Organization Culture Impact on Sudanese Construction Project performance

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ABSTRACT - Traditionally, construction industry is attributed of being fragmented, risky, fluctuated, complex, associated with antagonism, blame culture, short term mentality and poor communication. All enthroned as poor performance. Sudanese construction industry is believed to exhibit no exception of that. Sudanese construction industry is an industry that operates in an economically, politically and socially turbulent developing country environment. Organizational culture, as a mean of internal integration and external adoption, is deemed by many scholars and professionals to be one of the main theoretical levers for organizational performance enhancement. Thus, it is essential to articulate how organizational culture can enhance construction project performance in Sudanese context. This research study sought to tackle the identified research gap in the literature concerning the empirical linkage between organizational culture and the construction project performance in Sudanese context. Descriptive quantitative research methodology was adopted in the study; quantitative/statistical methods were exercised to capture the proposed empirical link. Self-administrated survey (questionnaire) was the main tool used to collect required data. SPSS version (21) software was used to analyze the data. The key finding of the study was: Organizational cultures selected dimensions (people and leadership, processes and systems, information management and business focus) of Sudanese construction industry projects are significantly correlated with organizational outcomes (performance). This research concluded that there is a proven empirical relationship between organization culture and construction project performance in Sudanese context. Furthermore, generated models provide practical implications and an aiding tool for projects managers/stakeholders to improve desired practices in order to enhance project performance.

Keywords: construction industry, organization culture, performance, construction project.

المستخلص – واجه أداء المشاريع الإنشائية بانتقادات عديدة و متكررة فيما يتعلق بقدرته على الإيفاء بمتطلبات القيود الزمنية و المالية و تحقيق رضى الملاك وأصحاب المصلحة في المشروع و تحقيق أهدافه بشكل عام . تتصف صناعة الإنشاءات بالتجزئة، الخطورة النسبية، التعقيد ، التذبذب إنتشار ثقافة الخصومة وا لقاء اللوم و عقلية المدى القصير و ضعف الإتصالات. ان صناعة الإنشاءات السودانية ليست بمعزل عن كل ما سبق، اذ أنها صناعة تعمل في بيئة متقلبة و متنوعة ثقافيا و سياسيا و اقتصاديا ، و عليه فإن صناعة الإنشاءات السودانية تعاني من المشاكل و المعوقات التي تعاني منها الصناعة بشكل عام مضافا إليها المشاكل ذات الخصوصية بالبيئة السودانية. يعزي كثير من الباحثين في مجال تحسين أداء المشاريع الإنشائية المشاكل المتعلقة بضعف الأداء (على مستوى المشروع) إلى الثقافة المؤسسة السائدة في المشروع ، إذ أنها تعد من أهم الروافع النظرية لتحسين الأداء. تهدف هذه الدراسة لملأ الفجوة المعرفية في البحث عن العلاقة التجريبية بين الثقافة المؤسسية (بوصفها وسيلة للتكامل الداخلي واستيعاب المتغيرات الخارجية على مستوى المشروع باعتباره مؤسسة قصيرة الأمد) وأداء المشروع بالنسبة إلى معايير أداء مختارة (التكلفة، الزمن، الجودة) وذلك في سياق صناعة الإنشاء السودانية. من أجل تحقيق هدف الدراسة تم تطوير نموذج مفاهيمي يحوي مجموعة من العوامل (السوابق) والمتغيرات(الأبعاد) المختارة للربط بينها و بين معايير الأداء المختارة ضمن منهجية الوصف الكمي. خلصت الدراسة الى التالي:المتغيرات (الأبعاد) المختارة للثقافة المؤسسية مرتبطة ارتباط ذو دلالة إحصائية مع معايير الأداء المختارة. و عليه فقد خلص البحث إلى وجود علاقة تجريبية قوية وذات دلالة إحصائية بين الثقافية المؤسسية على مستوى المشروع وأداء المشروع الإنشائي بالإضافة إلى تطوير نماذج رياضية لمساعدة مدراء المشاريع لتطوير الممارسات المرغوبة لتحسين الأداء.

