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A Study on Critical Factors Affecting Public Infrastructures Project Performance in Ethiopia

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Abstract. It has been demonstrated that the construction industry can be characterized by inefficient and ineffective service delivery. The main goal of this paper is to examine the critical causal factors affecting public infrastructures projects performance in Ethiopia in order to improve the industry's service delivery. Based on the 58 factors compiled through the analysis of existing theories and investigations, we prepared and distributed 700 structured survey questionnaires for professionals in the construction industry of Ethiopia; and received 578 (82.57 %) of them. The results from an extended statistical analysis on the collected data revealed that the top 8 critical specific factors affecting government-financed infrastructures projects performance in the Ethiopia comprehends: poor project planning & administration system, weak project management leadership skills & institutional capacity, inadequate project design, escalation of construction materials price, lack of integrated project planning system among parties, inadequate capacity of the contractor, poor project schedule and cost management system. The study has an implication for construction industry practitioners, government officials, and research fellows.

Introduction

Through promoting infrastructures investments, create job opportunities, and deeds as a major consumer of intermediate products, and related services from another business sector via its complex value chain; *Construction Industry* acts as an engine for socio-economic development of a nation[1, 2] [3-5]. However, the sector is troubled with numerous internal and external factors that hamper the productivity of the industry across the world. The critical of them include: its complex nature, ever regulation change ,unreliable contractor, high insurance cost, technology adoption limitation, management aspect, market price change, inadequate capacity both in finance and technique, labor shortages, stagnant productivity level and failing to delivery project as the intended time, cost and quality standards are belongs to the most constraints of this sector [6]. Consequently, nowadays, a construction project is characterized by inefficient and ineffective project delivery globally[7-11]. Due to the presence of varied underlying problems which affect industry productivity, the sector is characterized by underperformance [12-13]. Previous studies clarified diverse factors affecting the performance of the construction industry. Though, due to the rapid changes in everything in this world, there is still a wide gap to thoroughly understand the underlying problems caused by the underperformance of this sector [5, 14].

Ethiopia has no exception regarding problems associated with the construction industry performance. As the case in Ethiopia, conflict among project participants, the project manager's ignorance and lack of knowledge and poor human resource management are the top factors hindering the schedule performance of public projects[15]. It is also suggested that due to less emphasis to planning, failure to update schedule on time, poor contract management, poor site supervision, inflation price of construction materials, change order, delayed payments, schedule overrun, quality defect cost overrun, capacity problems, weak organization, and coordination failing public infrastructures projects execution in Ethiopia suffer from performance failure[16, 17]. The mystery behind these chronic problems from global perspectives to local (the case in Ethiopia) enthused me to

research a comprehensive study which emphasizes on investigating the influential factors affecting public infrastructures projects in Ethiopia.

Research Objective and Hypotheses

After an in-depth review of the previous study, we identified and organized 58 frequent factors affecting public infrastructures projects performance, and then, examined the relevant of verified factors with the existing situations of the study areas through discussing with practitioners. Finally, based on that captured assumption, we formulated the objectives and hypotheses of the study.

Hypothesis 1: Project owner related problems positively impact construction project performance.

Hypothesis 2: Contractor related problems positively impact construction project performance.

Hypothesis 3: Project external environment-related problems positively impact construction project performance.

Hypothesis 4: Project stakeholders related problems positively impact construction project performance.

Hypothesis 5: Project contract administration system related problems positively impact construction project performance.

Hypothesis 6: Project design-procurement process-related problems positively impact construction project performance.

Hypothesis 7: Construction materials supply related problems positively impact construction project performance.

The objective of the Study: The main aim and objective of this study are to investigate the influential factors affecting government-financed infrastructures projects performance in Ethiopia.

Data Collection and Statistical Analysis

Data Collection and Respondents Profile

This study employed a quantitative research approach. We prepared and distributed structured questionnaires survey based on the Likert scale five points for 700 sample respondents taken from the construction professionals in the study areas; received 578 (82.57%) of them. We that recognize respondents have adequate work experience and education background. That is, 70.9% of them had service experience between 5 years and 20 years and 90% of the respondent’s profession is directly related to the construction industry sector.

