

MANAGING RETENTION IN RESIDENTIAL BUILDING PROJECTS IN SELECTED STATES IN NIGERIA

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Residential building projects consist of complex interrelated subsystems of cost centers which often require huge financial commitment. The huge financial commitment therefore makes monitoring the disbursement and flow of financial resources a worthwhile task. Therefore in order to maximize fund on various cost centers, client and project actors often exhibits restraint in fund disbursement in order to ensure value for fund already released. However, it is the proper management of the process of fund release and retention of some funds that determines the value for money expected on the projects. It is against this background that this study was centered on managing project retention fee in residential building projects in Lagos state, Ogun state, Abuja (F.C.T.) and Port Harcourt in Nigeria. A random sampling technique was used in the study, a population size of 250 residential building projects was used for the study from which sample size of 120 was chosen. Moreover, a structured questionnaire in Likert scale 1-5 was used for the work. Mean Item Score was used to generate the agreement index for the parameters influencing the retention fee management process. It was discovered that most deducted retention percentage is 5% of the project cost. Also, the type of intervention system often used as alternative intervention system was studied, the most advocated intervention system is paying interest on retention when delayed, followed by release of retention on line item basis. There should be adequate compensation for the fund tied down. However the following intervention system could be used: release of retention fee on line item basis, introduction of letter of credit, application of bond as alternative of retention fee, application of performance bond, financial security package, the use of escrow account for retention fee, use of payment bond and performance bond among others. The combination of two or three or all of them should guarantee adequate management of the fund. However, there are challenges often encountered in the fund administration these includes; delay in the release of fund, reduction in contractors fee and retention fee reduces contractors profit if all the retained fund is used to remedy bad work among others. Factor Analysis

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in Regression Analysis of SPSS software was used to generate factors for a suitable fee management model by reducing the factors to their Coefficients and Eigen Values. The model would assist clients and project actors in management of project elements retention fee on residential building sites.

Keywords: factor analysis, project management, residential building project, retention

INTRODUCTION

Understanding the retainage concept

The practice of retainage has its origin in the United Kingdom industry at the outset of railway system construction in 1840's. There was massive construction then, and it created environment that encourage all entrants to practice construction in order to meet the surging demand. The inability of many of the companies to perform lead to insolvency, this situation then influenced the rail road companies to develop system of keeping back 20% of the contractors payments to guarantee performance and offset completion cost on should the company default (Specialist Engineering Construction Groups (SECG), 2002). Retention commonly referred to as retainage is a concept used to describe the amount of money often kept back on construction project. Holmes (2014) described it as the percentage amount of payment money held back from contractors' project fee. The benchmarking, configuration and structuring of the fee is the responsibility of the contractor to the subcontractor, client to contractors or those paying for the work to be done. Also, Cherrine (2014) viewed retainage as amount of money earned but not paid out immediately. Construction project can be divided into elements with accompanied elemental cost implications, the retention fee therefore indemnify contractors against financial loss in situation of adverse financial condition.

Purpose of retention and retainage amounts

Retention provides the project owner the opportunity to obtain value for his money with full understanding of the fact that the contractor or builder must complete the work if he is to be completely paid for his or her work. Retention plan often calls for the withholding of 5 percent to 10 percent of payment until the work is finished as promised. Also, according to Holmes (2015) and Joint Contracts Tribunal (1998), retention is also centers on items on punch list; this refers to items that will vary after completion of a project, retention would ensure completion of the items in its entirety; for instance, if an owner award a contract of constructing a four bedroom flat at ₦20,000,000, or ₦ 4,000,000 for maintenance service. The builder would not receive 20 percent of what was completed until the completion of the whole project elements. The 20 percent of the fund would be released after project completion.

Limitation of retention bond and retention fee

A retention bond is a formal agreement between the sub-contractor and a third party. The bond involves surety that acts as guarantor between contractor and sub-contractor. In an ideal situation, retention bond only takes effect if the sub-contractor fails to effect the practical completion or remedy a defect. Hawkswel (2014); Hughes; Gray and Murdoch (1997) and MacCartney (1992) were of the opinion that retention bond allows contractor the opportunity to rectify any identified defects within an agreed period., hence, it is a good thing to include retention clause in the administration of a project.