INTRODUCTION

Construction industry is a large, risky, fragmented, fluctuated, dynamic, complex, multi-discipline, heterogeneous, non-standardized, capital intensive, highly influenced by unpredictable variables, time consuming and intricate project based industry sector. It is also comprising a considerable portion of worldwide economy and investments. Nevertheless, it is a frequently cited notion in the literature that the construction industry is associated with poor performance reputation. Many efforts and initiatives with diverse perspectives and grounds of thoughts took place to enhance the industry performance. Fair share amount of these initiatives and exerted efforts failed. This is widely believed that is due to the neglecting of the role that organization culture plays with this regard.

IMPORTANCE OF THE STUDY

Construction industry provides a physical environment where social and economic activities can take place. It is a stimulator for many other associated industries such as building material and associated services.Construction industry final products are characterized of being unique, durable, immobile, costly, having various and difference stakeholders and parties of interest. The industry as a whole is attributed with fragmentation, complexity, antagonism, dynamism and risk.

  Construction industry in developing countries is lagging behind in many aspects. Such as lack of adequate funding and heavily depending on imported materials. It also depends, to large extent, on imported construction skills and machinery. This is may be attributed to incompetent local skills, lack of competitiveness of locally produced materials and lagging in catching up with technology used in construction (Elkhalifa [6].

Sudan (although there are no comprehensive studies -up to author knowledge- to back up this claim) seems to face the same sets of developing countries industry problems. The Sudanese construction industry is working in a highly fragmented manner, lacking of efficient central bodies. Notwithstanding the existence of several councils, institutes, and unions which are concerned with the development of the construction industry. Each of these bodies plays in isolation, lacking effective coordination and collaborative work with its counterparts. Construction project management in Sudan is more tedious than it should be. No holistic view, prioritizing criteria (up to author knowledge) have been made to tackle these construction problems in Sudanese context. Consequently, resulting in a poor industry performance. Hassan [8] argued that "Sudanese construction industry is the least developed in terms of mechanization, productivity and the benefit derived from industrial progress". Bannaga cited in ElKhalifa [6] argued that problems that hinder the development of Sudanese construction industry are limited to very few studies conducted by pioneer researchers. Hence, accurate reliable and up to date information about the industry status are lacking. It is argued by many scholars as well as by practitioners that effectiveness/performance of organizations, at least in part, can be ascribed to its organization culture.

Research problem: As has been suggested by many scholars, attention paid to organization culture in construction industry can be best described as marginal. It is argued byWilderom et al. cited in Daniel Denison [4] that "Nevertheless, the great intuitive appeal of C-P linkage, the preliminary evidence found so far and the many research challenges involved in obtaining the evidence give some reason to still believe in this link". The implied relationship between organizational culture and performance suffers from a lack in empirical evidence globally and none (up to author knowledge) in Sudanese construction industry context. This study aims to empirically examine the link between organizational culture construct and construction project performance in Sudanese context (considering construction project as a temporary and short time organization).

ORGANIZATION CULTURE

Organization Culture is a relatively new branch of knowledge (as a distinctive branch of knowledge) emerged in the 80's of the last century; nevertheless, its roots go back to much earlier times. The organization culture borrowed knowledge (theories, concepts, meanings etc.) from various branches of knowledge, mainly, anthropology, social sciences, psychology, business and management. In its beginning it was

dealt as a black box, resorted to when all of the known explanations failed to provide sufficient understanding/explanations. Organizational culture with its "soft" and "subjective" nature is based on two constructs; organization and culture. Organization is primary vehicle for humans to achieve those desired goals which cannot be achieved individually. Common and interrelated organization characteristics are people, strategies, technology, environment, structure and culture. Culture is the shared solutions adopted by group of people to deal with deep and universal problems. It is like glue that puts the organization together and a road map on how to act toward encountered different situations (Hellriegel et al., cited in Meijen[7].

Edgar H. Schein [9] in his paper titled "organizational culture" stated that "there is still insufficient linkage of theory with observed data. We are still operating in the context of discovering and seeking hypothesis rather than testing specific theoretical formulation". This status appears to be still under research momentum and iterated in recent researches. Many recent studies are still following this trend. For instance, Ankrah [1]in his study of "investigation into the impact of culture on construction project performance", Jossy Mathew in his study of "three perspectives analysis of the relationship between organizational culture and effectiveness", Zhang in his study "An organizational cultural analysis of the effectiveness of Chinese construction enterprises", N. Ankrah, D. Proverbs and Y. Debrah in their study "cultural profile of construction project organizations in the UK" and Dongdong Jiang in his study of "engineering project management in the international context: A Chinese culture based exploratory and comparative evaluation" are some of the studies that are still undergo the same trend. Organizational outcomes such as performance, productivity, self-confidence, ethical behavior and commitment, are suggested to be influenced by organization culture [2]. Organization culture in plain is how things are done in an organization [5]. This implies that successful implementation of management practices depends on their fitness with the organization cultural characteristics.

