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A Study on the Critical failure factors for Software projects in Nigeria

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ABSTRACT: *This study firstly examines the current literature concerning software project problemsduring implementation phases and factors that causessoftware projects failure. A quantitative research methodology was adopted to understand the factors that are critical in Nigeria for the failure of software systems implemented. Different stakeholders (including topmanagement, project manager, project team members and software consultants) from both private and public sector partook of the survey and a total of 200 respondents were recorded. After an extensive literature review, seven factors were identified as critical for software project failures. These factors were sent out for validation by experts in Nigeria and returned with a 15 item instrument. Fifteen criticalfailure factors were analyzed using the principal component analysis (PCA), and as a resultfive factors were identified as critical in terms of respondents agreement to the constructs, while three common critical failure factors were identified as important for failures of software projects. The underlying failure factor structures were identified and discussed. It is hoped that this research willhelp to bridge the current literature gap and provide practical advice for both academics andpractitioners.*
Keywords:*Critical Failure Factors, Software Projects Implementation, software project management.*

I. INTRODUCTION

Software development projects have become key drivers in today's world Garg, (2010) and its popularity is rapidly increasing globally due to the tremendous need and dependency for software across businesses (Aldammas, 2011). According to Aldammas (2011) as cited in Al-Mudimigh, (2001), software solutions bring great value to organizations and its potential cannot be over-emphasized or disputed. Research has shown that organizations have now realized the undeniable benefits of software solutions to increase the quality, accuracy and operational effectiveness while also using software solutions as strategic drivers for fulfilling the vision of the organization (Azad et al, 2010). Businesses have become so dependent on software solutions to drive their processes; however the development of software in itself is not a perfect process (Chow et al, 2008).The software development and project management are still facing problems and issues Akbar, (2011) this has led to a compelling reason for opening the "black box" to investigate the factors causing software project failure (Wong et al 2010).

Business organizations in Nigeria in recent times have adopted software solutions to re-engineer their business processes Asiegbu, (2011). This has caused the demand on locally developed software in Nigeria to increase. As at the 1980s and early 1990s, several software developing companies sprang up, but only a few are in existence today. Their exit from business has been attributed to consistent project failures (Asiegbu, 2011).

It has been estimated that at least 90% of Software Project implementations end up late or over-budget, and almost half fail to achieve the desired results (Oracle, 2004; Martin, 1998). Also the Chaos report (2004) by the Standish Group have found that 26 % of all software projects fail while 46 % experience cost and schedule overrun similarly, Adibe, (2003) has suggested an 85% software failure rate in Nigeria.

The overall objective of this research is to investigate which factors from the list of identified factors from literature are critical for the failure of software projects in Nigeria.

Boehm et al (2000) suggests that most of the times software projects are prematurely terminated by the client, Akbar et al (2011) agrees with Boehm that being able to understand the client's perspective is critical for software project success, hence the scope of this research is limited to the clients perspective.

II. METHODOLGY

Questionnaire method was used for data collection. The questionnaire was handed over to the respondent with a covering note with necessary instructions. A comprehensive instrument generation to measure the constructs of critical failure factors and project failure was undergone. This commenced with an exhaustive survey of literature, Arnuphaptrairong (2011), draft instrument of seven (7) items was taken as the base for measuring the critical failure factors for software projects. It was appended with items from other checklists from chief information officers from across the private and public sector of Nigeria. This resulted in a questionnaire with 15 items as the checklist for measuring critical failure factors for software projects. The respondent had to indicate the presence of each failure factor item in his project on a five point Likert scale (strongly disagree; disagree; neither agree nor disagree; agree and strongly agree). They also had to indicate the importance of each factor on a five point Likert Scale (very high=5, high=4, medium=3, low=2 and very low=1).

