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Research paper

Development and Validation of Payment Performance Assessment Tool for Construction Industry

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Abstract

The late payment has been the major issues facing the construction industry across the globe. Many studies have looked at this issues from management and legal perspectives. Despite its endemic effect on the construction industry, there is no any assessment tools for measuring the payment performance (late and prompt payment). This paper developed and validated a payment performance assessment tool in the context of construction industry client organization, particularly in the Nigerian construction industry. The tool was developed based on the organizational culture and payment performance attributes for the client organization. Analytical Hierarchy Process (AHP) was used to elicit pair-wise comparison and weight of each variable. This led to the development of the tool. The tool was then validated in the assessment of client's payment performance of a case organization. The assessment tool was calibrated based on consensus benchmarking. However, the calibration ranges from 0.00-0.69 as late payment performance, 0.70-0.98 prompt payment performance and 0.99-1.00. Absolute prompt payment performance. The result shows that the payment assessment tool succeeded in measuring payment performance of a case organization with a score of 0.50 points indicating that the organization do not pay its contractors on time. Therefore, the organization is experiencing late payment. However, there is need to replication the study to revalidate the tool in another organization or country.

Keywords: *Organizational culture; Payment performance attributes; payment performance*

1. Introduction

Achieving prompt payment to the contractors is one of the most significant responsibilities of both public and private paymaster's organizations in Nigeria. Late payment practices create disharmony and cause cash flow problem with distressing effect, such as clients bankrupting client (Moavenzadeh et al, 2008). According to Emenike et al. (2010), late and non-payment practices are endemic in the Nigerian construction industry which attributed to culture and attitude toward payment. However, the late payment is a global issue, for example, Ye and Rahman (2010) reported that the Malaysian construction industry is also prone to late payment. Likewise, the British construction industry records an average of 53 days' late payment after payment application (Johnston, 1999) in Emenike et al. (2010). It seems that everywhere, contractors are at the mercy of clients, with a late payment on a global outlook. The various administrative measures taken to address the problem of late payment have proven ineffective, this prompted governments to enact payment legislation. The problem seems to defy even legal redress. However, a major handicap at tackling late payment is lack of a tool that industry practitioners could use in assessing payment performances of paymaster organizations at an earlier stage. The paper believes, that developing such a tool is the first step in identifying and rectify the problem that continues to hamstring the development of the construction industry. Given this, this study developed a payment performance assessment tool which integrates payment performance attributes and paymaster's organizational cultures. The performance of an organization is expressed in the results of its processes or outcomes. Such processes or outcomes cover three specific fields: financial performance (profits, return on assets, return on investment, etc.), market performance (sales, market share, etc.), and shareholder returns (total shareholder return, economic value added, etc.) (Yaghoobi & Haddadi, 2016). However, a normative approach to gauging performance is to express it regarding beneficial or adverse outcomes, outcomes that have to determine the influence on the very survival of the assessed entity. In client's payment to the contractors, it is referred as prompt payment performance or late payment performance.

2. Literature Review

2.1. Organizational Culture

Organizational culture is a concept that has been the subject of multidisciplinary research since the early twentieth century. However, many studies in the different field have acknowledged the roles and influence of organizational culture influence the organizational performances (Arditie et al, 2017: Zhu et al, 2016; Karpen and Lukas et al., 2015; Salau Paul, and Olumuyiwa, 2014; Hakkak and Ghodsi, 2014) (Martin J and Siehl, 1983: Maloney and Federle, 1993). An evaluation of organizations payment performance entails identifying the cultures elements within which the organization operates and its payment performance attributes (Janicijevic, 2012). According to Deal and Kennedy (1982), each organization has a culture. Thus, paymaster organizations in the construction industry have specific cultures as their distinct ways

of doing things. These cultural elements represent shared attitudes, values, beliefs, customs recognized and internalized by members of the paymaster organizations (Martin and Siehl, 1983). In effect, organizational culture describes the shared meaning and patterns of beliefs, symbols, rituals, and myths that evolve and that function as social glue binding organizational members one to the others (Smirch, 1983). Organizational culture gives the identity of organization (Cheung et al. 2011: Denison & Mishra, 2014).