PERFORMANCE MEASUREMENT

Establishing an effective, efficient, systematic and holistic performance measurement system is inevitable for the success of any organization. This is applicable for construction project as it is a temporary organization. The adage goes as "if you do not measure it, you cannot improve it".

The intention of establishing a good performance measurement system for the construction project management is to know where it stands. Only then an informed and fact/data based decisions towered the desired direction and orientation can be taken. The aim of a good performance measurement system is to define the gap between what is actually happening in the project and what is desired to be achieved by the management with respect to certain set of chosen indicators. The intensive performance literature review revealed that there is no consensus on the definition, conceptualization and measurement of performance. Nevertheless, Key performance indicators (KPI) can be divided according the objectivity and subjectivity of indicators. Objective indicators for instance are time and cost. On the other hand, subjective indicator can be for instance health, safety and quality. Performance measures can also be divided to financial and non-financial measures. A golden triangle of cost, time and quality is commonly and widely used to measure construction project performance. Despite the fact that there are many (KPI) identified and introduced in the literature, the golden triangle was chosen to measure construction project performance in this study.

RESEARCH HYPOTHESIS

In pursuing the goal of fulfillment the study aims and objectives, the following hypothesis were formulated.

H1: Organizational culture of Sudanese construction industry projects selected dimensions are not correlated with organizational outcomes (performance).

IMPLICATION OF THE STUDY

The implications of this study can be of significant value as they can systematically and empirically investigate the link between the organizational culture construct to construction project performance. Consequently, provide construction project managers and senior construction professionals with valuable predictive tool.

METHODOLOGY

Methodology is concerned with what, why, where, how and when data were collected and how they were analyzed. Among the two main research philosophies cited in the literature, namely; the positivism and the Interpretive. Positivism philosophy is attributed to be "scientific", hypothetic, deductive and quantitative extensive. On the other hand, interpretive philosophy (also referred to as phenomenology), is attributed to be ethnographic and qualitative intensive. Positivism is considered to be the preferred and most followed approach in social quarries and researches.

In actual reality, real research is rarely purely one or the other. Methodologies establish the distinction, but actual research practice usually spans both philosophies. This is also stressed by Jung [10] where he argued that a combination of two approaches should be adopted to overcome the short comings of each. Choosing the research paradigm should be a tradeoff between depth and breadth of data and the paradigm that best suits answering the research question. The way data were compiled and then analyzed depends on the chosen research method. This research is positivism by nature. The purpose of the research is mainly descriptive, i.e. the research aims at reflecting an accurate picture (as practical to research limitations) of the situation of the organizational culture in Sudanese construction projects and depict the relationship between organization culture and construction project performance.

Research strategy is needed to guide the operation of research performing before deciding about the research design and activities. In this research, the first research question explicitly expresses a question about "what" in the form of how much or how many. Hence, survey strategy is found to be the most suitable to study the organization culture project within Sudanese construction context. Due to the limitations of time and cost constraints, self-administrated questionnaire design was adopted for this study.

Questionnaires are one of the most commonly used data collection techniques used in organizational cultural study. They are efficient and standardized in collecting required data. In the current research, employees were requested to complete an individual (self-administrated) questionnaire. The purpose of this questionnaire is to obtain individuals' perception of the culture of the organization and thereby describe the organization in the view of the employees. A blend of ordinal, categorical, scale, open ended and closed ended questions were used in the questionnaire. Due to time and resource limitations a frame of correct samples of (n>30) is adopted in this thesis. It is a widely accepted in the literature to be a large sample that enables to conduct inferential statistical analysis upon.

There are two main recognized types of sampling, namely; probability sampling and non-probability sampling. The chosen sampling type for this thesis is the non-probability sampling type. This choice is made due to the following reasons.

