change the existing understanding of organizational culture when defining the organizational culture of a project. Although culture has been studied at various

levels and researched extensively in relation to national culture, corporate culture, organizational culture, etc., there is still consensus on the general meaning of the term. Many definitions of organizational culture include aspects of service concept, values and rules beliefs and psychological system.

### 3. Research Methodology

In order to assess the validity of the proposed research model, a structured questionnaire was employed to gather data from various organizations within the private sector of the Iraqi construction industry. The survey questionnaire has been developed through a rigorous process of reliability testing and validation. The process of assessing reliability involves a preliminary investigation that encompasses a pilot study consisting of 368 participants from construction projects in Iraq. Meanwhile, the validation process involves an evaluation by a panel of experts comprising five individuals from the Iraqi construction sections within the private sector of the Iraqi construction industry. The questionnaire comprises various sections that encompass demographic factors, the impact on the Iraqi construction industry, and the effects of industry, communication, cost, technological factors, top management support, and local authorities support factors. Additionally, organizational culture serves as a moderating factor. The survey is intended to target various professionals within the Iraqi construction industry, including contractors, consultants, project managers, and civil engineers and the selection of respondents will be based on a simple random sampling technique. The determination of the sample size is based on the methodology proposed by (54) which recommends that the sample size be equivalent to ten times the maximum number of formative indicators utilized to assess a singular construct. The sample size is intended to be 368; however, a total of 420 questionnaires were distributed to

account for potential shortages resulting from various factors, such as missing, ignored, or incomplete responses. The research design employed in the study was quantitative in nature. The study's unit of analysis pertains to the construction companies operating within the geographical boundaries of Iraq. This study involved the selection of a sample of 368 participants, from whom data was collected using a research instrument. The participants were instructed to evaluate each element of the study's variables using a 5-point Likert scale. The data obtained from the questionnaire was subjected to statistical analysis using SPSS and AMOS software packages(55). Various statistical techniques, including descriptive and multivariate analyses, were employed to establish a measurement model of the factors that influence the phenomenon under investigation. The research tool utilized was a research questionnaire featuring a closed-ended Likert scale.

### 4. Results and Discussion

#### 4.1. Questionnaire Validity and Reliability

The panel of experts proposed several modifications, including alterations to the structure of the questionnaire, adjustments to certain items within the dimensions and style, as well as modifications to the personal information of the respondents. The pilot study is employed to assess the dependability of the research questionnaire through the utilization of Cronbach's alpha(56). Established that in exploratory research, values ranging from 0.60 to 0.70 are deemed as the lower acceptable limits. Table 1 displays the Cronbach alpha values for the constructs. According to Table 1, the coefficient alpha values for all items exceed 0.7. The indicates a notable degree of internal consistency and reliability across all constructs that are intended for implementation in the ultimate survey questionnaire.

**Table 1.** Reliability Test of Pilot Study

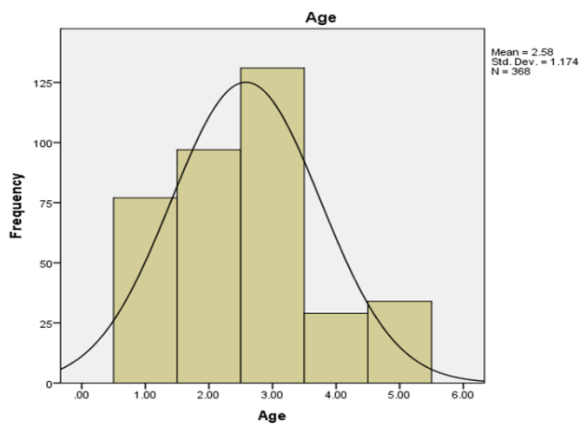
No.	Field	Cronbach's Alpha
1	Iraqi Construction Industry	0.725
2	Client	0.728
3	Consultant	0.794
4	Contractor	0.746
5	Employees	0.741
6	Communications Factors	0.797
7	Time factors	0.85
8	Technological Factors	0.888
9	Cost Factors	0.881
10	Organizational Culture	0.885