A number of cultural typologies exist, in which scholars explicate the construct within organizational settings (Naranjo-Valencia et al., 2016; Rodin & Yudkin, 2011; Zhu, & von Zedtwitz et al., 2016; Karpen & Lukas et al., 2015; Salau Paul, & Olumuyiwa, 2014; Hakkak & Ghodsi, 2014). However, such explications specific to the construction industry does not exist. For this study, therefore, we utilize Sarki & Adul-Hamid (2016) cultural typologies as follows: Task culture, Bureaucratic culture, and Innovative culture. The purpose of choosing this typology is because it has been empirically identified as organizational cultures for paymaster organizations in the construction industry (Sarki & Adul-Hamid 2016).

2.2. Payment Performance Attributes

Construction Payment has been always the significant issues in the construction practice (Hansen, Rostiyanti, & Purnomo, 2017). The prompt payment to contractors or supply chain is intended for the industry to improve performance. Contractor's cash flow and financial standing largely depend on how timely the payments are made, late and incomplete payments can critically affect contractors performance (Tran & Carmichael, 2013). The prompt payment is achieved if the appropriate payment instrument is recognized by the relevant project members in a transparent and negotiated way (Motawa & Kaka, 2009) according to the established practices.

Payment performance attributes encompass the attributes that affect the processes and procedures of making payment to the contractors. For this study, we define payment performance attributes according to the Standard Form of Contract and Joint Contract Tribunal (JCT 98) Nigerian version, issued by the Federal Ministry of Works and Housing. These attributes relate to legal and contractual related matters comprises of five attributes namely: regular payment within honouring period, payment according to terms of the contract, setting-off sum certified, contractor's rights to payment, and certified value retained. Paymaster related matter also comprises of five attributes namely: certification of work executed, the size of the workforce, movement of the file for payment approval, selective payment, paymaster satisfaction. Contractors related matters comprise of five attributes namely: contractor's claims, compliance to design, compliance to specification, time of delivery contractor's satisfaction. Construction industry related matters comprise of five attributes namely: credit payment, long project duration, large interim payment cost overrun, time overrun. External related matters comprise of four attributes namely: war or civil disturbance, flooding, change of government policies, economic meltdown (Emenike et al., 2010).

2.3. Organizational Culture and Payment Performance

The study of organizational culture has been for a very long time (Trice & Beyer, 1993). It can be traced early back 1930 by the studies of Hawthorne (Mohanty & Rath, 2012) at the Western Electric Company in Chicago, Illinois. Organizational culture has attracted many attentions in the research since the 1980s, and the current attention on the organizational culture emerged as a result of the U.S. firms having difficulty in competing with its counterparts in another country mainly Japan (Schein, 1990; Trice & Beyer, 1993). The previous studies identified that national culture alone could not explains all the differences. As alternative researchers justified the need to distinguish between organizations within a society, especially about organizational performance and effectiveness, (Wilkins & Ouchi, 1983).

In the recent years, there has been an increasing amount of literature on the organizational culture as it affects performance outcomes. In finding out the success or failure of the organizations over the coming decades, different organizations have various cultural profiles. However, it is possible that various organizations have an organizational culture that does not allow the achievement of high performance. It happens in a case where the team consists of unintellectual and irrational persons (Kotter & Heskett, 1992).

The construction industry criticized for its hostile subculture and absence of performances (Kaka et al. 2007). The significant effort made in raising awareness for the need of integrations from a negative attitude not accepted as the culture of the industry. The paymaster's inability behavior to make prompt payment performance has emerged as a culture of the industry. As highlighted in the recent study by Hamzah & Chen (2013) that the cause of late payment performance and many other related issues within the construction industry can be deep-seated inside the culture of the industry and its organizational cultures and component of the enterprise (Hamzah & Chen, 2013). Moreover, it is recognized by many industries such as services industry, financial and production industry that organizational culture improves organizational performance. (Naranjo-Valencia, et al., 2016; Zhu, & von Zedtwitz et al., 2016; Karpen & Lukas et al., 2015; Salau Paul, & Olumuyiwa, 2014; Hakkak & Ghodsi, 2014). Organizational culture offers a background for improving an organization's effectiveness. (Cameron & Quinn, 2006; Saad, 2013; Hee & Ping, 2014; Imran et al,. 2014). However, as stated by Emenike et al. (2010), and Thompson (1993) and Kotter and Heskett (1992), to name few, organizational culture plays a vital role in determining the overall performance of people and organizations and consequently affecting their work productiveness, efficiency, and effectiveness. This goes to indicate that, aside from the technical, administrative and legal elements, work culture in the Clients' organization is also one of the main elements that contribute to the problems of late and non-payment performance in the construction industry. The paymaster's organizational culture that affects payment performance in the construction industry are innovative culture, bureaucratic culture and task culture (Sarki & Adulhamid, 2016 : Sarki, et.al 2017).

