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The impact of rework and organisational culture on project delivery

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Abstract

Purpose – It is generally accepted that organisational culture is capable of influencing how project organisation performs. It can also impact on how people set individual goals and objectives, perform their roles, tasks and deploy resources to achieve set objectives. The purpose of this paper is to examine the influence of organisational culture on the occurrence of rework in Nigerian construction industry.

Design/methodology/approach – The research adopted mixed method research using both quantitative and qualitative approaches to elicit information. Though, the result of the questionnaire survey was presented in this paper. Exploratory factor analysis was used to identify which variables measured attributes of the same underlying proportions, while descriptive statistics and multiple regression analysis were used to establish the influence of organisational culture on rework.

Findings – The study identifies 14 factors as causes of rework from the result of factor analysis. The outcome also indicates that leadership style, success criteria and management style are important organisational culture dimensions. Poor management practices and lack of teamwork are found to be largely responsible for poor project delivery due to rework occurrence.

Practical/implications – The research will be of significant benefit to both the academic and industry practitioners. The result of the research will provide academics with useful insights into the influence of organisational culture on project delivery by undertaking future research to inform better understanding. The research will also provide practitioners with good understanding of how culture within their organisations can influence the performance of their subordinates or employees. Further research is encouraged to investigate the influence of management and leadership style on project delivery in the context of Nigeria.

Originality/value – This study is the first attempt to investigate the influence of organisational culture on occurrence of rework empirically in the Nigerian construction industry. There is paucity of research focusing on this area as it affects project delivery.

Keywords Construction project management, Nigeria, Organizational culture, Leadership style, Culture in construction, Management practices, Project delivery, Rework

Paper type Research paper



Introduction

The construction industry is a major and an important contributor to the economic growth of Nigeria. It plays a vital role as a huge employer of labour and provides abundant economic opportunities for the growth of large, medium and small contracting outfit within the sector. One of the favourable conditions for this growth is the renaissance of democracy in Nigeria in 1999. Since the rebirth of democracy, the industry has witnessed a growing affluence in the infrastructure construction activities. This in-turn has drawn the interest of many political job seekers who, with or without requisite qualifications, have suddenly become building and civil engineering contractors with a nickname “portfolio contractors”. The rules of the game are bent to satisfy these contractors with the resultant effect of poor project delivery. Akpan and Igwe (2001) opine that compromised technical competence, total disregard for acquisition of needed experience to carry out construction works at certain level and pervasive sharp practices by stakeholders are collectively largely responsible for the poor projects delivery in Nigeria.

Although, over the past few decades, industry practitioners, academics, public sector agencies and consultants have emphasised the challenges facing Nigerian construction industry. The challenges are onerous and exhibit significant impact on the performance of the industry. Despite all efforts to address these challenges within the industry, the performance of the industry remains at sub-optimal level and the trend continues unabated. Thus, making poor delivery of projects as a result of cost and time overrun a common phenomenon in the Nigerian construction industry (Baloi and Price, 2003; Ogunsemi and Aje, 2006). Added to these myriad of factors causing the poor delivery of projects is the occurrence of rework. Hwang *et al.* (2009) contend that rework is a momentous element that contributes directly to poor construction projects delivery in terms of both time and cost overruns. Rework has been variously defined in extant literature which Hwang *et al.* (2009) reportedly state that the definitions demonstrate how rework is viewed from different perspectives. The perspectives vary from deviation in quality, quality failure and non-conformance to defects. Thence, rework is described as the exertion of unnecessary efforts and resources to redo a process or activity due to non-conformance to specification or as a result of wrongful execution of work the first time it was done (Love, 2002; Hwang *et al.*, 2009).

A plethora of research has been carried out to unravel the causes of rework, schedule and cost overruns, as it affects projects delivery (Love, 2002; Hwang *et al.*, 2009), but little effort has been directed to examine the influence of organisational culture on the occurrence of rework in construction projects. For example, Ndiokubwayo and Haupt investigate the origins of variation orders in construction projects in South Africa context, it was found that project clients are largely responsible for occurrence of rework due to lack of defined project needs or financial constraints. Also, Love *et al.* (2010) identify some factors as the cause of rework in 115 civil infrastructure projects in Australia. These include lack of effective use of information technologies, excessive involvement of client in the project, lack of clearly defined working procedures, client initiated changes and insufficient changes initiated by the contractor to improve quality. In another study, Love *et al.* (2011) report the causes of rework in complex offshore hydrocarbon projects and identify among other things poor project governance, lack of support among the professionals (engineers), staff turnover or continuity and lack of scope definitions. These assertions depict that reworks occur both in building, civil or

heavy engineering infrastructure projects as well as in projects in oil and gas sector, and the causes are related. However, organisational culture can play a crucial role in influencing the performance of any organisation to reduce the problems associated with reworks. Organisational culture has been viewed as a representation of a firm's internal environment which reflects the belief, values, behaviour, attitude and assumptions of internal stakeholders (Peteraf, 1993; Aycan *et al.*, 1999). Organisational culture is a viable management tools that is capable of improving the performance of construction organisations by reducing the stress of having to execute same activity twice. The landmark reports of Latham (1994) and Egan (1998) emphasises the need for a change in the culture within the construction industry before the desired performance can be achieved. Consequently, it has been regarded as a realistic tool designed to fashion the attitude and behaviour of the employees by management in wilful ways. For example, Haley (1984) argues that the matchless performance of Japanese contracting firm is as a result of viable organisational culture that is entrenched by Japanese contractors. This culture allows employee's participation within the organisation and enhances high premium placed on quality, thus accounting for their superior performances. This submission is underscored by the findings of Xiao and Proverbs (2002) that evaluate the performance of contractors in three different countries, Japan, USA and the UK and found that Japanese contractors perform better than their counterparts in the two other nations. Xiao and Proverbs (2002) assert that constructed facilities or works in Japan experience lesser defects or rework with lesser recall despite having the longest defect liability periods. Pettigrew (1979) contends that organisational culture is firmly rooted in thinking systems which allows an organisation to describe how employees arrived at their decisions. Perhaps, this plays very vital roles in an organisation in enhancing and improving employee's performance and commitment. Gaining total commitment of employees and ability to predict the result of their input is capable of reducing the menace of rework that directly affects project delivery (Love and Edwards, 2013). Hence, organisation culture requires adequate consideration most especially with the belief that certain knowledge or specific effort can lead to expected outcome. Therefore, this study tends to investigate the influence of organisational culture on the occurrence of rework with a view to improving projects delivery process and enhancing the performance of the organisations and the industry at large.