#### 4.2. Actual Survey Reliability Test

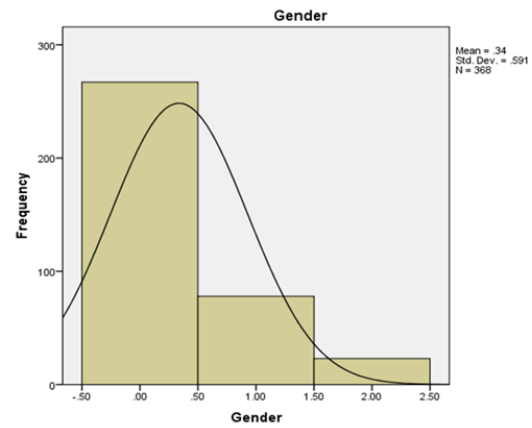
A total of 420 questionnaires were distributed, of which 368 were collected. The number of valid responses obtained was also 368. Table 2 presents the demographic characteristics of the participants. The descriptive Table 2. Respondents Demographic Characteristics

statistics pertaining to demographics encompassed various details such as gender, age, education, job type, and working experience. The total number of participants in the study was 368, and the relevant particulars are presented in Table 2.

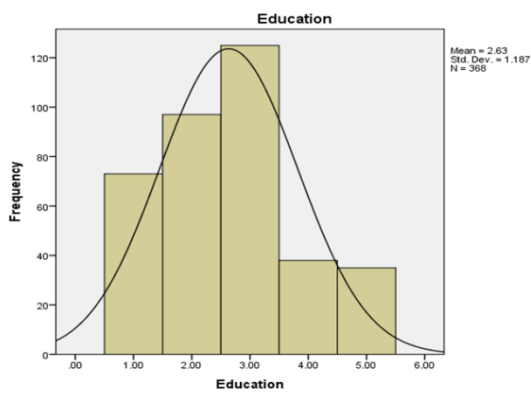
Gender			
		Frequency	Percent
	Male	267	72.6
	Female	78	21.2
	Prefer not to say	23	6.3
	Total	368	100
Age			
		Frequency	Percent
Valid	below 25 years	77	20.9
	26-30	97	26.4
	31-35	131	35.6
	36-40	29	7.9
	Above 40	34	9.2
	Total	368	100
Education			
		Frequency	Percent
	intermediate	73	19.8
	Graduation	97	26.4
	Masters	125	34
	M.Phil	38	10.3
	Phd	35	9.5
	Total	368	100
Job Type			
		Frequency	Percent
	Worker	146	39.7
	Supervisor	107	29.1
	Manager	57	15.5
	Senior management	58	15.8
	Total	368	100
Working Experience			
		Frequency	Percent
	Below 5 years	173	47
	05-Oct	195	53



