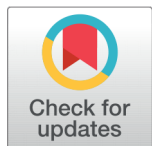


RESEARCH ARTICLE



Received: 28.02.2021
Accepted: 09.05.2021
Published: 28.05.2021

Citation: Abera Y (2021) Challenges on Successful Completion and Delivery of Public Building Construction Projects: The Case of West Shoa Zone, Oromia, Ethiopia. Indian Journal of Science and Technology 14(19): 1534-1544. <https://doi.org/10.17485/IJST/v14i19.332>

* **Corresponding author.**

Tel: +251-913-619-845
yerosana7@gmail.com

Funding: None

Competing Interests: None

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Published By Indian Society for Education and Environment ([iSee](https://www.indst.org/))

ISSN

Print: 0974-6846
 Electronic: 0974-5645

Challenges on Successful Completion and Delivery of Public Building Construction Projects: The Case of West Shoa Zone, Oromia, Ethiopia

Yerosan Abera^{1*}

¹ Civil Engineering Department, Ambo Institute of Technology, Ambo University, Ambo, Ethiopia. Tel.: +251-913-619-845

Abstract

Objectives: To identify the most common challenges or constraints on successful completion and delivery of construction projects in West Shoa Zone, Oromia, Ethiopia. Besides, this study focuses on stakeholder assessment on the identified constraints and rank challenges according to their impact on time, cost, and quality of the projects. **Methods:** A pilot study, questionnaire, and literature review were employed to collect primary and secondary data. For this purpose, 53 different challenges were identified, categorized into six major group factors, and analyzed by relative importance index and correlation analysis using the SPSS software. **Findings:** The identified challenges/constraints were examined by construction stakeholders and ranked according to their impact on building construction projects. Accordingly, Inflation (RII=0.811), Inadequate design, and specification (RII=0.794), Poor planning, monitoring, and feedback mechanism (RII=0.766), Delay in solving design problems (RII=0.766), and less financing capability of the owner (RII=0.760) are the top 5 challenging factors influencing construction project delivery. Finally, the case study was conducted on selected projects to assess how many of the projects were affected by the identified challenges using performance indicators such as scheduled performance index (SPI) and cost performance index (CPI). The average value of (CPI+SPI)/2 of the five selected projects was 0.785 which reveals that the projects were under performance. **Novelty:** The impact ranking of most challenging factors affecting successful completion and delivery of construction projects in West Shoa Zone, Oromia, Ethiopia were identified. Economic related factors such as inflation, less financing capability of the owner, and economic instability in the country were the most challenging factors. The CPI and SPI values of selected projects were used as a control to clearly understand the project's under performance. It is recommended that the concerned body should have a common understanding of those identified constraints and solve them according to their impact ranking.

Keywords: Challenges; Successful Completion; Project Delivery; Impact Ranking; Performance Indicator

1 Introduction

The construction industry is a fundamental economic sector that permeates most of the other sectors as it transforms various resources into constructed physical economic and social infrastructure necessary for socio-economic development⁽¹⁾. It has important contributions to socio-economic development of the country⁽²⁾. It provides the basis upon which other sectors can grow by constructing the physical facilities required for the production and distribution of goods and services⁽³⁾. Ethiopia's construction industry has been rapidly expanding, accounting for a significant portion of the country's GDP and constituting an important component of domestic gross capital formation⁽²⁾.

Even though the advancement in the construction industry is increasing from time to time, the frequency of development and productivity of the construction industry is decreasing⁽⁴⁾. According to the study⁽⁴⁾, productivity denotes the efficiency with which the various inputs are converted into goods and services. The development of productivity in construction compared to total productivity seems to be different for a lot of countries in the world. The productivity of the construction industry in the United States of America, Germany, and Japan does not increase like its total productivity⁽⁵⁾. The three reasons for low productivity in the construction industry are the size of construction companies, the complicity of the industry, different understanding of all parties in the construction industry⁽⁵⁾. The main objective of construction stakeholders is to successfully deliver projects to end-users. However, construction projects have been facing different challenges which lead to cost overrun, time delay, poor quality, and lack sustainability⁽⁶⁾. These challenges may be any condition, such as temporal/spatial limitations and safety/quality concerns, which may prevent a project to achieve its goals⁽⁷⁾. The effective development of the industry needs identification of its challenges, long-term planning with objective indicators in place, and continual performance measurement and improvement practice⁽⁸⁾.