Organisational culture

Culture has been viewed as an influencing element that impacts on the morale of employee, his motivation and willingness; level of productivity and effectiveness; the quality of work; innovation and creativity; and the attitude of employees in the workplace (Campbell *et al.*, 1999). Cheung *et al.* (2011), Lynch (2012) and Abiola-Falemu (2012) argue that organisational culture can be viewed in the context of commitment, leadership style and management decision-making style. These explain the manner used by an organisation to offer supports to its employees, train and lead them to attain superior performance and competitive advantage that other organisations cannot equal (Cheung *et al.*, 2011; Lynch, 2012). Previous studies have established that leadership has an impact on employee's attitude and behaviour, and this in turn have telling effects on how they relate (Yukl, 2012). Giritli *et al.* (2013) assert that leadership styles and organizational culture are interwoven and are dependent on each other, though each plays an important role in determining organizational effectiveness. Jones (2013, p. 31)

posits that organisational culture “is the set of shared values and norms that controls organisational members’ interaction with each other and with suppliers, customers, and other people outside the organisation”. Organisational culture could be viewed as the dominant leadership style of an organisation which is responsible for all the ills within the organisation or sometime applauded for positive impacts. Organisational structure and culture is the instrument used by organisation to attain its set goals (Jones, 2013).

Coffey *et al.* (2011) reportedly assert that organisational culture can be explained by organisational characteristics such as commitment, loyalty and good team work. This aligns with Porter, Steers, Mowday and Boulian view on organisational commitment which was surmised by Zeinabadi (2010, p. 999):

[...] as the strength of an individual’s identification and involvement in a particular organisation as characterised by a strong belief in and acceptance of the organization’s goals and values (value commitment) along with a readiness to exert considerable effort on behalf of the organisation and a positive appeal to remain a member (commitment to stay).

Meanwhile, organisational commitment was classified into three basic aspects by Meyer and Allen (1991) and Meyer *et al.* (1993) as affective commitment or desire-based (wanting to stay with the organisation), normative commitment or obligation-based (feeling obliged to stay) and continuance commitment or cost-based (staying because of the high cost associated with leaving the organisation).

In addition, management style in the context of organisational culture may also take any of these form developed by Likert (cited in Amzat and Idris, 2012) which has resultant effects on performance of employees. The style may be exploitative authoritative system, where an employee must obey all the instructions given by the superior without questioning or he faces sanction. In the benevolent authoritative system, the superior makes the decision and subordinates are rewarded for constructive contributions. Consultative system allows for subordinates participation in the decision-making process, but the superior takes the final decision. Finally, participative system is a style that allows top management to repose confidence in the employees with complete trust. The style encourages freedom of speech, and this invariably enhances employee’s sense of belonging and willingness to give all his best to the organisation. Abiola-Falemu (2012) opines that in general, managerial leadership styles have strong influence on employee attitudes of attachment to their organisations.

Rework, organisational culture and project delivery

Love and Edwards (2013) contend that it is essential for organisations to acknowledge that rework occurs in construction projects, and there is need to evaluate its influence on project delivery or performance so that adequate measure can be put in place to reduce its occurrence. Rework has been argued to be a contributor to poor project delivery both in term of costs, time extension and satisfaction of stakeholders (Palaneeswaran, 2006; Hwang *et al.*, 2009). Palaneeswaran (2006) highlights that variations in the cost and time of projects due to rework are as a result of errors in design, omission during construction, failures of constructed part, changes initiated by client or his representative, poor communication and poor coordination. Previous studies have argued that occurrence of rework is capable of increasing the total cost of construction project by 13 and 6.5 per cent as reported by Rhodes and Smallwood (2003) in the context of South Africa and by Love and Edwards (2004) in the context of Australia, respectively. Other recent studies have also examined the influence of rework on project

delivery or performance in terms of cost, schedule and quality deviations. In an investigation of 115 civil infrastructure projects executed in Australia, [Love et al. \(2010\)](#) found both the indirect and the direct cost of reworks to be around 5.22 and 5.075 per cent, respectively, and this was considered to be lower compared with building construction projects as stated earlier. In another research that explore the dynamics or rework occurrence in complex offshore projects, rework cost was found to be in the range of 3 to 25 per cent of total capital expenditure with 10 per cent considered as acceptable rework cost level ([Love et al., 2011](#)). In the context of Singapore, [Hwang et al. \(2013\)](#) investigates the causes of rework initiated or caused by the client on a building project, and the research reveals that client contributes mostly to occurrence of rework which resulted in 7.1 per cent overrun in cost and 3.3 weeks delay in project schedule averagely for the 381 building projects considered. Meanwhile, [Elinwa and Joshua \(2001\)](#) report that time overruns are more prevalent in public sponsored projects in Nigeria, and its impact could be as high as 89 per cent of total project duration. Accordingly, [Trigunarysyah \(2004\)](#) contends that time overrun is as a result of extension of time beyond planned completion dates traceable to the contractors. It is obvious, that occurrence of rework in construction process requires correction which has to be done within time allocated for the project. This may cause a shift in program of work and thus lead to an overrun in the project duration or perhaps delay in project delivery. However, time and cost overrun appears to be simple in literature, but it is a serious threat to the performance of the Nigerian construction industry ([Elinwa and Joshua, 2001](#)). The success of the project is hinged on timely completion and value for money given to the client in term of functionality and performance requirement of the constructed facility.