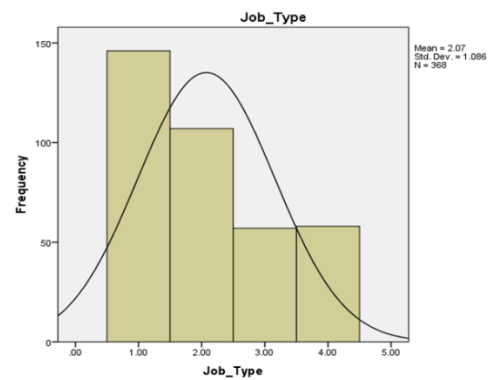
**Fig 3.** Respondents gander



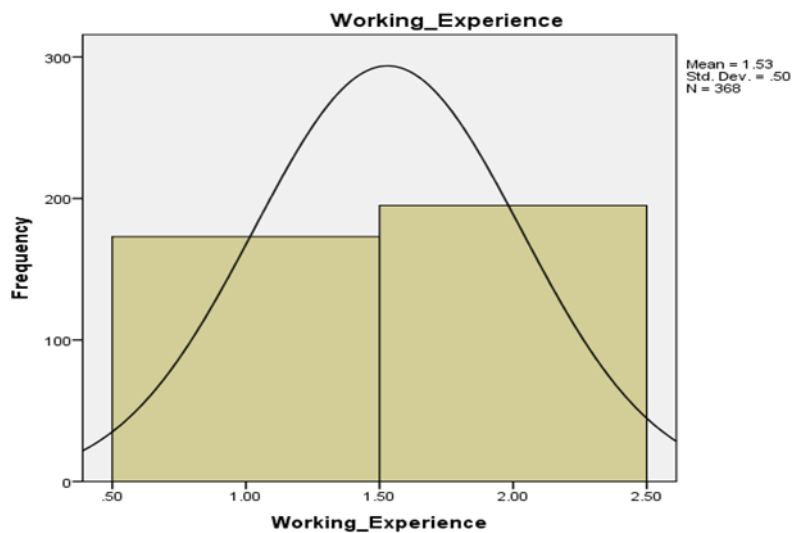
**Fig 4.** Respondents age



**Fig 5.** Respondents education



**Fig 6.** Respondents job type



**Fig 7.** Respondents working experiences

Typically, this is conveyed through a data digest that outlines the substance of the data. As an illustration, a census may encompass descriptive statistics pertaining to the proportion of females to males within a specific urban area. Descriptive statistics can be categorized into measures of central tendency and measures of variance,

specifically popularity. Measures of central tendency, such as mean, median, and mode, are commonly used in statistical analysis. On the other hand, measures of variance, including the standard deviation, variance, minimum and maximum variance, kurtosis, and skewness, are also frequently employed to assess the



spread or distribution of data(57). There are two distinct types of descriptive statistics: measures of central tendency and discrete measures. The mean, median, and mode are three statistical measures commonly used to describe the central tendency of a dataset. The descriptive statistics pertaining to demographics encompassed various details such as gender, age, educational attainment, occupational classification, and work experience, among others. The study involved a total of 368 participants, and their respective information is presented in Table 2.

#### 4.3. Reliability Test

Conducting a reliability test on an actual survey entail evaluating the survey instrument's consistency and stability in yielding results across various circumstances or time periods. This assessment ensures that the survey effectively measures its intended constructs and generates dependable outcomes. Such testing commonly employs statistical techniques like computing Cronbach's alpha to assess internal consistency or conducting test-retest reliability analysis to gauge response stability over time. The objective of the reliability test is to ascertain the questionnaires consistency and stability. Table 3 demonstrates the utilization of Cronbach's alpha for this objective.

**Table 3.** Reliability Test of Actual Survey

Variable	Cronbach Alpha	Convergent Validity
Demographics	0.818	0.81
Stakeholders Factors	0.918	0.86
Communication Factors	0.815	0.61
Time Factors	0.863	0.71
Technological Factors	0.844	0.59
Cost Factors	0.816	0.61
Top Management Support	0.815	0.65
Local Authorities Support	0.875	0.57
Organizational Culture	0.817	0.9
Iraqi Construction Industry	0.816	0.89

A Cronbach's alpha value above 0.6 is deemed significant based on our research findings(58). The stakeholder possesses 0.818 and the topic of 0.918 pertains to communication. The statement the year is 0.815, which lacks clarity and coherence, does not convey a clear meaning. It is not possible to rewrite it academically without additional context or information. The technological factor is present in 0.863. The cost is 0.844. The provision of top management support is crucial in the context of 0.816. Local authorities have been reported to have 0.815. Organizational culture has been observed to have an impact at the level of 0.875. The Iraqi construction industry has experienced growth in the year 0.817. The value of 0.816.

#### 4.4. Descriptive Statistics

Descriptive statistics provide an overview of the sample and data measures by presenting a summary of the detailed data characteristics. Table 4 presents the mean and standard deviation as the typical descriptive statistics. The questionnaire has been categorized into multiple sections to facilitate the dissemination of data. This classification of the questionnaire aids in comprehending the outcomes more effectively. The questionnaire comprises subsections pertaining to demographic information. Table 4 presents a comprehensive descriptive analysis of all variables. The table includes information on N, minimum, maximum, mean, and standard deviation. The data displays deviations.

**Table 4.** Results of descriptive statistics for all variables

	N	Minimum	Maximum	Mean	Std. Deviation
Demographics	368	1	5	3.6685	1.22146
Stakeholders Factors	368	1	5	3.8179	1.31311

Communication Factors	368	1	5	3.4674	1.33656
Time Factors	368	1	5	3.0761	1.2061
Technological Factors	368	1	5	3.2418	1.4461
Cost Factors	368	1	5	3.6196	1.29423
Top Management Support	368	1	5	3.6223	1.50973
Local Authorities Support	368	1	5	2.6957	1.58494
Organizational Culture	368	1	5	3.6467	1.42771
Iraqi Construction Industry	368	1	5	3.6141	1.49222
Valid N (listwise)	368				