However, retention fee is not applicable in all situations; one of such situations is the store materials handling. Construction retention plan must not be enforced on construction workers that handle store materials, Also, materials suppliers should not be enforced to follow retention plan since they must complete their work before the commencement of works, the reason for it is that they must be paid up front with no retention plan in place. Finally, retention plan is limited in correcting situation of dishonesty and disingenuous about contractors' work.

CONCEPTUAL FRAMEWORK

This work adopts random sampling technique to collate data. The study started by defining the concept of retention drawing from strong concept that needed to be explained. Literature review was carried out to situate the work in the light of previous researches so as to establish and whip into line the opinion presented in this study. In deploying the random sampling technique, structured questionnaire was used designed in Likert scale 1-5, this was used to harvest respondents' opinion. The locations chosen for the study are Abuja, Lagos state and Port Harcourt in Nigeria. The location was chosen in view of the fact that they are noted for agglomeration of different cadres of construction companies. The data analyzed was processed using the following dichotomies: scope of retention fee application on project elements on selected projects, challenges of retainage practice as peculiar to the sampled projects intervention systems in retention fee administration, impact of retention fee on projects and project participants and model for managing retainage fee on building construction projects.

Hedonic model was presented that could help in managing retention on residential construction sites using regression analysis. Conclusions and recommendation were drawn from the outcome of the research drawing strength from previous research works.

REVIEW OF RELATED LITERATURE

In this section summary of relevant literature was presented, the literature items cut across the retention and hedonic model that was presented for managing the retention on building project.

A study was carried out by Specialist Engineering Contractors Group (SECG) (2002) on the use of retention in the construction industry in the United States of America. The study was conducted on sites with residential and commercial projects. 150 questionnaires was used to collate information from the respondents which are engineers. The study noted that cases of default was common among residential building contractor who were engaged on private projects as compared to public buildings. It was further reported that due process was followed on government projects than the private projects.

However, it was discovered that the practice of retention has tendency of inducing hardship on contractors and subcontractors profitability. Robert (2002) carried out a study on industries' profit margin and capability to withstand their money being retained in United States of America. Financial data from 120 companies was collated through questionnaire administration and analyzed for their averages for comparison and benchmarking. In a study conducted by Robert in 1972, it was noted that contractors earned approximately 6% profit on each dollar of revenue, by 1986, the profit margin oscillated around 2% of total revenue, therefore an owner retaining 10% on work installed is typically withholding up to five or three times the contractor's profit on the project

Moreover, Holmes (2014) studied retention on engineering projects in two (2) selected African countries: Nigeria and South Africa, the study adopted random sampling technique and combination of interview and questionnaire administration. The study explored the extent of retention application on selected private and public works. The study among other things discovered that majority of private projects did not practice retention while retention was in practice in most of the public construction projects. Incidence of delay payment of retention was noted on few projects that adopt the system. The study recommended an integrated approach to retention management on sites.

Similarly, Hawskwel (2014) explored problems of retention on selected sites in Dalet, Spain, the study used combination of interview and questionnaire administration. Construction professionals were used as a sample on the selected 85 projects among the top rated factors are: insufficient fund, communication breakdown and communication breakdown.

However, opinions on retainage is subjective, it depends on the philosophical point of view and contractual position with which it is being considered. The disparity between the public and private agencies was examined in a study carried out in Florida by Ahmad and Barnes in 1994. Ahmad and Barnes (1994) studied retainage in the United States

(Florida), fifty five (55) general contractors and thirty eight (38) public agencies were used in the study. Questionnaire administration was used in the study. It was discovered that the two groups agreed that 10% retainage was common and that it encourages front end loading and had a consensus on periodic release of the fund. It was noted that 88% of the contractors felt that retainage adversely impacted profitability while only 19% share the opinion, 87% agreed that retainage protects the owner, the contractors felt that retainage increased the possibility of contractors entering into insolvencies, in Hughes, Hilderbradt and Mudock (2000) “the impact of contract duration on the cost of cash retention” it was submitted that cash retention is a common means of protecting an employer from a contractor’s insolvency as well as ensuring that contractors finish the work that they start, also it was in their opinions that contractors withhold part of payments due to their sub-contractors. According to the study, larger contracts tend to be subjected to smaller rates of retention. Finally it was submitted that through calculating the cost of retention as an amount per year of a contract, retention would be far more expensive for firms whose work consists of short contracts considering the small capital involved.