- Non availability of valid, reliable and comprehensive data base of organizations or firms operating in the construction industry in Sudan in any of the professional bodies that represent and regulate construction industry in Sudan.
- The limited resources and time available for this study.
- The comprehensive and relatively lengthy nature of the questionnaire utilized in this study.

Non probability sampling type adopted in this study goes in [8] words as "the sample is restricted to a part of the population that is readily accessible, the sample, also, consists essentially of volunteers. With small but heterogeneous population, the sample will inspect the whole of it and selects a small sample of typical units-that is, units that are close to his impression of average of the population. Lastly, the sample selected haphazardly, that is mean selection without planning.

CONCEPTUAL FREMEWORK

There are three categories of approaches for organizational culture classification. Dimensions approach, interrelated structure approach (adopted for this study) and Typology approaches. Framework is to harmonize all related/interrelated aspects. Conceptual frameworks, sometimes used as synonymous to theoretical frameworks, are mostly used where study is informed by multiple theories and bodies of literature.

This study developed a conceptual framework from organizational culture and performance

literature (Figure 1) and then tested it by utilizing quantitative methods. Empirically determine the extent to which organizational culture influences construction project performance and the nature of this influence. The model was developed according to acceptable criteria set. However, conducted literature survey revealed that theoretical, conceptual frameworks and models that explain and depict organizational performance in construction industry context are rather low. This can be due to the fact that there is a lack of consensus on agreed upon set of criteria (from organizational cultural perspective) to assess construction project performance against. Model chosen dimensions were selected according to comprehensive synthesis process. Mathematical model(s) that are expected to assist construction project organizations to assess (in terms of performance) the possible outcomes of their cultural orientation were developed. The research also uncovered and identified the Sudanese construction project organization profile, prevailing and dominating (if any) Sudanese project construction organizational culture orientation.

There are two approaches to deal with culture, an approach dealing with values and the other is dealing with practices. Practices are ways of behaving as well as reflection. As organizational cultures are shaped by management through cultural practices, this is the approach adopted for the current study (Practices approach). Developing a model that captures the organizational culture phenomenon should take into consideration all the three aspects of (antecedents, dimensions of organizational culture and Consequences) to be able to explain the correlation, cause and effect relationships between organizational culture and its consequences.

Reconciling/Synthesizing organizational culture dimensions, organizational culture determinants and related performance indicators, a conceptual framework has been proposed. Fusing of antecedents (background factors and context of the organization), dimension (behaviors and practices) and consequences (performance), a conceptual model for organization culture of construction project in Sudanese context were formulated and presented. Based the on following criteria and procedures:

- Conducting an extensive analysis of existing values-based and behaviors/practices-based models/instruments (this research is adopting Hofsteade's approach, i.e. measuring perception of values). Behaviors/practices as reflection of values model were developed)

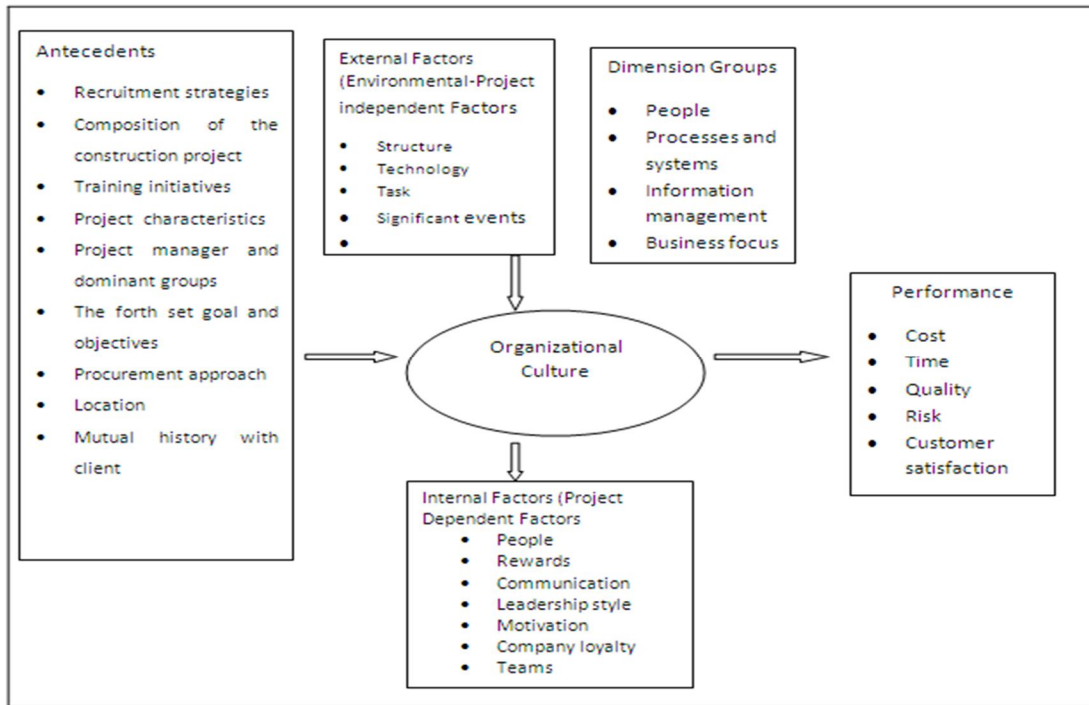- Choosing dimension relevant to construction industry.