Statistical Data Analysis

With the help of SPSS software, the collected data were analyzed using the statistical techniques. Before start data analysis the quality of the data set was verified and we removed 45 cases due to missing values and unaged responses were above 27%. Also, check the normality of the data distribution, and obtained the skewness and kurtosis statistics between -/+2.2, which confirmed us whether the data set is fairly distributed based on the scholars' suggestion.

Using SPSS version 24, we analyzed the data set organized which contains 58 observed variables by using principal component analysis method; and obtained 50 observed items structured under 8 components. Next, by performing EFA, which used maximum likelihood estimation method based on the eigenvalue greater than 1, we obtained 35 variables noted factor loadings above 0.691; though there are no sole cutoff criteria, popular recommended that it is better to retain variables above 0.50 factor loadings, then, we decided to retain all of the variables. We conducted the reliability analysis and obtained 0.933 Cronbach’s alpha value which confirmed the existence of consistent relationships among the variables; also with high KMO value of 0.927. The communalities extracted by those variables is ranged between 0.619 and 0.991; which is within the high communality scale as scholars recommended. Furthermore, the total variance explained by eight factors retained here is 85.277%, which is quite adequate. Likewise, there are no inflated correlation coefficients among the factors. It

implies whether the extracted constructs are divergent, and have a potential of measuring distinct concepts.

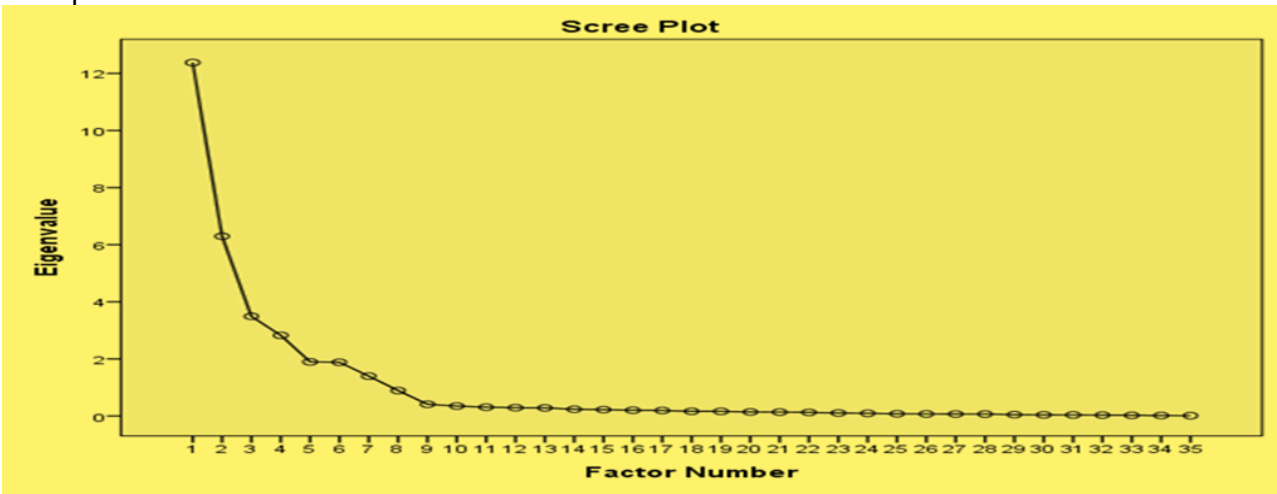

Figure 1. Scree Plot

Table 1. Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8
1	1.000	.211	.257	-.067	.211	.618	.524	.067
2	.211	1.000	.584	.318	.059	.191	.270	.214
3	.257	.584	1.000	.254	.258	.298	.175	.232
4	-.067	.318	.254	1.000	.164	-.154	-.008	.346
5	.211	.059	.258	.164	1.000	-.041	-.168	.089
6	.618	.191	.298	-.154	-.041	1.000	.317	-.121
7	.524	.270	.175	-.008	-.168	.317	1.000	.014
8	.067	.214	.232	.346	.089	-.121	.014	1.000