The second segment of the review was focus on literature that positioned the best approach to modeling variables such those involved in retention management.

In a study, Picard, Antoniou and Adré de Palma (2010) carried a study on econometric model and came up with canonic and hedonic price model. The study used regression model to generate hedonic regression model, hedonic model was used in estimating demand and value of a specific good by decomposing it into its constituent characteristics. The estimate of contributory value of the constituents was aided by hedonic regression price model.

Hedonic models are usually estimated using regression analysis, however, more generalized models, such as sales adjustment grids, are special cases of hedonic models. The strength of hedonic model lies in capacity to accommodate non-linearity, variable interaction and other complex situations. Some of application areas of hedonic model include real estate application, real estate appraisals, computation of consumer price index (CPI) and relative price index (RPI) among others. In real estate economics, hedonic model is applicable in solving problem of price determination and price adjudication (Amusan et al., 2012). The model has capacity to accommodate heterogeneous variables such as those obtainable on building projects. Building project for instance involved several heterogeneous variables which tend to possess linear and non-linear relationships; hedonic model can combine such heterogeneous variables for meaningful deductions. Hedonic model according to the study can treat the variables separately and estimate cost and prices (in case of an additive model) or elasticity in case of a log model). To this end, the econometric model developed in this study toe the line of submissions of Picard et al; (2010), the hedonic related model adopted cost entropy and

econometric approach to generate a model that incorporates heterogeneous variable of residential project for price and cost judgement.

Similarly, Cattell, Bowen and Kaka (2008) developed a hedonic related econometric model which was used in unbalanced bidding. The study presents different schools of thought in the study of unbalanced-bidding in line with submissions of Stark (1972).

Finally, Cattell, Bowen and Kaka (2008) described available methods as Back-end loading, Front-end loading and Individual rate loading systems. According to the study, Front-end loading method, is used to mark up of items scheduled to come up early at beginning of the project as high as possible in order to provide avenue for builders to generate as much profit as could help in further project financing.

ANALYTICAL FRAMEWORK

Structured questionnaire was used to collate respondents' opinion. The data was validated using content analysis. Mean item score method was used to determine agreement index of the variables measured in the study. Data was processed using simple percentages, ranking etc.

The response from questionnaire was loaded onto the statistical package for social science students (SPSS) software, the factors were subjected to factor rotation so as to ensure emergence of stable criteria which would be used in modeling and represent relationship among the thirty variables regarded as retainage fee modelling parameters. The resultant factors were then subjected to stepwise multiple regression analysis to establish pattern of relationships among them taking into consideration their communality sizes and their Eigen Values. Factors rotation was used in this study to identify the relationship of individual variables to the set of common factor synthesized; Oblim rotation can be used to achieve this. Therefore, Oblim rotation approach was adopted.

RESEARCH DESIGN AND METHOD

A platform was set for the research through comprehensive literature search to establish the current state of knowledge in order to put the work into proper perspective. Random sampling technique was used to gather information from population of site managers, project directors, construction managers, maintenance engineer and facility manager. One hundred and fifty questionnaires were administered and one hundred and twenty were returned and used for the analysis. Samples of respondents were taken from Lagos state, Ogun state, Abuja (F.C.T.) and Port Harcourt. These locations were chosen as a result of high concentration of construction activities taking place there. The distributed questionnaire was designed in Likert scale 1 to 5, the respondent were requested to express their opinion in the degree tabulated on the questionnaires. A scale 1 to 5 was adopted, with 1 representing "strongly disagree (SD)" 2 –

being disagree (D) 3 – being neither agree nor disagree (N), 5- being strongly agree (SA).