Construction projects are regarded as being successful when it is completed within cost, schedule and meeting the required minimum standard in terms of quality ([Xiao and Proverbs, 2002](#)). These are three fundamental criteria for measuring effective project delivery, which [Atkinson \(1999\)](#) describes as “golden triangle”. The fragmented nature of the construction industry is characterised by a uniquely project-specific and complex environment, combining different investors, clients, contractual arrangements, consulting professions and contracting organisations that come together on an *ad hoc* basis ([Bassioni, 2004](#)). In this kind of arrangement, dispute and counter accusation is inevitable. Therefore, to achieve efficient and improved delivery process of construction projects, there is need to give culture a chance ([Ankrah et al., 2009](#)). This is because employees have to be coordinated and work together in unison as a team. Thus, controls, coordination and motivation are made possible with viable organisational culture which shapes the attitude and the behaviour of participant or employees in the organisation ([Jones, 2013](#)). [Cheung et al. \(2011\)](#) argue that organisational culture makes an organisation appear unique and that the accomplishment of employees or workers in organisations are collectively bounded by the organisational culture which in turn reflects characteristics of the organisation. In a research carried out by [Coffey et al. \(2011\)](#) to profile organisational culture in Indonesian construction companies, it was reported that significant correlation exists between the company’s organisational culture and the quality performance of contractors and, thus, conclude that the characteristics of organisational culture is a key determinant element for continuous improvement in quality. Corroborating this conclusion, [Abiola-Falemu \(2012\)](#) explains that the dominant characteristics of an organisation contribute significantly to the quality of service delivered by an organisation. This support the earlier assertion of

Latham (1994) and Egan (1998) which places high premium on the need for a rethink in the culture within the construction industry to attain the desired quality and avoid the menace of having to carry out the same task more than once.

In another research reported by Love *et al.* (2000) to improve the performance and competitiveness of the Australian construction industry, it was asserted that there is a need for a change in the cultural and behavioural settings in the way of thinking of stakeholders to improve quality. However, several authors in the extant literature tend to assume that the alignment of organisations basic values, attitudes and beliefs is only a requirement for organisational performance, lest there exist a well-matched between organisations and the need to change their *modus operandi*, the desired improvement on project delivery or organisational performance cannot be achieved (Bresnen and Marshal, 2000). This is underpinned by Emuze and Smallwood (2011) in a research conducted to improve project delivery in South Africa context, which makes apparent that there will be a major improvement in project delivery if stakeholders can proactively implement practices such as optimum management of quality and enhanced organisational culture, in their efforts to improve project delivery. This is consistent with the conclusions drawn by Coffey (2008) which further underpins the established relationship in the earlier studies between strong organisational culture and project success. Therefore, a mismatch of organisational cultural practices can negatively affect the productivity and performance of an organisation which in return can lead to the occurrence of rework and poor project delivery.

Organisational culture and project performance

Over few years, the absolute connection between organisational culture and organisational performance has been emphasised both within and outside the construction industry research purview (Ankrah and Proverbs, 2005; Ehtesham *et al.*, 2011). Ankrah (2007) suggests that within the construction industry realm, organisational culture has been recognised as a significant topical issue, but many of the previous studies focus on the “soft” aspect which is regarded as vital to the management of projects and construction businesses. Though, performance of construction projects is influenced by array of elements that are interconnected and classified under different headings by Ankrah (2007), such as factors that are related to project itself, factors that concern the organisation, those that revolves round the industry or those that are external to the organisation. Very few studies identified organisational culture as one of the factors responsible for poor project performance. However, there is a general acceptance that culture within the construction industry has an effect on its performance (Latham, 1994; Egan, 1998; Ankrah, 2007; Abiola-Falemu, 2012). The need to have a good understanding of what culture means and how to build a team culture, adapted to high performance, is of vital essence in attaining better project delivery within a construction organisation than focusing on the entire industry (Speechley, 2005). The fragmented nature of the construction industry significantly impact on the culture within the industry which in turn affects its performance. At times, many of the stakeholders’ involved in a project are in different boats heading towards the same destination as illustrated by Speechley (2005), experiencing different weather and turbulence. This may be as a result of factors identified by Ankrah (2007) which include antagonism, lack of trust, poor communication, short-term mentality, blames culture, casual approaches to recruitment, machismo and sexism. These factors often lead to

adversarial or acrimonious relationship many of which have resulted into litigation, cause poor health, poor performance in terms of safety or less attention to superior quality (Ankrah, 2007).