According to AMOS, a normal distribution exhibits a kurtosis value of 0. Distributions of data that exhibit significant skewness may exhibit kurtosis values that are either positively or negatively high, whereas distributions that are nearly normal will have kurtosis values that are close to zero. According to (59), in order to indicate that the data is normal, the acceptable range of values for skewness and kurtosis should fall between -2 and +2. According to the results of the normality test presented above, the data falls within the range of normality, which is defined as values between -2 and +2. Table 4.3 presents a comprehensive analysis of the data. The questionnaire has been categorized into multiple sections to facilitate data dissemination. This classification of the questionnaire helps in comprehending the outcomes more effectively(60). The questionnaire comprises subsections pertaining to demographic information. Table 4. presents

a comprehensive descriptive analysis of all variables, including N, minimum, maximum, mean, and standard deviation.

#### 4.5. Measurement Model

The measurement and analysis of associations between observable and unobservable variables. Regression analysis is a statistical method that examines linear causal relationships between variables while taking measurement error into account servable and unobservable variables. Regression analysis is a statistical method that examines linear causal relationships between variables while taking measurement error into account. It is a more robust technique than other methods, such as correlation analysis, for identifying and quantifying the strength of relationships between variables.

**Table 5.** Measurement Model (Sample Covariances of model)

Factors	Organizational Culture	Stakeholder	Communication	Time	Technological	Cost	Top management support	Local authorities support	Iraqi construction industry
Organizational Culture	1								
Stakeholders	-0.008	1							
Communication	0.041	0.535	1						
Time	0.522	-0.017	0.008	1					
Technological	0.294	0.006	0.054	0.532	1				
Cost	0.151	-0.004	0.018	0.378	0.731	1			

Top management support	-0.081	0.012	0.008	0.439	0.212	0.269	1		
Local authorities support	-0.378	0.083	0.075	-0.059	0.148	0.446	0.406	1	
Iraqi construction industry	0.034	0.07	0.107	0.038	0.032	0.024	-0.02	0.032	1

The measurement model (sample covariances of model) is a statistical framework utilized in structural equation modeling (SEM) to examine the connections between observed variables (indicators) and latent factors. In this model, the covariances of the observed variables in the sample are utilized to standard the relationships between these variables and the latent factors they are presumed to represent. These relationships are depicted through factor loadings, indicating the strength and direction of the links between each observed variable and its corresponding

latent factor. Moreover, the measurement model encompasses error terms, which capture the residual variance in the observed variables that is not explained by the latent factors. These error terms are assumed to be independent of each other and of the latent factors. Overall, the measurement model (sample covariances of model) constitutes a fundamental element of SEM analysis, providing a framework for estimating the connections between observed variables and latent factors based on the covariances observed in the sample.

**Table 6.** Measurement Model (Sample Correlations)

Factors	Organizational Culture	Stakeholder	Communication	Time	Technological	Cost	Top management support	Local authorities support	Iraqi construction industry
Organizational Culture	1								
Stakeholder	-0.008	1							
Communication	0.041	0.535	1						
Time	0.522	-0.017	0.008	1					
Technological	0.294	0.006	0.054	0.532	1				
Cost	0.151	-0.004	0.018	0.378	0.731	1			
Top management support	-0.081	0.012	0.008	0.439	0.212	0.269	1		
Local authorities support	-0.378	0.083	0.075	-0.059	0.148	0.446	0.406	1	
Iraqi construction industry	0.034	0.07	0.107	0.038	0.032	0.024	-0.02	0.032	1

#### 4.6. Discriminant validity

Discriminant validity is a statistical concept used in research to determine whether two measures that are supposed to be measuring different constructs are measuring different constructs and not just different aspects of the same construct. The reliability of a

questionnaire can be evaluated based on its dependability, consistency, and relevance. The function of construct reliability is to enhance the level of confidence regarding the accuracy of item measurements obtained from a sample that represents the true score in the population. The present study has examined the construct reliability by analyzing the outer loading and specific cross loading.

As per the guidelines provided by (61), the outer loading is expected to exceed 0.7. The Cronbach's alpha coefficient has been computed to exceed 0.7 for the comprehensive factor analysis. As previously mentioned, the Cronbach's alpha results fall within the acceptable range. Additional metrics, such as composite reliability and average variance extracted, exhibit values that fall within the prescribed threshold limits, suggesting favorable outcomes overall. The information is presented in Table 3 below.