Agreement index of the respondents was generated using the relation
 $M.A.I = 5S.A + 4A + 3S.D + 2D + 1N/5(S.A+ A+S.D+D+N)$

$$M.A.I = \frac{1 (\sum A_{ij})}{N \sum A_{ij}} \quad \text{where } M.A.I = \text{Mean Agreement Index} \quad A =$$

Agreement variable $i =$ Lower boundary, $j =$ Upper boundary

$N =$ Frequency of Variable $\Sigma =$ Summation Notation.

Model Development

Different researchers have used diverse methods to generate model to measure parameters in construction operation. Chan and Tam (2000) used combination of multiple regression analysis and factor analysis. Roston and Amer (2006) adopted weighted average, factor analysis, Pareto and stepwise multiple regression analysis. Also, Abdel Rasaq et al; (2001); Ling (2005) used calculated Pearson’s correlation coefficient, and weighted average approach. However for the purpose of this work, this research work adopted combination of stepwise multiple regression methods and factor analysis for data reduction. The response from questionnaire was loaded onto the statistical package for social science students (SPSS) software, the factors were subjected to factor rotation so as to ensure emergence of stable criteria which would be used in modeling and represent relationship among the thirty variables regarded as retainage fee modelling parameters. The resultant factors were then subjected to stepwise multiple regression analysis to establish pattern of relationships among them taking into consideration their communality sizes and their Eigen Values.

Factor Extraction:

Percentage of total variance obtained from each of the independent variables (the thirty-nine (39) variables (sub factors) were examined). Each variable was standardized to have variance of 1, while total variance was given by the sum of each variable which totaled thirty-nine (39). Chan and Tam (2000), Ruston and Amer (2006) adopted two approaches to determine the factors to be included in the model. They used Screeplot and Eigen value approach, Chan and Tam (2000) submitted that in Eigen value approach, only variable with Eigen value greater than one (1) should be included in the model formation. In screeplot approach, there is differential relationship pattern among variables; there is always a distinct demarcation between large variables on steep slope and gradual trailing off scores of the rest variables. This usually occurs at the variable, where K is the true number of variables Chan and Tam (2000). However, this study adopted Eigen value and regression coefficient approach. Eighty-two percent of (82%) the total variance is attributed to the first 20 variables where these variables have an Eigen value greater than 1. Other twelve (12) variables account for only about 38.25% of the total

variance. This shows that a model with 20 factors should be robust enough to represent the data

Factors Rotation

Factors rotation was used in this study to identify the relationship of individual variables to the set of common factor synthesized; Oblim rotation can be used to achieve this. Therefore, Oblim rotation approach was adopted. On the other hand, Rostom and Amer (2006), used variance rotation methods, and were able to discover each variable with a single factor. Table 7 shows the relationship of the variables to the common factors, the new factors and elements related to each factor. The new set sixteen (16) factors that emerged after rotation is presented in Table 9.

RESULTS AND DISCUSSION

Analysis of data/discussion

Table 1: Scope of retention fee application on project elements on selected projects

S/N	RETENTION FEE ARC OF COVERAGE	AGREEMENT INDEX	PERCENTAGE	RANK
i	10% and above for the contract sum of total elements cost throughout duration	24	20.00	3 rd
ii	10% till 50% completion on elements and 5% on the remainder	40	33.33	1 st
iii	10%till 50% on the total elements cost then none on the remainder	16	13.33	4 th
iv	5% on the contract sum of the elements throughout the contract duration	34	28.33	2 nd
v	5% till 50% then none on remainder	8	6.67	7 th
vi	3% on the contract sum of total elements throughout the contract duration	9	7.50	6 th
vii	1% on the contract sum of total elements throughout the contract duration	10	8.33	5 th

Source: 2015 Survey

Scope of application of retention fee on selected projects is presented in Table 1 above, the first parameter (10% till 50% completion and 5%) on the remainder of project cost, was ranked 1st by 33.33% of respondents; application of 5% on the contract sum throughout the contract duration was ranked 2nd by 28.33% of total respondents relative to 10% and above for the contract sum throughout duration which was ranked 3rd by 20% of the respondents. Also, another parameter (10% till 50% then none on the remainder) was ranked 4th by 13.33% of the respondent while 1% on the contract sum throughout the contract duration was ranked 5th with 8.33%. The application of 10% till 50% completion and 5% on the remainder of the total project cost remain popular opinion that cut across substantial number of the respondents. The implication of this trend is that clients on the project sampled adopts payment of retention fee on the work in stages until the 50% of the work is done, then the remaining 50% is left for the defect liability period. The 50% would then be released after the period.