Research methodology

This study uses mixed research methods in obtaining different data which however are complementary in identifying the influence of organisational culture on the occurrence of rework within the Nigerian construction industry, Kaduna state specifically. This approach has been arguably considered to be pertinent for a research of this type (van den Berg and Wilderom, 2004; Ankrah *et al.*, 2009). Within this research, both quantitative and qualitative data were collected and analysed independently (Creswell, 2011), but the results of the quantitative data are presented in this paper. The mixed approach of quantitative and qualitative paradigms allow for multiple data collection in one study and thus reduce the limitations or personal biases the study may likely experience when only a single methodological design is adopted (Wu, 2009). It becomes essential to combine the two research approaches by drawing on the strength of one to cover the weakness of the other. This is because some combinations of the two provide researcher with the best information for research questions and hypotheses (Creswell, 2003). Sekaran (2003) contends that qualitative research strategy accede to lack of generalisability and ability to repeat the same research procedures to test the commonality of the findings while quantitative approach is considered to be more demanding.

Epistemologically, this research aligned with pragmatic approach where multiple viewpoints are provided by collecting data based on what works to attend to research questions raised in the research (Creswell, 2011). The adopted scales used for the constructs were derived from the critique of existing literature reviewed, and these are revised to match the purpose of our study to guarantee reliability and validity of the measurement used. A questionnaire survey was designed to elicit quantitative data from the targeted construction companies that registered, won competitive tenders and subsequently executed the contracts from year 2000 to 2010 in Kaduna State. Questionnaires were pre-tested among different groups, such as colleagues and professionals engaged in construction works on some projects in the university where the researchers domiciled. This was carried out to refine the difficulties of answering the questionnaire and to ensure that the data collected could answer the research question (Saunders *et al.*, 2009). Though, the comprehensive list of registered contractors was not available, but a total of 40 contractors who have executed building construction works within the period understudy was identified from the document provided by the government agency saddled with responsibilities of administering contracts.

The targeted participant in each of the organisations is either the professional architect, quantity surveyor or a builder on the premise that they have required knowledge and experience of construction works. This is because not all the organisations have all the professionals on their payroll, some outsource only when they have contracts. The questionnaires were self-administered to the participants and consist of three main parts. Part one is on the demographic information of the respondents, part two is on the causes of reworks and, finally, part three centres on organisational culture variables and its dimensions. A research pro-forma was also used

to get information on project characteristics, etc., but do not form part of the report in this paper.

The respondents were provided with ratings based on a Likert scale of 1-5, where 1 = Not important/Strongly disagree; 2 = Less important/disagree, 3 = somewhat important/Somehow agree, 4 = Important/Agree, 5 = Very important/strongly agree. A total 40 questionnaires were distributed, and a total valid 33 questionnaires were used for the analysis in this research amounting to 82.5 per cent response rate. Invalid questionnaires were deleted due to their failure to meet the rules identified by Li *et al.* (2010) such as irregularity in response and failure of questionnaires to be answered in blanks. The data were analysed using descriptive statistics, factors analysis to precipitate the underlying factors responsible for rework occurrence and regression analysis to depict the influence of organisational culture on the occurrence of reworks.

Analysis and discussion of results

The credibility of this research lies in the quality of response and feedback received from the respondents as a result of their cognate experience, profession and their involvement in all the projects executed by their respective companies for the period under consideration. Tables I and II indicate the mean values for each of the variables, associated standard deviation and their corresponding alpha value. The significance level was set in line with the conventional practice of 95 per cent level for Likert scale rating. Higher values (4 and 5) are considered to be important or agreed and very important or strongly agreed as the case may be. According to Ahadzie (2007), values with 3.5 in a five-point Likert scale can be considered to be important or agreed as indicated in the analysis of results. Meanwhile, Field (cited in Badu *et al.*, 2012) contends that when a tie occurs between two variables or having the same mean value, variables which has the least standard deviation is ranked first. From the Tables I and II, 16 (41 per cent) of the variables identified to be capable of causing rework show mean values of 3.5 and above of 39 variables, while the measures of organisational culture exhibits mean values above 3.5.

These results indicate that all the variables having mean value of 3.5 and above are important and agreed by the respondents in causing poor project delivery as a result of rework caused by organisational culture. It was considered useful to check the internal-consistency reliability of these questions. There are various techniques used to perform this (Eisinga *et al.*, 2012). Among the most popular ones is the Cronbach's alpha. This alpha value lies between 0 and 1, with 0 indicating a lowest reliability and 1 indicating a perfect reliability. Sekaran (2003) asserts that reliability coefficient is a reflection of how well the items are positively correlated to one another in a set. Sekaran (2005) contends that a reliability (alpha) value of 0.7 is considered to be reliable for a study, as it gives little or no room for errors. Therefore, the internal-consistency reliability value of all the variables were above 0.7 as stated by Sekaran (2005), indicating that all the measures are reliable with average alpha values for rework occurrence and organisational culture being 0.846 and 0.815, respectively.

Organisation culture constructs

This study adopted the six organisational culture dimensions, namely, dominant characteristics, organizational leadership, management of employees, organizational glue, strategic emphases and success criteria, developed by Cameron and Quinn (1999)