#### 4.7. Discriminant validity of Measurement Model

Discriminant validity in structural equation modeling (SEM) refers to the model's capacity to differentiate between various latent constructs or factors. It evaluates whether the observed variables associated with each latent factor exhibit stronger correlations with their respective factor compared to correlations with other factors within the model. In essence, discriminant validity ensures that indicators representing a particular latent construct are more closely associated with that construct than with any other constructs in the model, thereby confirming the distinctiveness of the latent constructs and their ability to measure distinct underlying concepts or dimensions

Table 7. FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.903	2.829	2.549	3.13
Saturated model	0	0	0	0
Independence model	2.921	2.823	2.542	3.124

In structural equation modeling (SEM) analysis, "FMIN" typically denotes the process of reducing the difference between the observed covariance matrix and the model-implied covariance matrix. This procedure is carried out through an optimization algorithm known as "FMIN" or a similar term, depending on the SEM software used. In software packages like AMOS, Mplus, or lavaan in R, the FMIN optimization algorithm is utilized to determine the model parameters that best fit the observed data. This entails iteratively adjusting parameter estimates to minimize a specified fit function, such as the disparity

between observed and model-implied covariance matrices(62). Throughout the FMIN optimization, the software algorithm seeks optimal parameter estimates that yield the closest fit between the model and observed data, employing criteria like maximum likelihood estimation, or weighted least squares estimation. Essentially, FMIN in SEM analysis serves as the optimization algorithm aimed at estimating model parameters to minimize the difference between observed data and the model's covariance matrix, thereby evaluating the fit of the SEM model to the data.

Table 8. RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0.324	0.307	0.34	0
Independence model	0.28	0.266	0.295	0

RMSEA, or Root Mean Square Error of Approximation, serves as a crucial statistic within structural equation modeling (SEM) methodologies, playing a pivotal role in evaluating how well a model aligns with observed data(63). By quantifying the disparity between the observed covariance matrix and the one implied by the

model, RMSEA offers insights into the goodness-of-fit of the model. Its numerical range spans from 0 to infinity, where lower values signify a closer fit between the model and data. Typically, RMSEA values below 0.05 indicate a strong fit, while those falling between 0.05 and 0.08 suggest a reasonable fit. Conversely, RMSEA values

surpassing 0.10 signify a poor fit. In the realm of SEM analysis, RMSEA stands alongside other fit indices like the Comparative Fit Index (CFI) and Tucker-Lewis Index

(TLI), collectively contributing to a comprehensive assessment of the overall model fit.

Table 9. AIC

Model	AIC	BCC	BIC	CAIC
Default model	1101.39	1102.4	1171.74	1189.74
Saturated model	90	92.521	265.864	310.864
Independence model	1090.05	1090.55	1125.22	1134.22

AIC, short for Akaike Information Criterion, is a statistical measure utilized in modeling to evaluate the comparative quality of various models. It serves to strike a balance between a model's goodness of fit and its complexity, discouraging excessively intricate models to prevent overfitting. This criterion is computed based on the model's likelihood function and the number of parameters it employs. Lower AIC values signify a more favorable compromise between model adequacy and simplicity, indicating a more concise and dependable model(64). In model selection processes, AIC is widely employed to compare competing models, where

researchers assess several models fitted to the same data. The model exhibiting the lowest AIC value is deemed the most fitting among the options, as it represents the optimal trade-off between fit accuracy and model complexity. This methodology is prevalent across various disciplines, including statistics, econometrics, and machine learning, facilitating model selection and inference procedures. Essentially, within the realm of AIC, the most favorable value is the lowest one among the models under consideration, representing the most suitable model given the available data.