Also, in practice is the art of leveraging 5% on the total project cost and keep till the end of the project when it would be restored.

However, unpopular among the respondents are; 1% on the contract sum throughout the contract duration, which was ranked 6th, the 3% on the contract sum throughout the contract duration, ranked 6th and 5% till 50% then none on remainder which was ranked 7th supported by 6.67% of the respondents. The implication of this is that the system is not popular in Nigeria though being practiced by few persons.

Table 2: Intervention systems in retention fee administration

S/N	RETENTION FEE INTERVENTION SYSTEMS	AGREEMENT INDEX	RANK
i	Application of bond as alternative of retention fee	3.54	4 th
ii	Financial security package	3.50	6 th
iii	Introduction of letter of credit	3.56	3 rd
iv	Deployment of payment bond	3.00	8 th
v	Escrowing retention fee by lodging in escrow account	3.50	6 th
vi	Application of performance bond	3.52	5 th
vii	Release of retention fee on line item basis	3.58	2 nd
viii	Release of retainage fee at early part of construction work	2.76	9 th
ix	Payment of interest on retention fund when over delayed.	3.67	1 st

Source: 2015 Survey

Intervention systems in retention fee payment operation is illustrated in Table 2. Payment of interest on retention fund when over-delayed was advocated by a great percentage of the respondents, thereby ranked 1st with mean score of 3.67. There should be adequate compensation for the money tied down during delayed payment. The prospect of paying interest on tied down fund would serve as detraction to undue delayed retention fee payment. This is an intervention approach on occasion of delayed retention fee payment.

Also, retainage fee can be released on line item basis. Line item release of retention fee is a practice whereby funds are released when a separately identifiable portion of the work is satisfactorily completed.

Serial release of the retention fee for portions of the work which task has been completed would be favoured by this option which was ranked 2nd by the respondents. According to Stockenberg (2002), this intervention system would prevent undue delay in payment of works often completed early in the course of project execution. Furthermore, Introduction of letter of credit in place of retainage fee was ranked 3rd while Application of bond as alternative of retention fee was also ranked 4th. Therefore, bond can be used as a substitute to retained fund.

Moreover, application of performance bond ranked was ranked 5th while Escrowing retention fee by lodging in escrow account was ranked 6th. Alternatively retention fund can be lodged in an account called escrow account to prevent unwarranted expenditure or diversion of retained

funds. This practices allows funds to be kept out of reach of creditor should the owner experience financial difficulties. An Escrow account generally involves two types of expense that must be borne by one of the parties. This includes the administration cost and cost of running or financing the escrowed fund.

Table 3: Challenges of retainage practice as peculiar to the sampled projects

S/N	CHALLENGES OF RETAINAGE PRACTICE	AGREEMENT INDEX	RANK
i	Retention fee is often delayed	3.86	1 st
ii	Retention fee is not often released in accordance with the contract	3.45	7 th
iii	Release of retention fee is often dependent on circumstances beyond contractors' control	3.85	2 nd
iv	Employers often seek to withhold retention fee due to wrong interpretation of works information	3.84	4 th
v	Holding back of retainage fee to reduce the resultant payable amount on final contract payment	2.50	9 th
vi	Retention fee instigates lack of trust in the contractor	3.60	5 th
vii	Non introduction of Retention fee improves relationship on project	3.50	6 th
viii	Retainage fee has tendency of reducing contractors' profit	3.40	8 th
ix	Contractors could lose the retention money if all is used for repair work	3.85	2 nd

Source: 2015 Survey

Some of the challenges often encountered in retention fee administration is presented in Table 3. "Retention fee is often delayed", presented as one of the challenges of fund management was ranked 1st with mean index value of 3.86. In construction industry, according to Cherrine (2014), Delay is one of the challenges encountered in retainage fee payment; it was discovered that retention fee could be delayed by days, weeks, months or even years. Similarly, Contractors could lose the retention money if all is used for repair work was ranked second (2nd) with mean index value of 3.85, also, Release of retention fee is often dependent on circumstances beyond contractors' control was ranked 2nd with mean index value of 3.85. In the light of this the fund could be kept in an escrow account to prevent unwarranted expenditure as a way out.