S/No.	Rework variables	<i>n</i>	Alpha	Mean	SD
1	Design errors	33	0.850	3.850	1.093
2	Design omissions	33	0.845	3.670	1.291
3	Construction errors	33	0.844	3.730	0.452
4	Construction omissions	33	0.848	3.850	0.972
5	Quality deviation	33	0.851	3.700	1.075
6	Design changes	33	0.848	3.300	1.075
7	Poor documentation	33	0.845	3.330	1.267
8	Overlook site condition	33	0.848	3.480	1.202
9	Proper monitoring	33	0.843	3.270	1.232
10	Conflicting information	33	0.843	2.970	1.262
11	Unrealistic programme	33	0.844	3.240	1.251
12	Work separation	33	0.847	3.030	1.132
13	Change in plan and scope by client	33	0.847	3.670	1.137
14	Change in specification by client	33	0.846	4.060	1.171
15	Contractor initiated changes	33	0.847	4.060	0.827
16	Lack of attention to quality	33	0.851	3.940	1.088
17	Interpretation of client's requirement	33	0.843	4.090	0.879
18	Safety consideration	33	0.848	3.880	1.023
19	Defect	33	0.842	4.520	0.834
20	Checking procedure	33	0.846	2.820	0.635
21	Poor management practices	33	0.840	2.760	1.091
22	Poor communication	33	0.843	3.700	1.357
23	Quality focus	33	0.840	4.120	1.293
24	Poor team work	33	0.839	2.730	1.306
25	Procurement method	33	0.836	3.210	1.341
26	Contractor selection method	33	0.838	2.910	1.355
27	Cost pressure	33	0.837	3.180	1.014
28	Staff turnover	33	0.842	3.480	1.121
29	Disturbance	33	0.841	3.330	1.472
30	Lack of training	33	0.841	4.120	0.992
31	Lack of motivation	33	0.844	3.270	1.232
32	Inexperienced personnel	33	0.839	3.670	1.080
33	Lack of knowledge	33	0.844	3.580	1.062
34	Delays	33	0.844	3.910	0.723
35	Alteration	33	0.841	3.270	1.232
36	Lack of skill development	33	0.845	3.180	1.261
37	Excessive over time	33	0.846	3.240	1.200
38	Inadequate planning and resourcing	33	0.844	3.520	1.093
39	Ambiguous instruction	33	0.839	3.420	1.226
	Cronbach's alpha		0.846		

Table I.
Descriptive statistics
of rework variables

in measuring organisational culture within companies considered. From [Table III](#) showing the organisational constructs, organisational leadership has the highest mean value and least standard deviation with standard error close to zero. This denotes that leadership style is ranked highest by the respondents in measuring the culture within their respective organisations. Success criteria and management style are ranked second and third, respectively. This support the assertion of [Giritli et al. \(2013\)](#) that organizational culture and leadership are integrated and intertwined deeply within an

Table II.
Descriptive statistics
of organisational
culture variables

S/No.	Organisational culture variable	<i>n</i>	Alpha	Mean	SD
1	Description as red taped	33	0.819	4.240	0.902
2	ideas and collaboration	33	0.82	3.610	1.345
3	productivity is central	33	0.826	3.820	1.334
4	Freedom	33	0.806	4.060	0.747
5	Targets and Result	33	0.807	4.000	0.866
6	Security of employment	33	0.805	3.880	0.893
7	Satisfaction	33	0.79	4.000	0.750
8	Dynamic strategy	33	0.795	4.030	0.770
9	Competitive methods	33	0.791	3.880	0.927
10	Job performance	33	0.794	3.880	1.023
11	Welfares	33	0.788	4.000	1.031
12	Market leader	33	0.798	4.030	0.984
13	Presence and shares	33	0.804	3.850	1.034
14	Project performance	33	0.801	4.000	0.935
	Cronbach's alpha			0.815	

Table III.
Dimensions of
organisational
culture

Organisational culture dimension	<i>n</i> statistic	Mean statistic	Standard error	SD
Dominant characteristics	33	3.667	0.149	0.854
Management of employees	33	3.909	0.118	0.678
Organisational glue	33	3.879	0.136	0.781
Organisational leadership	33	4.212	0.072	0.415
Strategic emphasis	33	3.697	0.160	0.918
Success criteria	33	4.121	0.104	0.600

organization. [Giritli *et al.* \(2013\)](#) thus concludes that as organisation develops, the culture within the organisation defines the leadership style. Empirically, [Ogbonna and Harris \(2000\)](#) also contend that organisational culture act as a mediator in the relationship between leadership style and performance. [Ogbonna and Harris \(2000\)](#) argue further that leadership style is not directly linked to performance but a forecaster of organisational competitiveness and innovative cultures which in turn predict performance.

Furthermore, a study conducted by [Ogunlana *et al.* \(2002\)](#) to investigate the factors and procedures used in Thailand construction industry in matching project managers to construction projects, revealed that project managers considered relationship-oriented leadership style to be more important for the construction project managers than the task-oriented style in achieving desired project performance. Also, in an exploratory study focusing Thai employees by [Yukongdi \(2004\)](#), to investigate preferred management style of managers, it was reported that employees' who realised their managers are more autocratic or paternalistic become afraid to express difference of opinion than those working under a democratic manager. Additionally, [Yukongdi \(2004\)](#) contends that employees considered consultative management style to be more ideal than participative or paternalistic, while the least proportion of employees favoured an autocratic manager.

However, the success criteria of any organisation revolve round the successful completion and delivery of project within time and cost without deviation in specification (Xiao and Proverbs, 2002). Hence, management style of an organisation may influence the performance of employees with respect to their job satisfaction (Amzat and Idris, 2012). This influence may be as a result of quality of work place relationship and employee's superior, quality of the working environment within the organisation and the extent of self-fulfilment derived in doing the work (Lambert *et al.*, 2008; Adenike, 2011).