Figure 1: A conceptual model for investigating the influence of organizational culture on construction project performance in Sudanese context. [Developed by Author]

- Incorporating project dependent and independent antecedents. Project dependent antecedents were incorporated in formulation of the questionnaire as the project is the studied unit in this research.
- Choosing organization related dimensions rather than national related dimension as the organization is a microcosm of the society.
- Choosing dimensions that are addressing construction problems and issues in developing countries in general and Sudan in particular such as lack of long term vision, poor level of professionalism and lack of commitment to duty.
- Using common dimensions with other similar studies (as practical) to ease comparison with other studies.

DATA ANALYSIS
The obtained data from the distributed questionnaire (32 valid questionnaires) were analyzed using several descriptive and inferential techniques.

RELIABILITY OF DATA
For this research internal consistency reliability or agreement are adopted to test reliability. Although Cronbach Alpha is very common in testing reliability, it comes with its share of disadvantages; technically speaking it is not a test. It is a coefficient that measures internal consistency. Its main advantage for this research is its sensitivity to multidimensional structure (Nguyen, 2009). It was decided to check internal consistency by Cronbach Alpha and consistency of response by including few similar pairs of questions and implement Pearson chi-square technique over them and then check the significance of results. Question of B5 reads as (was the project completed on time) and question B19 reads as (Has the project been completed on planned time) were tested by chi-square. The results (Table 1) were as follows:

TABLE1: COMPARISON BETWEEN QUESTIONS B5&17.

Test Statistics

	completed in time	has the project completed on planned time
Chi-Square	12.500[a]	15.125[a]
df	1	1
Asymp. Sig.	.000	.000

0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 16.0.

With X^2= 12.500, P<0.05 for B5 and X^2=15.125, P<0.05 for B19 the null hypothesis (there is no difference) is rejected for both questions.

TABLE 2: RELIABILITY OF INTERNAL CONSISTENCY

Dimensions of the project culture	Number of questions	Cronbach's alpha coefficient
Processes and System	10	0.772
Information Management	5	0.790
People and Leadership	7	0.697
Business Focus	5	0.797

Cronbach Alpha is computed for the cultural dimensions and the results (Table 2) were as follows:

The above obtained results showed that Cronbach Alpha(s) for cultural dimensions' groups were .772, .790, .697 and .796 respectively as shown in Table 6.2. This is within the good and acceptable range of 0.6-0.7 of Cronbach Alpha. This infers that there an association between the two scores of the two questions. Hence, from all the above it is inferred that questionnaires were completed with a reasonable reliability.

VALIDITY

Validity is concerned with the accuracy of the questions asked, the data collected and the explanations offered. Generally, it is related to the data and the analysis used in the research. It refers to the quality of data and explanations and the confidence we might have that they accord with what is true or what is real.

Before conducting the path analysis to verify the relationship between cultural dimensions and selected cost time and quality performance indicators, the number of dimensions to be included has to be reduced (from the chosen 27 dimensions selected). The purpose of data reduction is to "remove redundant (highly correlated) variables from the data file, perhaps replacing the entire data file with a smaller number of uncorrelated variables"[1]. As a rule of thumb the number of dimensions should lay between '7 ± 2' [1]. The approach followed is to reduce variables in this study was to choose the most representative dimensions from the four identified dimensions groups' categories. The next step is to examine the correlation between the nine extracted cultural dimensions and the performance indicators. Using the correlation matrix produced seven dimensions (Table 3).