Even though the construction industry in all countries faces problems, the challenges and problems of developing countries are different from those in developed countries. These difficulties and challenges are present alongside a general situation of socio-economic stress, chronic resource shortages, institutional weaknesses, and a general inability to deal with the key issues. There is also evidence that the problems have become greater in degree and severity in recent years⁽⁹⁾. Eight construction industry problems in Ethiopia were identified through factor analysis of four sources, according to⁽⁸⁾. These problems were delay in construction industry delivery policy implementation and corruption, weak capacity of contractors and consultants, lack of collaboration and professionalism, and lack of benchmarking practice.

A building construction project is economical when it is completed on time, within budget, under the specifications, and to stakeholders' satisfaction⁽¹⁰⁾. Therefore, the impact of risks to the project should also be reflected in these indicators⁽¹¹⁾. In Ethiopia, hardly few projects get completed on time and within budget since construction projects are exposed to uncertain environments because of such factors as construction complexity; the presence of various interest groups such as the project owners, end-users, consultants, contractors, financiers; materials, equipment, project funding; climatic environment; the economic and political environment and statutory regulations^(3,8). The performance of public building construction project delivery is usually evaluated on the framework set in the subject of contract agreement mainly; time of completion, quality of work performed, and amount of cost incurred for the construction⁽¹²⁾.

Successful completion and delivery systems of public building construction in the West Shoa Zone, Ethiopia have been facing different problems. A desk study shows that about 70% of public building construction in the Zone faces cost, time overrun, quality, and safety. These problems have been increasing and plaguing good governance problems in the region. The main objective of this study is to identify and rank key challenges in public building construction project delivery.

1.1 Research questions

The following are research questions that are the core value of this study:

- What are the common challenges found in public building construction project delivery in the West Shoa Zone?
- What are the critical constraints that affect time, cost, and quality performance of public building construction projects in the West Shoa Zone?
- Is there any significant correlation between the client, contractor and consultant on public building construction challenges?
- What is the performance of public building construction projects in the region?

1.2 Previous work

Numerous studies have been conducted to identify the challenges to the construction industry in the context of their respective countries. Many of the research was conducted separately on factors of time delay, cost overrun, and quality delivery. Any challenges that cause a time overrun, on the other hand, have an impact on the project's cost and quality, and vice versa. According to⁽⁸⁾, 45 challenges facing the construction industry were identified based on their sources: variables arising from the role of government, resource-related variables, those arising from the nature of the industry, and variables arising from the industry's own vision, and it was discovered that contractors and consultants lacked capacity, as well as a lack of collaboration and professionalism. Bruno K. et.al,⁽⁶⁾ identified 50 constraints on project delivery and found that escalation of material price, delay in interim payment, and financial problems are the most prevalent challenges. In addition, 83 different delay factors were identified by⁽¹⁰⁾ and categorized into nine major groups. According to⁽¹⁰⁾ inadequate contractor experience, ineffective project planning, and scheduling, poor site management and supervision, design changes by owner or agent during construction, and late delivery of materials were the top five factors for the delay. Similarly,⁽¹²⁾ identified 25 factors affecting construction time performance and, the result indicates financial related problems, improper utilization of advance payment followed by financial constraint for construction material and spare parts have been agreed as very important factors that affect the time performance. Again,⁽¹³⁾ identified

66 construction performance challenges on selected buildings in Ethiopia and found that escalation of material prices, unavailability of resources, and the number of disputes between owners and project parties were the most critical factors affecting construction performance. Furthermore, ⁽¹⁴⁾ identified 15 factors that cause time and cost overruns in construction projects and discovered that a lack of planning, poor contract management, and a poor planning process are the primary causes. Accordingly, the following challenges were identified and categorized under 6 groups of factors.