Moreover, Employers often seek to withhold retention fee due to wrong interpretation of works information was ranked 5th with mean index of 3.60, while Retention fee instigates lack of trust in the contractor was ranked 6th with mean index value 3.5. Above all, one should guard against delaying the contractor retainage fee to prevent project disharmony. In the light of the above, if those challenges are carefully considered and managed, it is likely that the negative aspect of retention fee can be eliminated.

Table 4: Impact of retention fee on projects and project participants

S/N	IMPACT OF RETENTION FEE ON PROJECT AND PARTICIPANTS	AGREEMENT INDEX	RANK
i	Sharp practice by the contractors in a bid to cushion effect of retention fee in likely situation of non-payment of retention fee.	3.89	4 th
ii	Retention fee has attendant consequence of reducing contractors' fee.	3.90	2 nd
iii	Retention fee reduces contractors profit if all sent at defect liability period	3.88	7 th
iv	Retention fee discourages potential contractor for a project	3.50	8 th
v	During defect liability period retained fund speeds up the rate of completion of works	3.92	1 st
vi	Tendency to get retained fund speeds up the completion of defects by contractor	3.90	2 nd
vii	Retention fee instills in contractor sense of responsibility to the client or professionals.	3.80	6 th
viii	Retention fee creates awareness about constraint to perform maximally on a project	3.89	4 th

Source: 2015 Survey

In Table 4, the parameter (iv) (During defect liability period retained fund speeds up the rate of completion of works) was ranked 1st with mean index value 3.92. Tendency to get retained fund speeds up the completion of defects by contractor and Retention fee has attendant consequence of reducing contractors' fees were ranked 2nd with mean index value 3.90 respective. Sharp practice by the contractors in a bid to cushion effect of retention fee in likely situation of non-payment was also ranked 4th with index magnitude of 3.90 among others. Antidote to the above challenges is following standard best practice.

Parameters of model for managing retention fee is presented in Table 5 above. The parameters were analyzed for their respective Agreement index. It was discovered that releasing retention fee on line item basis has highest Agreement Index of 3.95. The rate of subscription to the release of retention fee on line item basis has the highest frequency. It was a common opinion among the respondents that retention fee should be paid on those items that are lined up for execution and has experienced remarkable progress and success. Also, respondents are of the opinion that introducing Retention fee would improves relationship on project and correct interpretation of works information by employer could prevent undue delay of contractors fund were ranked 2nd respectively with agreement index of 3.93. Retention fee would to a great extent improve level of relationship among clients and their contractors or builders. Contrary to the pre-retention fee era whereby contract are executed based on mutual trust, which makes enforcement for compliance to remedy defects difficult, thereby causes tension. Introduction of retention fee has been widely believed to improve relationship on projects; particularly the

agreement to the limit of individual responsibility as far as the brokerage and administration of the fee is concerned.

Similarly, another three factors, Timely payment of retainage fee has tendency of enhancing contractors' profit, All Contractors retention money should not be used for repair work and Prompt payment of retention fee were analyzed and all rounded off with agreement index of 3.92 and therefore were ranked 4th