3. Methodology

This study has conducted using a questionnaire survey to obtained expert's opinion. Various researchers such as (Yaghoobi & Haddadi, 2016 ; Erbasi & Parlakkaya, 2012; Chan, 2006) have used the analytical hierarchy process (APH) in the studies of performance assessment research in various perspective. This paper was analyzed using Analytical hierarchy process (AHP) as recommended by (Saaty 1980: Saaty, 1999). The (AHP) is used to prioritize and consolidate performance metrics based on multiple criteria (Cakmak and Cakmak, 2013: Erbasi & Parlakkaya, 2012; Zayed et al. 2008: Chan, 2006: Bayley, 2006: Mei, 2004; Reisinger et al., 2003: Al-Harbi, 2001). This paper used AHP approach by integrating the paymaster's organizational culture and payment performance to assess payment performance of paymaster.

The integration of both organizational culture and payment performance attributes, coupled with their weight obtained through pairwise comparison of criteria and attributes, leads to the development of research questionnaire. The questionnaire was administered to 12 experts in different client's organizations, with experience in organizational culture and payment practices, process and procedures, to prioritized the organizational culture and payment practices criteria and attributes obtained from the literature[36] (Abdul Rashid, 2010; Emenike et al., 2010; Cameron & Freeman, 1991; Sarki & Adulhamid 2016; Abeysekera, 2002; Schein, 2005; Abu-Jarad, Yusof & Nikbin, 2010; Aktas, Cicek & Kiyak, 2011; Cui & Hu, 2012). The experts include architects, quantity surveyors, engineers, building contractors, accountant paymaster (retired staff) this is to obtain more reliable data from those that have no

more interest in the organization. The Expert Choice software was used in the analysis. The software is using the principle of pairwise comparison matrix. The pairwise comparison sequence is represented in a pairwise comparison matrix. In case of any *n* items that require being compared to a particular matrix, a total of *n (n – 1) /two* judgment are desirable. The eigenvector of every pairwise comparison matrix gives a local priority order, and the eigenvalue offers the consistency judgment. After the results are synthesized, a total priority order of every attribute is then given by the analysis of eigenvector concerning the goal. Example of the process is described below in Figure 1.

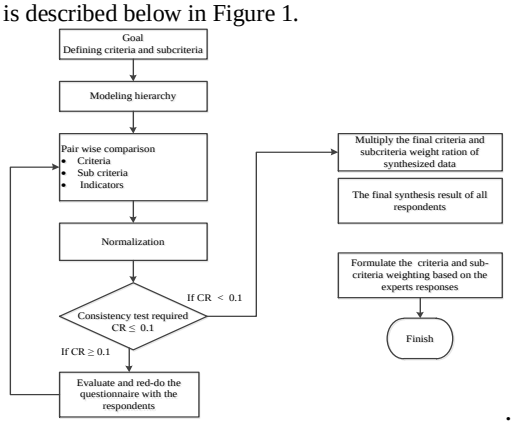

Fig. 1: Analytical Hierarchy Process (AHP) (Lo,1999)

The tool was developed by utilizing weight generated. The comparing matrix was initially calculated by using the following formula obtained based on the opinion of the experts to synthesize the paymaster's organizational culture and payment performance in order to develop an assessment tool for measuring the payment performance

4. Results and Discussions

The weighting of each criterion and attribute of organizational culture and payment performance were obtained based on the opinion of the experts to synthesize the paymaster's organizational culture and payment performance to develop an assessment tool for measuring the payment performance.
For example: According to feedback from experts, the paper obtained the relative weight in the following process.

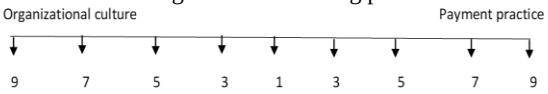

Fig. 2: Judgement Scale

How to use the judgment scale in Figure 1 to fill in the matrix table the subsequent rules are: If the judgment value is on the left side the actual number in the scale is considered and If the judgment value is on the right side the reciprocal is considered (Saaty, 1999).