Exploratory factor analysis

The research adopted exploratory factor analysis in the variables identified from extant literature in Table IV using SPSS. The Kaiser-Meyer-Olkin (KMO) measure of the adequacy of the sample is 0.854 which meets the factor analysis condition that when KMO value tends towards 1, it depicts that the nature of the correlation amongst the variable are compact. Fifteen factors were retained from extraction process of the principal component analysis with eigenvalue greater than 1 using varimax rotation. This concurred to Kaiser criterion which says unless a factor extracts at least as much as the equivalent of one original variable, it cannot be retained (Kaiser cited in StatSoft, 2013). Therefore, the relevant factors are those factors that show eigenvalue greater than 1, and this is because an eigenvalue in principal component analysis indicates relative importance of each of the factors as explained by the variance. The extracted factors explained total cumulative variance of 88.13 per cent. Each of the variables used in the analysis exhibits Cronbach's alpha coefficient value of above 0.7 as indicated in Table I. This shows that the variables are reliable and thus loaded on the factors. Variables with factor loadings exceeding or >0.50 were considered based on the criteria that any

Component	Total	Initial eigenvalues		Total	Extraction sums of squared loadings		Total	Rotation sums of squared loadings	
		% of variance	Cumulative %		% of variance	Cumulative %		% of variance	Cumulative %
1	8.49	16.98	16.98	8.49	16.98	16.98	4.904	9.808	9.808
2	5.632	11.263	28.243	5.632	11.263	28.243	4.433	8.866	18.673
3	4.576	9.152	37.395	4.576	9.152	37.395	3.789	7.578	26.251
4	3.681	7.361	44.757	3.681	7.361	44.757	3.397	6.795	33.046
5	3.392	6.785	51.541	3.392	6.785	51.541	3.217	6.434	39.481
6	3.206	6.412	57.954	3.206	6.412	57.954	3.119	6.238	45.719
7	2.704	5.409	63.362	2.704	5.409	63.362	2.877	5.755	51.473
8	2.344	4.687	68.049	2.344	4.687	68.049	2.826	5.651	57.125
9	2.023	4.046	72.095	2.023	4.046	72.095	2.762	5.525	62.649
10	1.853	3.707	75.802	1.853	3.707	75.802	2.555	5.11	67.759
11	1.46	2.92	78.722	1.46	2.92	78.722	2.406	4.812	72.571
12	1.348	2.696	81.418	1.348	2.696	81.418	2.273	4.546	77.117
13	1.214	2.428	83.846	1.214	2.428	83.846	2.198	4.396	81.512
14	1.11	2.22	86.066	1.11	2.22	86.066	1.95	3.899	85.412
15	1.024	2.047	88.113	1.024	2.047	88.113	1.351	2.702	88.113

Table IV.
Total variance explained

Note: Extraction method: principal component analysis

variable that exhibits highest loading with value >0.50 in one component belongs to that component (Kaming *et al.*, 1997).

The study also establishes communality and eigenvalues for the variables and factors, respectively. The communality explains the proportion of the variance of variables that is produced by the common factors underlying the set of variables given in extraction process. Communality thus indicates the total percentage of the measured variable has in common with the constructs upon which it is loaded, and it is an indicator of reliability of variables in the sum of the squared factors loading for the factors in the iteration process (Hair *et al.*, 2010). Table V shows the communality values of all the variables capable of causing rework and all the variables obtained from the extraction process exhibit high reliability indicator, which means commonality value that is above 0.50 at the initial iteration denotes that variables are significant and should either be included for further analysis or be removed (Badu *et al.*, 2012).

Extraction of underlying factors

The study adopted varimax method with an orthogonal rotation that minimises the number of variables that has high loading on each factor by using the principal components extraction method. From Tables VI, through the application of the Kaiser criterion and the rules given by Kaming *et al.* (1997) and Badu *et al.* (2012), the study identifies 14 extracted factors. None of the variables loaded on factor 15 meets the criteria for consideration, and hence the factor is deleted. Therefore, the 14 extracted factors cumulatively explained 86.06 per cent of total variation of rework occurrence variables measured. These factors are renamed to offer explanation on how the variables loaded onto each component relates or explain the construct. The factors (1-14) as indicated in table were named as follows: criteria changes, inexperience personnel, poor documentation, deviation in quality, differing site/preliminary inquiry, changes in scope, poor skill development, finance-related issues, deficiencies in construction, poor communication, poor site management, work separation and delay.

Criteria changes

Four variables are loaded onto this factor which includes procurement method, contractor selection method, inadequate funding and ambiguous instruction. These criteria changes occur when there are inconsistencies in the standard or procurement process being adopted in the execution of project. Constant review of standard after the award of contract and inadequate funding of the tender board may allow compromises and thus, contribute to rework through criteria changes.

Inexperienced personnel and poor skill development

Involvement of inexperienced personnel in management and execution of projects or contracts is a serious issue in construction process. Five variables were identified to have contributed to rework occurrence under this component. These include disturbance, lack of training, lack of motivation, inexperienced personnel and lack of knowledge. Also, three variables were loaded onto the factor labelled poor skill development. As many of the variables identified from the rotated factor loadings centres on training or lapses as a result of inadequate knowledge in the management of contract by the participants on the projects. Hence, the factor is labelled inexperienced personnel and poor skill development because contract cannot be managed without having requisite experience if the occurrence rework has to be avoided to a considerable

JEDT 14,2	Variables	h ²
	Design errors	0.85
	Design omissions	0.878
	Construction errors	0.832
	Construction omissions	0.903
226	Quality deviation	0.896
	Design changes	0.866
	Poor documentation	0.87
	Overlook site condition	0.829
	Proper monitoring	0.853
	Conflicting information	0.857
	Unrealistic programme	0.883
	Work separation	0.812
	Change in plan and scope by client	0.979
	Change in specification by client	0.914
	Contractor initiated changes	0.934
	Lack of attention to quality	0.91
	Interpretation of client's requirement	0.932
	Safety consideration	0.876
	Defect	0.931
	Checking procedure	0.933
	Poor management practices	0.894
	Poor communication	0.869
	Quality focus	0.887
	Poor team work	0.933
	Procurement method	0.968
	Contractor selection method	0.881
	Cost pressure	0.881
	Staff turnover	0.754
	Disturbance	0.899
	Lack of training	0.945
	Lack of motivation	0.923
	Inexperienced personnel	0.921
	Lack of knowledge	0.881
	Delays	0.877
	Alteration	0.876
	Lack of skill development	0.904
	Excessive over time	0.914
	Inadequate planning and resourcing	0.871
	Ambiguous instruction	0.745