Table 2. Total Variance Explained and Communalities

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings	Communalities		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	Variables	Initial	Extraction
1	12.37	35.367	35.367	11.053	31.581	31.581	11.257	CMS1	.975	.981
2	6.295	17.985	53.351	3.792	10.836	42.416	5.924	CMS2	.978	.991
3	3.492	9.976	63.327	2.798	7.993	50.410	6.273	CMS3	.934	.932
4	2.825	8.070	71.398	5.646	16.131	66.541	4.165	PPMI6	.915	.908
5	1.897	5.421	76.818	2.347	6.705	73.246	3.735	PPMI7	.945	.936
6	1.883	5.379	82.197	1.376	3.932	77.179	7.846	PPMI4	.950	.946
7	1.398	3.993	86.191	1.448	4.137	81.316	5.717	PPMI2	.895	.890
8	1.001	2.548	88.738	1.386	3.961	85.277	2.971	PPMI5	.870	.852
9	.413	1.180	89.918					PPMI1	.928	.930
10	.349	.997	90.915					PPMI3	.920	.926
11	.309	.884	91.799					PPMI8	.939	.915
12	.292	.833	92.633					PPMI9	.886	.830
13	.285	.814	93.447					CONT1	.972	.979
14	.236	.675	94.121					CONT2	.967	.973
15	.225	.642	94.764					CONT3	.971	.979
16	.202	.577	95.341					CONT4	.953	.956
17	.194	.555	95.896					PEXENV1	.582	.619
18	.166	.473	96.369					PEXENV2	.677	.799
19	.162	.463	96.832					PEXENV3	.638	.716
20	.143	.408	97.240					PS1	.716	.750
21	.136	.389	97.629					PS2	.758	.808
22	.127	.362	97.991					PS3	.763	.821
23	.106	.302	98.293					PS4	.705	.738
24	.094	.267	98.560					DPP5	.653	.640
25	.080	.228	98.789					DPP6	.655	.635
26	.072	.207	98.996					DPP3	.706	.739
27	.070	.201	99.197					DPP1	.793	.848
28	.068	.193	99.390					DPP2	.724	.763
29	.049	.139	99.529					CM2	.882	.911
30	.042	.119	99.649					CM4	.817	.821
31	.038	.108	99.757					CM3	.832	.844
32	.031	.089	99.845					CM1	.875	.907
33	.023	.066	99.912					CL2	.826	.864
34	.018	.053	99.964					CL1	.848	.901
35	.013	.036	100.000					CL3	.765	.797
Extraction Method: Maximum Likelihood.										

Discussion and Findings of the Study

As stated under factor analysis section and Table 3 depicted below, all of the attributes corresponding to each of its own constructs have displayed a significance factor loadings ranged between 0.69 and

0.999. Furthermore, the Cronbach's α value is ranged between 0.921 and 0.992, which is above the popularly recommended threshold of 0.70, which is adequately acceptable. Moreover, all of the statistical results obtained through an analysis were above the recommended threshold. Hence, the findings of the study have a meaningful implication for the construction industry practitioners and can be interpreted in detail as follows.

From "contract management factors" poor project planning & administration system, and also slow & poor decision making system; from "client factors " extra work order / increase of work variations and weak project management leadership skills &institutional capacity problem of the client's organization; from "project design-procurement process factors" inadequate design &specification and lack of adequate skill & experience of the consultant team to prepare a complete design; from "construction material supply related factors" escalation of construction material price and unscheduled delivery of construction materials and equipment's on the site; from "project stakeholders factors ack of integrated project planning system among parties and existence of corruption practices among project parties related to project resources; from "construction project performance measurements factors" poor schedule and cost management ; from" project external environment factors" unforeseen project site condition and market price inflation & de-valuation of currency indicators; from " contractor factors" inadequate capacity of the contractor and poor project site management& supervision indicators have shown the first and the second largest factor loadings weights associated with their respective assumed constructs respectively. So, they have taken as the most influential factors of the topic under investigation. Similarly, the predictive relationships between the proposed factors were analyzed through multiple regression to test the stated hypotheses. All of the standardized beta coefficients and F-value statistics results obtained were statistically significant with the probability level of .000 (***). Based on this evidence, we recognized that all of the hypotheses theorized are supported.