Seven dimensions (as illustrated above) found to be correlated with performance indicators. Path analysis for cultural dimensions and performance indicators is presented in (Figure 2).

Path analysis showed significant negative relationships between different cost factors (cost performance indicator) and team communication cultural dimension.

TABLE 3: CULTURAL DIMENSIONS AND PERFORMANCE INDICATORS CORRELATION

Cultural Dimension	Performance Indicator
Relationship with management	The deviation (in percentage) of project total time to the contracted time (Time). How roughly the deviation from final cost (Cost)
Teamwork/Communication	The deviation (in percentage) of project total time to the contracted time (Time). To what extent was project free from apparent defects (Time). How roughly the deviation from final cost (Cost). What factors accounted for the difference between the final cost and contract price (Cost). How many design variations were made (Cost)
Organization structure	The deviation (in percentage) of project total time to the contracted time (Time). To what extent was project free from apparent defects (Quality).
Control or influence of lower level	To what extent was project free from apparent defects (Quality).
Bureaucratic / systematic & patrimonial roles	Paid liquidated damages (Time).
Continuity, stability & control	To what extent was project free from apparent defects (Quality). Orders from this client for new projects (Quality).
Outcome orientation	How roughly the deviation from final cost (Cost).

Significant negative relationships between project time deviation (time performance indicator) and management relationship dimension. Significant negative relationships between apparent defects free (quality performance indicator) and team communication cultural dimension. Significant negative relationships between design variations number (quality performance indicator) and team communication cultural dimension. Positive significant relationship was found between project time deviation (time performance indicator) and organization structure cultural dimension.

All the significant relationships are highlighted in (Tables 4 and 5). No other significant relationship among the rest of cultural dimensions and performance indicators in the model were found.