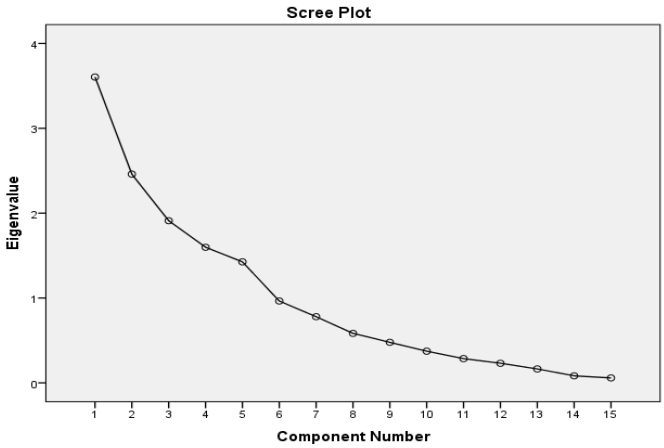
The questionnaire was administrated to a convenient sample of 200 software professionals with at least one year of software development experience. The goal of this exercise was to obtain a general assessment of the instruments' appearance, to further eliminate items that did not contribute significantly to the value of the instrument, and to understand the underlying structures of the constructs under study.

The data from the study was subjected to a Principal component Analysis (PCA) using a varimax rotation. The number of factors was decided looking into (a) literature support (b) percentage of variance explained (c) eigen values (d) interpretability of the factor structure.

If the factor structure explains 50% or even less in some cases, it is considered as satisfactory in social sciences (Hair et.al,1998). An eigen value represents the amount of variance associated with a factor. In this approach only factors with eigen value more than 1.0 were retained.

III. RESULTS

Presence of critical failure factors



Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.604	24.029	24.029	3.604	24.029	24.029	2.560	17.065	17.065
2	2.460	16.399	40.428	2.460	16.399	40.428	2.255	15.031	32.095
3	1.911	12.739	53.167	1.911	12.739	53.167	2.129	14.193	46.288
4	1.598	10.654	63.820	1.598	10.654	63.820	2.052	13.677	59.965
5	1.426	9.509	73.329	1.426	9.509	73.329	2.005	13.364	73.329
6	.965	6.430	79.759						
7	.780	5.198	84.958						
8	.584	3.890	88.848						
9	.478	3.183	92.031						
10	.373	2.488	94.519						
11	.286	1.905	96.424						
12	.231	1.538	97.962						
13	.164	1.095	99.057						
14	.083	.553	99.610						
15	.058	.390	100.000						

Fig. 2 Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]					
	Component				
	1	2	3	4	5
Unclear Requirements	.152	.391	-.067	.039	.749
Lack of top management support	.713	-.041	.352	.009	-.267
Lack of target user involvement	.831	.030	-.100	-.075	.164
Failure to gain user commitment	.838	-.115	-.004	.140	.294
Failure to manage end user expectations	-.035	.761	.352	.105	.074
Unstructured change control process and sponsor's buy in	-.069	.196	.662	.057	.083
Lack of an effective project management methodology	.599	.268	.309	.363	-.417
Unclear/unstructured project finance and control	.438	.618	.085	-.214	.179
Improper documentation	.015	.185	.112	.864	.103
Improper scoping and milestones	.063	.049	.035	.941	-.052
Lack of cooperation from third parties involved	.079	-.063	.765	.145	.088
Lack of required skilled manpower	-.185	.835	-.037	.348	-.076
Lack of hardware, software or any other resource	.001	.491	.188	.209	-.568
Stakeholder politics	.073	-.054	.296	.108	.825
Under estimation of cost	.168	.179	.776	-.054	-.102
Extraction Method: Principal Component Analysis. Fig 3: Rotation Method: Varimax with Kaiser Normalization.					

Based on the result of the principal component analysis(PCA), the percentage of variance accounted for by each component was obtained with only five eigenvalue greater than 1. The Cumulative percentage of variance accounted for by the first five (5) components explains nearly 73% of the variability in the original fifteen factors, thus we can considerably reduce the complexity of the data set by using these components, with only a 27% loss of information. This suggests that five (5) components are associated with failure of software projects in Nigeria.

Critical failure factors with highest values in each component are

1.failure to gain user commitment
2. Lack of required skilled manpower
3. Under-estimation of cost
4. Improper scoping and milestones
5. Stakeholder's politics.