Table 10. ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	3.001	2.72	3.302	3.004
Saturated model	0.245	0.245	0.245	0.252
Independence model	2.97	2.689	3.271	2.972

In structural equation modeling (SEM), ECVI, or the Expected Cross-Validation Index, serves as a metric for model selection, especially when researchers need to compare multiple models to identify the best fit for their data. ECVI estimates how well a model is likely to fit new data, assessing its ability to generalize to samples from the same population. This index considers both model fit and complexity, penalizing overly complex models to prevent overfitting. Lower ECVI values indicate superior model

fit and simplicity, suggesting a more suitable model for the dataset. Researchers often utilize ECVI alongside other fit indices like AIC and BIC to evaluate alternative models and choose the most appropriate one. Overall, ECVI aids in assessing model fit and complexity in SEM, helping researchers select the most suitable model for their data(65). While ECVI values are reported as numerical outcomes during SEM analysis, there's no specific standard range for them as they vary depending

on the specific model and dataset under examination. Researchers compare ECVI values across different models to determine the optimal balance between model fit and complexity. It's crucial to interpret ECVI values in conjunction with other fit indices and consider the

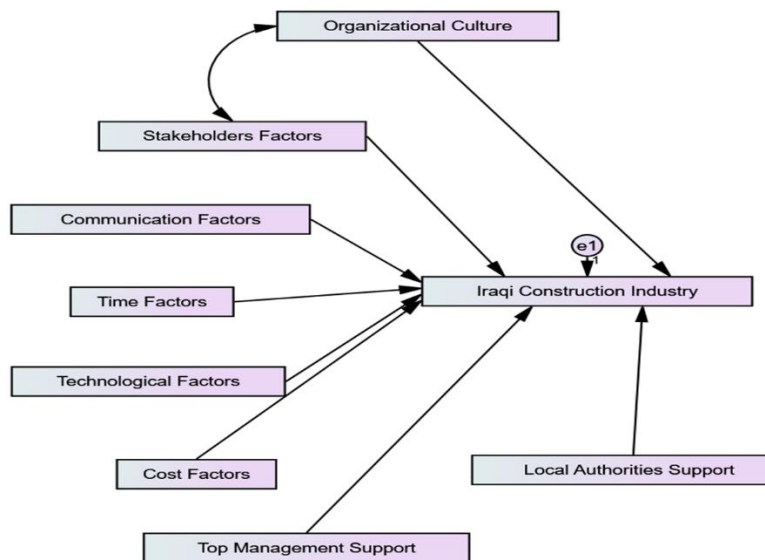
theoretical implications of the models being compared. Therefore, ECVI provides a numerical indication of a model's expected fit to new data, with lower values indicating better model fit and simplicity

**Table 11. HOELTER**

Model	HOELTER	HOELTER	HOELTER
	0.05	0.01	0.05
Default model	14	17	14
Independence model	18	21	18

In structural equation modeling (SEM), HOELTER serves as a metric to evaluate model fit by examining the stability of factor loadings, primarily in confirmatory factor analysis (CFA). HOELTER indices, also called Hoelter's critical N, offer critical sample size requirements for different levels of statistical significance in assessing factor loading stability. These indices aid researchers in determining the minimum sample size necessary for reliable and stable factor loadings. Alongside other fit indices like RMSEA, CFI, and TLI, HOELTER indices are utilized in SEM analysis to assess overall model fit. They provide valuable insights into the reliability of factor loadings and the generalizability of the SEM model to the target population. In essence, HOELTER indices are crucial in evaluating model fit adequacy and ensuring the validity and reliability of SEM findings(66). Discriminatory validity represents a form of construct validity. Stated differently, the assessment's validity pertains to its ability to accurately gauge the intended constructs. Discriminative validity is a statistical measure that evaluates whether constructs that are theoretically distinct are indeed distinct in practice. The interrater reliability tests that connect predictions are already interconnected. Tests aimed at establishing discriminant

validity, which presuppose that the constructs being measured should not be correlated, are deemed inconsequential. While no specific criterion value was established for discriminative validity, scores below 0.70 suggest the potential for a lack of discriminative validity between the two scales. Convergent validity and discriminant validity are two interrelated constructs that are integral to the validation of measurement instruments. The concept of convergent validity necessitates the presence of a favorable correlation between distinct assessments that gauge identical constructs. Conversely, discriminant validity does not mandate any correlation between the assessments that measure distinct constructs. It can be argued that there exists a positive association between scales that are theoretically similar, as indicated by interrater reliability, whereas scales that are theoretically dissimilar exhibit a negative association. In the absence of established discriminative validity, the inferences made regarding the association between the constructs under investigation may be erroneous. For instance, it is possible to overestimate the strength of a relationship or to affirm a relationship that does not actually exist