Table 1: Example of Respondents Scores of Relative Weight of Organizational Culture and Payment performance (Pairwise Comparison)

Organizational	Respondents												Aver	P
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12		
OC	5.0	5.0	9.0	9.0	9.0	7.0	5.0	9.0	9.0	5.0	5.0	9.0	7.17	PP

Thus, a pair-wise comparison matrix can be computed from the above Table 1. Let organizational culture be denoted by OC and payment performance be denoted as PP and matrix size be denoted as .N =2,
(2x2) matrix. Hence, we have

Table 2: Matrix Table

	OC	PP
OC	1	7.17
PP	0.14	1

4.1 Priority Vectors

Having the matrix, the next is to calculate the priority vector which is also so-called Eigenvector of the matrix. It is computed in the following steps.

With a solution matrix $S = \begin{bmatrix} 1 & 7.17 \\ 0.14 & 1 \end{bmatrix}$ where, $0.14 = \frac{1}{7.17}$.

$$S = \begin{bmatrix} 1 & 7.17 \\ 0.14 & 1 \end{bmatrix} = \begin{bmatrix} 1/1.14 & 7.17/8.17 \\ 0.14/1.14 & 1/8.17 \end{bmatrix} = \begin{bmatrix} 0.88 & 0.88 \\ 0.12 & 0.12 \end{bmatrix}$$

Sum each column of the matrix, each element of the solution matrix is divided by the sum of its column
STEP I. Sum each column of the resultant matrix (R)

$$R = \begin{bmatrix} 0.88 & 0.88 \\ 0.12 & 0.12 \end{bmatrix}$$

Table 3: Priority Vectors Table

	OC	**PP**
OC	0.88	0.88
PP	0.12	0.12
Sum	**1**	**1**

$$R = \begin{bmatrix} 0.88 & 0.88 \\ 0.12 & 0.12 \end{bmatrix}$$

STEP II. Take the average of the entries of each row in Table 3. This results in a weight matrix (W) whose corresponding entries denote the respective weights of each variable (OC and PP)

$$\text{Weightage} = \frac{1}{2}\begin{bmatrix} 0.88+0.88 \\ 0.12+0.12 \end{bmatrix} = \begin{bmatrix} 0.88 \\ 0.12 \end{bmatrix}$$

The resultant relative weight of organizational culture and payment performance are 88% and 12% respectively. The expert software is used for generating the weight details in Table 4 and Table 5.
Table 4 shows the weight of organizational culture criteria against payment performance with 0.878 weight, further showed the weight of organizational culture parameters: Task Culture 0.663, Bureaucratic Culture 0.219, Innovative Culture 0.118. This weight is the main component of the assessment tools.

Table 4: Normalized Weightings of Criteria and Parameters for Public Organizational Culture

Goal: Influence of Organizational Culture on Payment performance (Public Organization)		
Criteria	**Parameters**	**Weightings Normalized**
Organizational Culture (0.878)	Task Culture	0.663
	Bureaucratic Culture	0.219
	Innovative Culture	0.118

Table 5: Criteria parameters and attributes weight of payment performance

Goal: Influence of Organizational Culture on Payment performance(Public Organization)			
Criteria	**Parameters**	**Attributes**	**Weightings**
Payment Performance (0.122)	Legal and Contractual Related Matters	Regular payment within honoring period	0.472

	(0.479)	Payment according to terms of the contract	0.198
		Setting-off sum certified	0.139
		Contractors rights to payment	0.103
		Certified value retained	0.088
	Paymaster Related Matters (0.220)	Certification of work executed	0.457
		Supervision	0.217
		Movement of the file for payment approval	0.144
		Selective payment	0.122
		Paymaster satisfaction	0.060
	Contractors Related Matters (0.142)	Contractors claims	0.341
		Compliance with design	0.266
		Compliance with specification	0.174
		Time of delivery	0.129
		Contractor's satisfaction	0.089
	Construction Industry Related matters (0.097)	Credit payment	0.379
		Long project duration	0.210
		Large interim payment	0.172
		Cost overrun	0.138
		Time overrun	0.100
	External Related matters (0.059)	War/Civil disturbance	0.367
		Flooding	0.303
		Change of government policies	0.196
		Economic meltdown	0.134

Table 5 presented the weight of payment performance criteria, parameters, and attributes.