Importance of critical failure factors

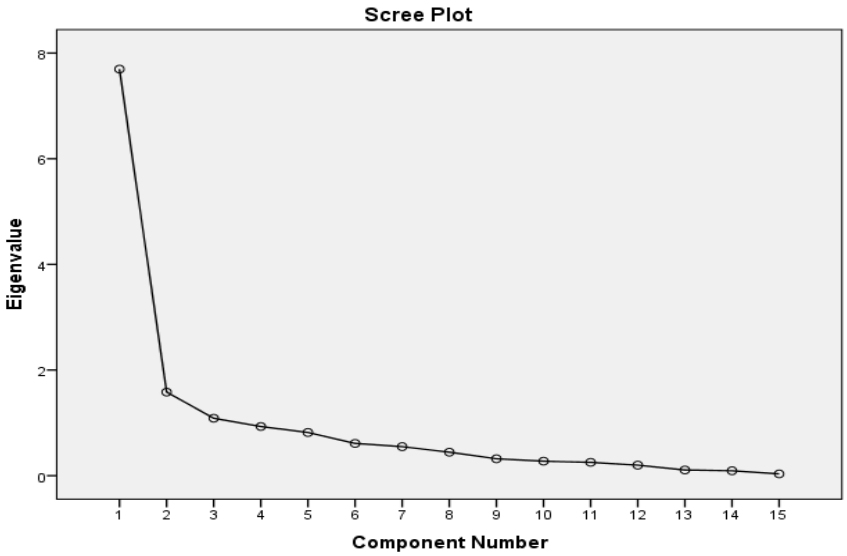


Fig 1: Scree plot for Importance of critical factors

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.696	51.305	51.305	7.696	51.305	51.305	4.223	28.157	28.157
2	1.582	10.549	61.854	1.582	10.549	61.854	3.706	24.704	52.860
3	1.087	7.249	69.103	1.087	7.249	69.103	2.436	16.243	69.103
4	.932	6.211	75.314						
5	.818	5.451	80.766						
6	.611	4.072	84.838						
7	.550	3.665	88.503						
8	.444	2.962	91.465						
9	.320	2.133	93.598						
10	.274	1.828	95.427						
11	.252	1.682	97.109						
12	.199	1.329	98.438						
13	.108	.720	99.158						
14	.093	.618	99.776						
15	.034	.224	100.000						

Fig 2: Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]			
	Component		
	1	2	3
Unclear Requirements	.200	.778	.356
Lack of top management support	.415	.509	.300
Lack of target user involvement	.355	.689	.116
Failure to gain user commitment	.059	.081	.683
Failure to manage end user expectations	.686	.515	.031
Unstructured change control process and sponsor's buy in	.842	.113	.109
Lack of an effective project management methodology	.757	.154	.362
Unclear/unstructured project finance and control	.548	.623	.150
Improper documentation	.313	.117	.779
Improper scoping and milestones	.299	.597	.563
Lack of cooperation from third parties involved	.585	.518	.042
Lack of required skilled manpower	.145	.795	.159
Lack of hardware, software or any other resource	.774	.287	.139
Stakeholder politics	.081	.481	.739
Under estimation of cost	.819	.294	.239

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Based on the principal component Analysis (PCA) ,the eigenvalue or amount of percentage in the original factors accounted for by each component was obtained. The percentage of variance accounted for by each component was obtained with only five eigenvalue greater than 1. The Cumulative percentage of variance accounted for by the first three (3) components explains nearly 69% of the variability in the original fifteen factors, thus we can considerably reduce the complexity of the data set by using these components, with only a 31% loss of information. This suggests that three (3) important components are associated with failure of software projects in Nigeria.

Critical failure factors with highest values in each component are

1.Unstructured change control and sponsor buy-in

2. Unclear requirement

3. Improper documentation.

IV. CONCLUSIONS

According to the results of the rotated component matrix of the PCA(for agreement), components 1,2,3,4 and 5 are highly correlated with failure to gain user commitment , Lack of required skilled manpower ,Under-estimation of cost , Improper scoping and milestones and Stakeholder's politics respectively.

According to the results of the rotated component matrix of the PCA (for importance), components 1,2, and 3 are highly correlated with unstructured change control and sponsor buy-in ,Unclear requirement and Improper documentation.

V. LIMITATION OF STUDY

The research limits the analysis to finding only the underlying structures of the critical failure factors, to discover the components that are really critical to the failure of software projects in Nigeria.

There remains room for more work on the contribution of each factor to software project failure and the relative importance of each of them.

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