TABLE 4: REGRESSION WEIGHTS

			Estimate	S.E.	C.R.	P	Label
organization_structure	<---	team_communication	0.538	0.149	3.618	***	par_11
control_influence_lower_level	<---	organization_structure	0.382	0.180	2.128	0.033	par_19
control_influence_lower_level	<---	manaqet_relation	0.318	0.164	1.937	0.053	par_20
control_influence_lower_level	<---	bureaucratic	0.273	0.166	1.646	0.100	par_21
outcome_orientation	<---	manaqet_relation	0.534	0.153	3.497	***	par_22
outcome_orientation	<---	team_communication	0.442	0.155	2.857	0.004	par_23
final_cost_deviation	<---	manaqet_relation	-3.643	5.083	-0.717	0.474	par_2
final_cost_deviation	<---	team_communication	-6.356	5.646	-1.13	0.260	par_3
final_cost_deviation	<---	outcome_orientation	-3.117	5.394	-0.578	0.563	par_8
new_projects_order	<---	control_influence_lower_level	-0.069	0.073	-0.948	0.343	par_12
different_cost_factors	<---	team_communication	-0.395	0.129	-3.06	0.002	par_18
continuity_stability	<---	organization_structure	0.304	0.159	1.914	0.056	par_24
project_time_deviation	<---	manaqet_relation	-37.379	11.51	-3.25	0.001	par_1
project_time_deviation	<---	team_communication	-16.079	15.72	-1.02	0.306	par_4
apparent_defect_free	<---	team_communication	-0.422	0.188	-2.24	0.025	par_5
project_time_deviation	<---	organization_structure	28.032	13.84	2.026	0.043	par_6
apparent_defect_free	<---	organization_structure	-0.297	0.213	-1.39	0.164	par_7
project_time_deviation	<---	different_cost_factors	58.380	15.32	3.81	***	par_9
apparent_defect_free	<---	new_projects_order	-0.875	0.369	-2.37	0.018	par_10
design_variation_number	<---	team_communication	-0.997	0.484	-2.06	0.039	par_13
paid_liquidated_damage	<---	bureaucratic	-0.225	0.059	-3.79	***	par_14
project_time_deviation	<---	final_cost_deviation	0.743	0.486	1.53	0.126	par_15
apparent_defect_free	<---	continuity_stability	0.069	0.184	0.376	0.707	par_16
apparent_defect_free	<---	control_influence_lower_level	-0.250	0.158	-1.58	0.114	par_17
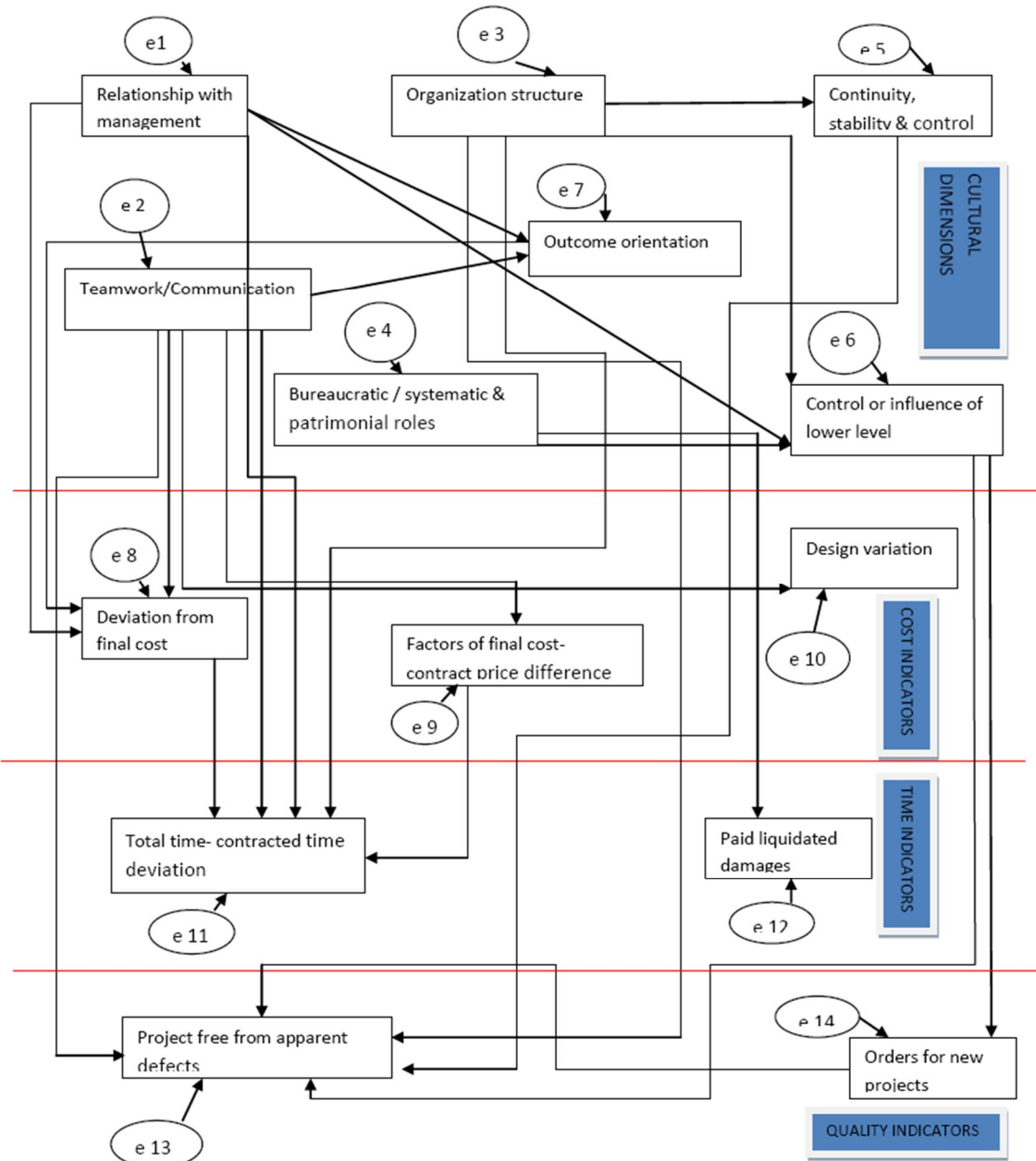
Figure 2: Path analysis model.