The payment performance parameters are weighted against the organizational culture, and the result is 0.122. Furthermore, the weight of parameters is also determined and presented. The legal and contractual related matters with a higher weight of (0.479) followed by paymaster related matters with (0.220) weight, contractors related matters with (0.142) weight, construction industry related matters with (0.097) weigh and external related matters (0.059) in ascending order. Lastly the weight of individual attributes as presented in Table 5. The generated weight for organizational culture criteria and parameters and payment performance criteria parameter and attributes were integrated and used for payment performances assessment development.

The assessment tools comprised: weight of the criteria, parameters of organizational culture and payment performance criteria, parameters and attributes. The sample of the assessment tool is presented in Table 6 and Table 7. Moreover, the sample of assessment scale and checklists are presented in the Appendix (A, B, and C). The assessment checklists comprised of the client's organizational culture and payment performance attributes. Furthermore, it contained the assessment criteria and a brief description of the parameters considered during assessment of public paymaster organizations. The cultural typologies for paymaster organization include task culture, bureaucratic culture, innovative culture. The scores for each of these criteria were calculated. Subsequently, the measurement scale was also used by industry experts to grade the case paymaster organization based on its culture and payment performance. The checklists and assessment scale are parts of the assessment tool.

The assessment of payment performance for public paymaster in Nigeria was carried out, and the resultant rating obtained were converted to score and multiply by weight of cultures and payment performance attributes, and the results were calculated for all the variables in the tool. The assessment tool was calibrated based on consensus benchmarking as recommended by (Gephart et al., 2018: Cramer et al., 2008: Hasson et al., 2000). The calibration ranges from 0.00-0.69 as late payment performance, 0.70-0.98 prompt payment performance and 0.99-1.00. Absolute prompt payment performance.

The Table 6, Table 7, Table 8 and Table 9. showed the validation and testing of the assessment tool in a case of organizations and the rating and its corresponding scores and weight of each attribute of organizational culture and payment performance were also shown

Table 6: Score of Criteria and Attributes (Organizational Culture)

Criteria	**Organizational culture**	**Assessment Grade**	**Attribute Weightage**	**Attributes Score**
Weightage	**0.878**	**(S)**	**(W)**	**(SXW)**
1	Task culture	3 (0.50)	0.663	0.33
2	Bureaucratic culture	3 (0.50)	0.219	0.11
3	Innovative culture	2 (0.25)	0.118	0.03
			Total	**0.47**

Table 7: Score of Criteria and Attributes (Payment Performance)

Criteria	**Legal & Contractual Related Matters**	**Assessment Grade**	**Attribute Weightage**	**Attributes Score**
Weightage	**0.479**	**(S)**	**(W)**	**(SXW)**
1	Regular payment within honouring period	4 (0.75)	0.472	0.35
2	Payment according to terms of contract	4 (0.75)	0.198	0.15
3	Setting-off sum certified	4 (0.75)	0.139	0.10
4	Contractors rights to payment	4 (0.75)	0.103	0.08
5	Certified value retained	4 (0.75)	0.088	0.07
			Total	**0.75**
	Paymasters Related Matters			
	0.220			
6	Certification of work executed	4 (0.75)	0.457	0.34
7	Supervision	4 (0.75)	0.217	0.16
8	Movement of file for payment approval	4 (0.75)	0.144	0.11
9	Selective payment	2 (0.25)	0.122	0.03
10	Paymaster satisfaction	3 (0.50)	0.060	0.03
			Total	**0.67**
	Contractors Related Matters			
	0.145			
11	Contractors claims	4 (0.75)	0.341	0.26
12	Compliance to design	4 (0.75)	0.266	0.20
13	Compliance to specification	4 (0.75)	0.174	0.13
14	Time of delivery	3 (0.50)	0.129	0.06
15	Contractor's satisfaction	3 (0.50)	0.089	0.04
			Total	**0.69**

Criteria	Legal & Contractual Related Matters	Assessment Grade	Attribute Weightage	Attributes Score
Weightage	**0.479**	**(S)**	**(W)**	**(SXW)**
	Construction Industry Related Matters			
	0.097			
16	Credit payment	5 (1.00)	0.379	0.38
17	Long project duration	4 (0.75)	0.210	0.16
18	Large interim payment	4 (0.75)	0.172	0.13
19	Cost overrun	4 (0.75)	0.138	0.10
20	Time overrun	4 (0.75)	0.100	0.08
			Total	**0.85**
	External Related Matters			
	0.059			
21	War or civil disturbance	2 (0.25)	0.367	0.09
22	Flooding	2 (0.25)	0.303	0.08
23	Change of Government policies	4 (0.75)	0.196	0.15
24	Economic meltdown	3 (0.50)	0.134	0.07
			Total	**0.39**