Table V.
Commonalities of
rework occurrence
variables

level. [Arain and Pheng \(2006\)](#) reportedly argue that acquisition of knowledge constitute the main bottleneck in the construction industry. Therefore, adequate knowledge through skill development will enhance the experience of employees and reduce redoing a process more than once.

Poor documentation and deviation in quality

On many occasions as a result of traditional procurement method that is predominantly in use in Nigeria, contract documents and design drawings are always inconclusive and

Causes of rework/component	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10	Factor 11	Factor 12	Factor 13	Factor 14	Cumulative explained variance %
Procurement method	0.834														
Contractor selection method	0.864														
Inadequate planning and resourcing	0.739														16.98
Ambiguous instruction	0.778														
Disturbance		0.761													
Lack of training		0.705													
Lack of motivation		0.84													
Inexperienced personnel		0.782													
Lack of knowledge		0.627													28.243
Poor documentation			0.749												
Proper monitoring			0.633												
Conflicting information			0.864												
Unrealistic programme			0.847												37.395
Design errors				0.783											
Design omissions				0.759											
Quality deviation				0.735											
Quality focus				0.684											44.757
Lack of attention to quality					0.672										
Safety consideration					0.863										
Defect					0.791										
Overlook site condition						0.723									
Change in plan and scope by client							0.718								
Poor team work							0.652								
Change in specification by client								0.912							

(continued)

Rework and organisational culture

Table VI.
Exploratory factor analysis

Table VI.

Causes of rework/component	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10	Factor 11	Factor 12	Factor 13	Factor 14	Cumulative explained variance %
Alteration								0.615							
Lack of skill development								0.842							68.049
Excessive over time								0.716							
Cost pressure									0.739						
Staff turnover									0.856						72.095
Construction errors										0.838					
Construction omissions										0.874					75.802
Interpretation of client's requirement											0.616				
Checking procedure											0.683				
Poor communication											0.796				78.722
Poor management practices												0.873			
Work separation												0.791			81.418
Design changes													0.75		83.846
Delays														0.706	86.066

Notes: Factors loadings of < 0.6 are not shown; Extraction method: principal component analysis; rotation method: Varimax with Kaiser normalisation

when available are not detailed, requiring a great amount of specifications to make it work. At times, due to difficulties in handling specifications, they are most often being ignored. Alarcon and Mardones (1998, p. 4):

[...] argue that very often design documents have inconsistencies, errors and omissions, or simply lack of clarity in the presentation. This implies that those that should carry out the work do not have the necessary information or have the wrong information to do the job and may cause total rework or outright cancellation.

Poor communication

Conflict of information is majorly one of the factors responsible for having rework-free construction projects. The fragmented nature of the industry impairs free flow of information, thus makes realisation of many difficult during the construction interface. When mistakes or omissions are made during information transfer, delays and errors will result (Keys *et al.*, 2016). In most cases according to Adejimi (2005), contractors or even the users are not fully involved during the design stage and as such construction processes are not well integrated until the later part of the contract. This erodes the benefit of overlapping of the processes (design and construction) and subsequently leads to rework due to misrepresentation of users requirement. Therefore, effective communication is crucial if rework occurrence is to be minimised in building design and construction.

Differing site/preliminary inquiry and deficiencies in construction

Improper site investigations or unforeseen circumstances are largely responsible for causing rework in many projects. Though, the rule says contractor has the right to inspect the site while tendering for the job or prior to commencement of works. But in many instances, time crashing does not permit many contractors to do this and therefore rely on visual inspection or local knowledge of the people in the area, if it is done at all. Hence, deficiencies in construction may occur as a result of failures of design or contract documents to capture such unforeseen circumstance.

Changes in scope

Design related rework in the form of change orders has been argued to be the major source of rework in construction projects (Josephson and Hammarlund, 1999; Love *et al.*, 1999). Bramble and Callahan (2000) asserts that certain condition in the construction contracts allows the project owner to make changes within the general scope of the contract without invalidating the contract. Changes in design may occur in any of the drawings: architectural, structural and plumbing and drainage, site works or other aspect of construction. Often the changes are no fault of the contractors. Cnudde (cited in Sugiharto, 2003) suggests that project delivery process may be enhanced when changes initiated by client are limited through clear definition of their requirements, proper selection of contractors or personnel, procurement options and good coordination of project direct stakeholders.

Finance-related issues

Cost pressure and staff turnover are two loaded factors on this component. When contractors experience cost pressure, he may tend to downsize or employees may decide

to change job. Evidence exist that when employees are not motivated, the quality of their work and output is affected (Campbell *et al.*, 1999).

Poor site management, work separation and delay

Poor site management or coordination may result in improper separation of work or line of authorities. Consequently, this may lead to conflicts or counter accusations which are capable of causing delay. Delay caused by this factor contributes to non-value adding activities causing rework. Most often elements of a building are designed in isolation, and the quality of information that passes between contractors is distorted and open to misinterpretation (Keys *et al.*, 2016). Other variables causing delays that may lead to rework include inclement weather, poor planning and scheduling, delay of material delivery to site, design changes and slow decision-making.