TABLE 5: STANDARDIZED REGRESSION WEIGHTS

			Estimate
organization_structure	<---	team_communication	0.545
control_influence_lower_level	<---	organization_structure	0.341
control_influence_lower_level	<---	managet_relation	0.301
control_influence_lower_level	<---	bureaucratic	0.278
outcome_orientation	<---	managet_relation	0.501
outcome_orientation	<---	team_communication	0.396
final_cost_deviation	<---	managet_relation	-0.148
final_cost_deviation	<---	team_communication	-0.247
final_cost_deviation	<---	outcome_orientation	-0.135
new_projects_order	<---	control_influence_lower_level	-0.165
different_cost_factors	<---	team_communication	-0.490
continuity_stability	<---	organization_structure	0.325
project_time_deviation	<---	managet_relation	-0.425
project_time_deviation	<---	team_communication	-0.175
apparent_defect_free	<---	team_communication	-0.361
project_time_deviation	<---	organization_structure	0.301
apparent_defect_free	<---	organization_structure	-0.251
project_time_deviation	<---	different_cost_factors	0.511
apparent_defect_free	<---	new_projects_order	-0.348
design_variation_number	<---	team_communication	-0.382
paid_liquidated_damage	<---	bureaucratic	-0.571
project_time_deviation	<---	final_cost_deviation	0.207
apparent_defect_free	<---	continuity_stability	0.055
apparent_defect_free	<---	control_influence_lower_level	-0.237

(Table 6) presents the path modeling results for the model and the overall fit is excellent (Chi-square = 56.071, df = 67, p-value = 0.827 ; TLI = 1.247; CFI = 1.000; RMSEA = .000). Eight of the 24 paths in the model are significant at the 0.05 level. The Tucker-Lewis index (TLI), and comparative-fit index (CFI) all were above the recommended value of 0.90. The value of the root mean square error of approximation (RMSEA) was below the value of 0.08 recommended by Browne and Cudeck [3], and the norm chi-square value ($\chi 2$/df) was less than 3. The above findings suggest that the hypothesized measurement models fit reasonably well with the data.

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	52	56.071	67	.827	.837
Saturated model	119	.000	0		

Model	NPAR	CMIN	DF	P	CMIN/DF
Independence model	14	174.298	105	.000	1.660

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.678	.496	1.102	1.247	1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.638	.433	.638
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.000	.000	9.248
Saturated model	.000	.000	.000
Independence model	69.298	36.883	109.608

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.809	.000	.000	.298
Saturated model	.000	.000	.000	.000
Independence model	5.623	2.235	1.190	3.536

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.000	.000	.067	.911
Independence model	.146	.106	.184	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	160.071	257.571		
Saturated model	238.000	461.125		
Independence model	202.298	228.548		

ECVI

Model	ECVI	LO 90	Minimization:	0.171
Default model	5.164	5.516		
Saturated model	7.677	7.677	Miscellaneous:	3.245
Independence model	6.526	5.480	Bootstrap:	0.000
			Total:	3.416

HOELTER

Model	HOELTER 0.05	HOELTER 0.01
Default model	49	54
Independence model	24	26

CONCLUSION

Significant positive and strong correlation relationship between organizational culture dimensions of (people/leadership, processes and systems, information management and business focus) and performance was found. This was reached in aggregate manner. More detailed investigation of the relationship between different sub dimensions of the aforementioned dimensions was conducted through correlations and path analysis. Path analysis showed significant negative relationships between different cost factors (cost performance indicator) and team communication cultural dimension.

Significant negative relationships between project time deviation (time performance indicator) and management relationship dimension. Significant negative relationships between apparent defects free (quality performance indicator) and team communication cultural dimension. Significant negative relationships between design variations number (quality performance indicator) and team communication cultural dimension. Positive significant relationship was found between project time deviation (time performance indicator) and organization structure cultural dimension.

Significant relationships with their respective (ß) are obtained. The study has fulfilled the aim/stated objectives (i.e. brooding understanding of its subject, developing organizational culture model and providing a predictive tool for managers and project stakeholders). The key finding of the study was: Organizational cultures selected dimensions (people and leadership, processes and systems, information management and business focus) of Sudanese construction industry projects are significantly correlated with organizational outcomes (performance).

Recommendations for Future Research

Future cross studies for the subject is recommended to compare the results obtained. Larger samples are recommended.

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