Table 8: Payment performance Sub Criteria Score for Paymaster's Organization

Payment performance Subcriteria	Weightage of The Criteria	Total Scores of Its Attributes	A score of The Criteria
Legal & Contractual Related Matters	0.479	0.75	0.359
Paymasters Related Matters	0.220	0.67	0.147
Contractors Related Matters	0.145	0.69	0.100
Construction Industry Related Matters	0.097	0.85	0.082
External Related Matters	0.059	0.39	0.023
Total score	**0.711**		

Table 9: Payment Performance Score for the Paymaster's Organization for a Case

Organizational culture and payment performance Criteria	Weightage score	Attributes Scores	Final Score
Organizational cultures	0.878	0.47	0.412
Payment Practice	0.122	0.71	0.087
Total score	**0.50**		

The payment performance assessment was established based on the client organizational culture and payment performance attributes. It comprises of organization culture dimensions for public paymaster and payment performance attributes and a brief explanation of those cultures and payment performance attributes. Furthermore, it contains columns for the recording of assessment and grading respectively. Along with the checklists is the assessment grade with its corresponding point and description were also provided. The assessment checklist is used for recording data, as used in the assessment tools. However, the organizational culture and payment performance attributes were established by the Delphi techniques, and the tool was tested on a client organization.

The results indicated that public paymaster's organization in a case organization has a lower score in innovative culture (0.30 point) follows by Bureaucratic Culture (0.11 points) Task culture (0.03 points). Further, the results have shown that organizations that emphasize on innovative have higher performance outcomes, while the organization with more of bureaucratic culture has lower performance outcomes.

The total score for both organizational culture and payment performance is 0.50 point. This score was compared with the benchmarking ≥ 0.69 late payment performance and ≤ 0.70 prompt payment performance and equal to 1 is absolute payment performance.

5. Conclusion

The paper concluded that the assessment tool is valid hence it measured the payment performance of client organization in a case. The organizations assessed is having late payment as indicated by benchmarking. However, the late payment performance recorded by the organization due to the nature of its organizational culture, therefore, the organizations needs improvement by strengthening the innovative culture so that it can achieve absolute prompt payment performance level of 1.00-point. The assessment tools can be used by clients to assessed his payment performance for improvement purpose. Furthermore, the tool can be used by contractor to assessed the paymaster's payment performance for the purpose of wise investment decision.

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Appendix A: Score for Criteria and Attributes (Organizational culture)

Observational checklist			
Criteria: 1 Organizational culture			
Attributes	**Assessment Criteria**	**Observation**	**Grade**
Task Culture	Task culture, the focus is on a particular job or function		
Bureaucratic culture	Hierarchy in leadership, procedural, strictness, cautions and regulated in payment process highly organized structure in nature and power oriented		
Innovative Culture	Innovation is achieved in organizations when creative risk taking and promptness in taking advantage of opportunities is encouraged by allowing individual responsibilities and initiatives. This is what Sarros *et al.*, (2011) referred to as innovation culture		

Appendix B: Assessment checklist for Organizational culture

Assessment grade	**Corresponding point**	**Description of the scales**
1	0.00	Not obtainable/ Not satisfied/ Not applicable
2	0.25	Non compliance
3	0.50	Law compliance
4	0.75	Higher compliance
5	1.00	Full compliance/Satisfied/Applicable

Appendix C: Assessment checklist for Payment Performance

Stroll through an Assessment checklist			
Criteria: 2 Payment Performance Attributes			
Attributes	**Assessment Criteria**	**Observation**	**Grade**
Legal and contractual related matters	Regular payment within honoring period		
	Payment according to terms of the contract		
	Setting-off sum certified		
	Contractors rights to payment		
	Certified value retained		
Paymaster Related Matters	Certification of work executed		
	Size of workforce		
	Movement of the file for payment approval		
	Selective payment		
	Paymaster satisfaction		
Contractors Related Matters	Contractors claims		
	Compliance with design		
	Compliance with specification		
	Time of delivery		
	Contractor's satisfaction		
Construction Industry Related Matters	Credit payment		

	Long project duration		
	Large interim payment		
	Cost overrun		
	Time overrun		
External Related Matters	War or civil disturbance		
	Flooding		
	Change of Government policies		
	Economic meltdown		