Table 5: Model for managing retainage fee on building construction projects

S/N	MODEL PARAMETERS	AGREEMENT INDEX	RANK
i	Prompt payment of retention fee	3.92	4 th
ii	Retention fee should be released in accordance with the contract	2.72	17 th
iii	Contractors situation to be considered in the release decision of Release of retention fee	2.50	16 th
iv	Correct interpretation of works information by employer to prevent undue delay of contractors fund	3.93	2 nd
v	Non-holding back of retainage fee to maintain the amount of resultant payable amount on final contract payment to contractor	2.78	15 th
vi	Administration of Retention fee should engenders trust in the contractor	2.99	12 th
vii	Introduction of Retention fee improves relationship on project	3.93	2 nd
viii	Timely payment of Retainage fee has tendency of enhancing contractors' profit	3.92	4 th
ix	All Contractors retention money should not be used for repair work	3.92	4 th
x	Application of bond as alternative to retainage fee	3.90	7 th
xi	Financial security package could be administered in exchange of retainage fee	3.89	8 th
xii	Introduction of letter of credit in place of retention fee	3.87	10 th
xiii	Deployment of payment bond to replace retention fee	3.88	11 th
xiv	Escrowing retention fee by lodging in escrow account	2.95	13 th
xv	Application of performance bond to activate retention fee	3.90	7 th
xvi	Release of retention fee on line item basis	3.95	1 st
xvii	Release of retainage fee at early part of construction work	2.92	14 th

Source: 2015 Survey

It was revealed from the analysis that Timely payment of retainage fee and Prompt payment of retention Fee has tendency of enhancing contractors' profit. Time and money are two indivisible project variables that are closely dependent, therefore there is a school of thought that believed that "Time is Money and Money is Time". Therefore, the more a builder stayed on a project the more the money being tied down and liable to lose value or depreciates. Therefore, if the retainage fee is paid as at when due it relieves the builder the pain of money depreciation, and enhance builders profit, therefore ranked fourth.

Furthermore, one of the factors listed in Table 5 (All contractors' retention money should not be used for repair) was also ranked fourth. It is a fact that the intention for entering into business is profit making, once the defect liability stage has commenced, restraint should be exercised in

order not to expend the entire retainage fee in remedying work defect. This has tendency to cause attrition or disharmony between client and the builder therefore should be discouraged.

Table 6 Factor Rotation of Parameters for Retention Fee Management Model

S/N	VARIABLES	F1	F2	F3	F4	F5	F6	F7	F8
i	Prompt payment of Retention fee	1.00							
ii	Contractor situation should be taken into consideration		1.00						
iii	Correct interpretation of work information by client/employer			1.00					
iv	Non-holding back of retention fee	0.984		0.988	1.00				
v	Administration of retention fee should engender trust in contractor					1.00			
vi	Introduction of Retention fee				0.988		1.00		
vii	Introduction of retention fee to improve relationship			0.999			0.999	1.00	
viii	All contractors' retention money should not be used for repair work			0.999			0.999		1.00
		F9	F10	F11	F12	F13	F14	F15	F16
ix	Application of bond as alternative to retention fee	1.00		0.997			0.997	0.999	0.999
x	Financial security in exchange of retain- age fee		1.00	0.982			0.987	0.984	0.989
xi	Introduction of letter of credit in place of retention fee			1.00					
xii	Deployment of payment bond	0.985			1.00				
xiii	Escrowing of retention fee in escrow account					1.00			
xiv	Application of Performance bond						1.00		
xv	Release of retention fee				0.986			1.00	
xvi	Release of retainage fee at early stage of work		0.971						1.00

Finally, two other factors, (Application of financial Bond as alternative to Retainage Fee and Application of Performance bond to activate Retention fee) were scored with agreement index of 3.90 and ranked 7th. It was advocated that Performance bod can be used as alternative to retention or retainage fee. Performance bond is project package that could serve as compensation in lieu of default in project performance. The bond could be in place which depicts the intention to perform by the builder and could be administered legally depending on term of agreement. The mode of performance bond management is unique relative to the retention or retainage fee.

Factor rotation of parameters for retention fee management model is presented in Table 7. The table contain the benchmarked parameters that could be used to manage Retention fee on a project. The parameters had been analyzed for their respective agreement index already and had been ranked. The parameters were further reduced to a sizeable number using Factor analysis. The resultant factors were examined, considering the

magnitude of their Eigen Value using Co-efficient of 0.9 to 0.1 as boundary limit.

The following factors emerged with reference to the Eigen values and variables with the 0.9 -1.0 Eigen coefficient dichotomy; $F_1, F_2, F_4, F_6, F_9, F_{11}, F_{14}, F_{15}, F_{16}$.