Conclusion of the Study

Based on the findings of the study, we recognized that government-financed infrastructures projects in Ethiopia have suffered from different generic interrelated factors; which comprise contractor factors, project owner factors and project contract management factors as the first three core problems, and followed by construction materials supply factors, project external environment factors, design - procurement factors and project stakeholder related factors. The detail of the verified factors depicted in the form of table 3 constructed above.

Finally, depending on the inclusive results of the study, we confidential declare that the earlier theorized assumption is supported by the observed data and existing situations of the study areas. The study potential provides comprehensive information to the construction industry practitioners, government officials, experts, and other concerned bodies. Enables them to easily address the problems underlying public infrastructures projects implementation and, find the solution. Hence, it requires the active involvement of the industry's concerned bodies from all angles in order to curb the influential factors affecting public construction projects performance; then, enables projects to have to be delivered successfully and improve the living standard of the citizens. Therefore, it has a great implication for construction industry practitioners and future researches.

Table 3. Investigated Key Factors of the Study

Name of Constructs (Latent)	List of Indicators(Manifested Variables)	Factor Loadings	Cronbach Alpha
Contract Management factors	poor project planning & administration system	0.975	0.963
	delay of approval and payments for completed works	0.947	
	slow and poor decision making	0.889	
	lack of proper project supervision, performance evaluation & reporting system	0.865	
Client factors	weak project management leadership skills & institutional capacity problem of the client's organization	0.898	0.944
	extra work order / increase of work variations	0.902	
	lack of prepare & delivery project site free of complain (right of way problem)	0.895	
ProjectDesign –Procurement factors	inadequate design & specification	0.939	0.921
	lack of adequate skill and experience of the consultant teams to prepare a complete design	0.908	
	inadequacy of procurement process	0.865	
	selecting contractors, consultants, and suppliers without their proven track records	0.722	
	lack of detailed feasibility study & survey work before design	0.691	
Construction Material Supply Related factors	unscheduled delivery of construction materials & required equipment's on the site	0.999	0.988
	escalation of construction materials price	0.996	
	inefficient construction materials quality test method & approval system	0.941	
Project Stakeholders factors	lack of integrated project planning system to properly define and include project party's requirements and interests across project life phase	0.915	0.931
	an existence of corrupt practices among project parties related to project resources	0.888	
	lack of commitments to execute as an agreement	0.868	
	lack of effective communication and coordination among project parties	0.838	
Poor Construction Project Performance Measurement Indicators	late project delivery (schedule overrun)	0.999	0.988
	a project over budget (cost overrun)	0.993	
	lack of fulfilling planned project standard & specification (poor quality project delivery)	0.985	
	failure to comply customer requirements (poor customer satisfaction)	0.976	
	failure to fulfill health &safety issues standards	0.964	
	poor stake holders management practice	0.923	
	poor end user (community participation)	0.885	
	poor project delivery strategy	0.877	
	ineffective project time-cost management practice	0.871	
Project External Environment factors	unforeseen project site condition (weather, soil character, politics)	0.829	0.989
	market price inflation & de-valuation of currency	0.905	
	lack of adequate skilled & experienced construction sector labor on the market	0.780	
Contractor factors	contractor's inadequate capacity (financial, technical ,skill and experience aspects)	0.933	0.992
	poor project site management & supervision	0.917	
	unproductive advance payments use system	0.891	
	project team commitment problems	0.921	

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