**Fig 4.** Measurement Model with Standardized Factor Loading

#### 4.8. Moderation Analysis

To test the results, a moderate analysis is performed against a hypothesis. Stakeholders (consultants, clients, contractors, and employees) are researched in connection to organizational culture and the Iraqi construction industry. It must be crucial for the mediation process from the perspective of organizational players in the Iraqi construction sector. This model has no mediation effect if any of the pathways is insignificant. To determine whether Correlations:

our theory is accepted or rejected, as well as whether the hypothesis we developed is accepted or rejected, we will check all possible paths. When comparing the table to (67) we can see that there is a substantial link between the impact of stakeholder factor on organizational culture and estimate value (.008). Strong correlation exists between the estimated values for the impact of stakeholder factor and organizational culture on the Iraqi construction sector, which is (.0080) for the latter and (.036) for the former.

			Estimate	S.E.	C.R.	P	Label
Stakeholder factors	<-->	Organizational Culture	.015	.098	-.158	.875	par_9

			Estimate	S.E.	C.R.	P	Label
Organizational Culture	<-->	Stakeholder factors	-.009	.057	-.158	.875	W3
Iraqi construction industry	<-->	Organizational Culture	.036	.054	.671	.502	W1
Iraqi construction industry	<-->	Stakeholder factors	.080	.059	1.345	.178	W2

#### Standardized Regression Weights

			Estimate
Organizational Culture	<---	Stakeholder factors	-.008

Iraqi construction industry	<---	Organizational Culture	.035
Iraqi construction industry	<---	Stakeholder factors	.070

#### Variations

	Estimate	S.E.	C.R.	P	Label
Stakeholder factors	1.720	.127	13.546	***	V1
e2	2.033	.150	13.546	***	V3
e1	2.207	.163	13.546	***	V2

Variations commonly denote the spread or diversity of a dataset around its mean or central value. In statistical analysis, variations serve to measure the extent of individual data points' deviation from the dataset's average value. This term finds application in various statistical methodologies, including structural equation modeling (SEM) and general statistical analysis. "e1" and "e2" are placeholders for error terms or residual terms in statistical models, representing the unexplained variance or error in the model's predictions.

#### Squared Multiple Correlations

	Estimate
Organizational Culture	.000
Iraqi construction industry	.006

### 5. Conclusion

The measurement model establishes the connections between observable and unobservable variables while characterizing the measurement characteristics of the observable variables. The present model proposes conjectures regarding the associations among the discernible variables and the unobservable variables that they were intended to evaluate. The constructs are considered observed variables, whereas the constructs are regarded as latent variables. The significance of the measurement model lies in its ability to evaluate the dependability of the observed variables utilized for gauging the latent variables. The process of convergent validity resulted in the removal of certain items pertaining to distinct constructs. The results of the discriminant validity tests indicate that all of the constructs exhibit discriminant validity, as each construct demonstrates a greater degree of shared variance with its respective items than with any other construct.

### 6. Recommendations

As previously stated, the project manager, along with all primary stakeholders, plays a crucial role in establishing a culture of excellence throughout the project development process. This study offers insights into the characteristics of an optimal project culture and identifies areas within

the industry that have room for enhancement while acknowledging the constraints within which the research was conducted. Consequently, several suggestions can be put forth to offer a framework for enhancement in this domain. Experts are recommended to exert effort in order to enhance the probability of satisfaction, innovation, learning, and overall performance of the participants. The provision of additional resources aims to enhance the human capital aspect of various factors. In practical terms, this entails incentivizing personnel, prioritizing collaborative efforts, fostering unobstructed communication within the worksite, prioritizing site safety, acknowledging exemplary performance, and ensuring that project advancement is communicated to management. The survey instrument utilized in the research was created by the investigators. The questionnaire exhibits a high level of design quality and ease of administration. The questionnaire is suggested for implementation in forthcoming research endeavors, either in its original form or with modifications, that aim to investigate diverse factors in various globally constructed settings. Consistent utilization will establish and maintain the dependability and credibility of the tool.

### 7. Future Works

The survey instrument utilized in the research was created by the investigators. The questionnaire exhibits a high



level of design quality and is straightforward to implement. The questionnaire is suggested for implementation in forthcoming research endeavors, either in its original form or with modifications, that aim to investigate diverse factors in various globally constructed settings. Frequent utilization of the tool will establish and maintain its reliability and credibility.

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#### Conflicts of Interest

The authors assert that they have no conflicts of interest with respect to the publication of this paper.

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