$0.980F_1$ (For Optimum Retainage Fee Management Performance)

$0.988F_4 + 0.985F_9 + 0.982 F_{11}$(For Moderately Retainage Fee Management Performance)

$0.99F_3 + 0.99F_6 + 0.99F_{14} + 0.99F_{15} + 0.99F_{16}$ (For High Retainage Fee Management Performance)

Fig.1: Benchmarked Model Parameters for Result Oriented Retention Fee Management

Model Interpretation

The interpretation of Factors F1 to F16 as contained in the structure of the model is as follow:

- F1 ----- Correct interpretation of work information by client/employer
- F3----- Non-holding back of retention fee; Introduction of retention fee to improve relationship, all contractors' retention money should not be used for repair work
- F4----- Application of bond as alternative to retention fee;
- F6 -----Introduction of retention fee to improve relationship; all contractors' retention money should not be used for repair work
- F9 ----- Deployment of payment bond
- F11 ----- Financial security in exchange of retain- age fee
- F14, F15, F16 ----- Financial security in exchange of retain-age fee; Application of performance bond as alternative to retainage fee.

Three dichotomies were presented by the model within the context of 0.1 representing minimum and 1.0 representing maximum effect; the optimum effect retainage fee management code, the moderate effect retainage fee management and high effect retainage fee management. Factor F_1 (correct interpretation of work information by client/employer) should guaranteed optimum effect on retainage fee management if observed. Furthermore, combination of three different factors (F_4, F_9, F_{11}) would produce a moderate retainage fee performance. The factors includes:

application of bond as alternative to retention fee; Deployment of payment bond and financial security in exchange of retain- age fee.

However, combination of the following factors would induce highest positive effect, F3, F6, F14, F15 and F16. The factors includes; (non-holding back of retention fee; introduction of retention fee to improve relationship, all contractors' retention money should not be used for repair work'); Financial security in exchange of retain-age fee; and application of performance bond as alternative to retainage fee. The combination of some or all of the factors guaranteed result oriented retainage fee management system.

CONCLUSION

The aim of the research work has been achieved, the study has presented issues that border on the management and administration of retention fee on selected construction projects. In Table 7.1. it was discovered that most deducted retention percentage is 5% of the project cost. Also, the type of intervention system often used as alternative intervention system was studied. Payment of interest on the retention fund on occasion of delayed payment was advocated, this is to be remedied with interest on the delayed fund. There should be adequate compensation for the fund tied down. However the following intervention system could be used: release of retention fee on line item basis, introduction of letter of credit, application of bond as alternative of retention fee, application of performance bond, financial security package, the use of escrow account for retention fee, use of payment bod and performance bond among others. The above toed the line of submission of Cherine (2014), Hawskwel (2014), Holmes (2014) and Ahmad and Barnes (1994). The combination of two or three or all of them should guarantee adequate management of the fund. However, there are challenges often encountered in the fund administration these includes; delay in the release of fund, reduction in contractors fee and retention fee reduces contractors profit if all the retained fund is used to remedy bad work among others, this as well is in agreement with Ahmad and Barnes (1994). Also, Hawskwel (2014); Hughes; Gray and Murdoch (1997) and MacCartney (1992) were of the opinion that retention bond allows contractor the opportunity to rectify any identified defects within an agreed period., hence, it is a good thing to include retention clause in the administration of a project which this study advocated.

Moreover, a model was presented that could help in the retention fee management on project works. The model toed the line of submissions of developing hedonic models in Picard, Antoniou and Adré de Palma (2010), Amusan; Joshua; Adegbenjo and Owolabi (2012), Rustom and Amer (2006), Bowel, Cattel and Kaka (2008).

However, according to the outcome of the analysis, combination of some factors contained in the model would induce highest positive effect, that is, F3, F6, F14, F15 and F16. These factors include; (non-holding back of

retention fee; introduction of retention fee to improve relationship and all contractors' retention money should not be used for repair work'). Also, financial security in exchange of retain-age fee; and application of performance bond as alternative to retainage fee. The combination of some or all of the factors guaranteed result oriented retention management system on residential and public construction projects.

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