Regression analysis

This study establishes the relationship between rework occurrence and organisation culture using multiple regression model. In this analysis, organisational culture and rework occurrence are taken as the independent and dependent variables, respectively. From the output of the regression analysis performed, shown in Table VII, it can be observed that organisational culture has influence on rework occurrence with respect to “Construction. omissions”, “Checking procedure”, “Poor management practices”, “Poor communication”, “Poor team work”, “Time pressure”, “Disturbance”, “Lack of motivation” and “Alteration”.

Poor management practice and team work exhibits the highest multiple R^2 value and are significant at 95 per cent confident level. Poor management practices explain that practices within an organisation indicate its culture which is capable of affecting the performance of the organisation in terms of quality. The R^2 of 78 per cent indicates that poor management practices explained 78 per cent variation in the data obtained in explaining influence of organisational culture in causing reworks. Tseng and Lee (2009) contend that different cultures exhibited within an organisation will indicate different impact on organization performance. Abdalkrim (2012) also asserts that good management practices provide employees with meaningful job requirements which can help in broadening their horizon in different fronts and different functional areas. He argues further that it will also enable employees develop a network of organization

Dependent variable	Multiple R	Multiple R^2	p -value
Construction omissions	0.778	0.605	0.089*
Checking procedure	0.787	0.62	0.071*
Poor management practices	0.883	0.779	0.002**
Poor communication	0.809	0.655	0.038**
Poor team work	0.86	0.739	0.006**
Time pressure	0.841	0.707	0.014**
Disturbance	0.819	0.671	0.028**
Lack of motivation	0.79	0.625	0.065*
Alteration	0.844	0.712	0.011**

Table VII.

Regression analysis

Notes: *Significant at 90% (0.10) confident level; **significant at 95% (0.05) confident level

contacts within the organisation and invariably enhance their skills and performance by eliminating errors. This corroborate the position of Cheung *et al.* (2005) who argue that, though individual employee have different task and role to play in different team but have good working relationship with project team is the underlying principle in relational contracting. Therefore, organisation with good management practice and teamwork that encourages employee's participation will enjoy better performance as witnessed by Japanese construction companies (Xiao and Proverbs, 2002).

Conclusion and recommendations

This paper has examined the influence of organisational culture on the occurrence of rework on building construction projects in Nigeria. The study identifies 14 factors as the major causes of rework as revealed by factor analysis. Although Kaiser Criterion indicated that 15 factors could be extracted from principal component analysis, an examination of the eigenvalue using the criterion, suggested a 14-factor solution. The result of the descriptive analysis on organisation variables lead to the conclusion that productivity is central to organisational performance as well as better ideas and collaborative relationship among workers. This result is consistent with earlier studies that have shown that rework is capable of causing poor project delivery. It is also in tune with previous studies that organisational culture has strong positive link between organisation's performance in terms of productivity and quality of work from the employees.

The measurement of an organisational culture using six dimensions identified in literature also indicates that leadership and management style can influence organisational culture. Organisational culture has been regarded as a mediator between performance and leadership style which is being predicted by the latter. Good leadership and management style can improve commitment and job satisfaction of employees which in turn can reduce the menace of carrying out or redoing same job many times. Regression analysis indicates significant relationship between organisational culture and rework occurrence. This depicts that poor management practices and lack of teamwork can significantly lead to rework occurrence and subsequently impair project performance.

However, there are no two construction projects that are entirely the same. Thus, projects exhibit different characteristics as a result of the complex and fragmented nature of the construction industry where different participants come together on an *ad hoc* basis with divergent ideas and cultures capable of influencing project outcomes. This depicts that different cultural values and norms exist within the project environment which may influence the occurrence of rework due to lack of support among participants, communication breakdown or other factors identified in the paper. There is need for participants in the industry to pay adequate attention to these factors and be aware of their complexities in planning for future projects to eliminate unwarranted cultures that can cause unfavourable project deliveries due to rework. Effective management practices and viable teamwork should be encouraged among the participants to enhance efficient project delivery and reduce rework occurrence.

The research will be of significant benefit to both the academic and industry practitioners, as it will provide project participants with useful insights into the influence of organisational culture on project delivery and also offer good understanding of how culture within their organisations can influence the performance of their subordinates or employees. A better understanding of this will enable organisations and project participants transfer lesson learnt from previous projects to plan for future projects by designing rework

reduction strategies that will enhance effective project delivery. This will also be of immense benefit to initiators of projects through the understanding of causes of rework and organisational cultures that may hinder project success by reducing the number of abandoned projects (though not investigated in this study, but it is one of the effects of rework) which may constitute hideouts for criminal activities in the country as a result of poor project delivery.

Limitations and agenda for future study

This study is not without its limitations. The study adopted non-probabilistic sampling techniques which may limit its generality. The study was carried out in a state within the country, Nigeria. Perhaps, the findings could have been possibly better explained if there was a high proportion of contracting organisation in the sample who has worked with the state government. Therefore, future research can replicate the research in other states and also adopt probabilistic sampling technique. It would be attention-grabbing if future research can investigate the impact of management and leadership style on rework occurrence and project performance.

In summary, this paper has provided empirical evidence on the influence of organisational culture on the occurrence of rework in the context of Nigeria. Although some of the findings in this study are not explicitly explained, this implies motivation for future topics to examine how organisational culture can eliminate and improve performance with less recall, like it is happening in Japanese construction industry. Meanwhile, the study demonstrated significant contribution to existing body of knowledge that culture within an organisation has influence on the occurrence of rework and project delivery.

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