Table 1. Challenges on Construction Project Delivery

Group of factors	S/No.	challenges/ Constraints	References
Economic related challenges ^(12,15–18)	1	Lack of economic stability	(1,3,5,7,8,10,12)
	2	Less financing capability of the owner	(3,8,10,19–21)
	3	Inadequate budget allocation by the government	(8,11,12,22)
	4	Inflation (escalation of material price)	(3,6,9,10,12,13,22–25)
	5	Inappropriate contingency allowance	(9)
	6	Variation change order	(3,6,9–11,13,14,19,20,23–25)
	7	Delay in progress payments	(1,6,9–14,19,21,22,25,26)
Technical related challenges ^(11,15–18)	8	Improper project cost estimation	(3,9–12,14,19,23)
	9	Inadequate design and specification	(3,9–14,19,22–24,27)
	10	Unrealistic scheduling	(1,6,9,10,12,13,19,24,25)
	11	Poor planning /monitoring/feedback mechanism	(1,3,6,9–14,19,20,22,25,28)
	12	Delay in solving design problems	(3,6,9,10,12,13,19,22,23,25)
	13	Material quality availability	(3,6,8,10–12,14,19–22)
	14	poor coordination between parties	(3,6,8–10,12,20,22,25)
	15	Imperfect drawing and detailing	(3,6,9,10,12,14,22)
	16	Inappropriate power delegation	(8,19)
	17	Un availability of skilled engineers and manager	(3,8–10,12,14,20,28)
	18	Improper resource allocation	(6,8,9,11,21,22)
	19	Slow decision making	(6,9,10,13,14,19–23,25)
	20	Delay in conflict resolution	(6,9,12,13,19,22,23)
	21	Lack of progress meeting	(6,9,19,21,25)
	22	Delay in material delivery	(6,9–11,14,19,22,23,26)
	23	Variance in contract document	(3,9,13)
Legal related challenges ^(15–18)	24	Difficulties in land acquisition	(10,22,23)
	25	Building regulation	(6,23,24)
	26	Difficulties in construct permit approval	(9,10,13,19,22,23,27)
	27	Safety regulation	(21,23,27)
	28	Law and regulation change	(6,8–10,19,21,22,24)
	29	Lack of skill certification scheme	(6,8,11,19)
	30	Government policy (work law)	(8)
	31	Lack of codes and standards	(6,8,11)
	32	Disputes related to contractual documents	(6,8,19,20,22,23,25)
Social related challenges ^(15–18)	33	Poor ownership (un belonging)	(3)
	34	Inadequate compensation for the land	(6,9)
	35	Poor communication	(1,3,8,9,11,19,22,25)
	36	Conflict with other stakeholders	(6,9,10,20)
	37	Civil unrest/ lack of political stability	(3,6,9,10,26)
	38	Lack of cultural changes to projects	(6,8,19)
Environmental related challenges ^(15–18)	39	Weather condition on execution activities	(1,6,9–11,13,14,19,22,23,27)
	40	Air, water or ground pollution	(9,10,14,21,25,27)
	41	Topography and soil condition	(9–11,19,20,23)
	42	Noise and dust pollution	(9,14)
	43	Transport inaccessibility	(6,14,19,26)
	44	Natural disasters	(9,10,14,19)
	45	Un expected surface and subsurface condition	(3,9–11,13,19,20,22,23)
	46	Inadequate safety/ accident on site	(1,6,9,10,21,22)
	47	Nature of the project	(3,6,9,10,12,19,23)

Other challenges

Continued on next page

Table 1 continued

48	Low labor productivity	(6,8–10,12,14,19,21–23)
49	Frequent equipment breakdown	(8–13,19–23)
50	Frequent change of sub-contractor	(9,10,12,14,24)
51	Rework due to errors	(3,7,9–14,19)
52	Insufficient utilities around the project (water, elec.)	(8,9,19)
53	Ineffective delay penalty practices	(9,10,19,20,22)

2 Research Methodology

2.1 Study Location

The study was conducted in West Shoa Zone, Oromia regional state, the western central part of Ethiopia. The zone has 22 Woreda (district). Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this zone has a total population of 2,058,676, of whom 1,028,501 are male and 1,030,175 female; with an area of 14,788.78 square kilometers. Its geographical coordinates are between 8° 59'N latitude and 37° 51'E longitude with an area of 14,788.78 square kilometers and an elevation of 2101 m above mean sea level.

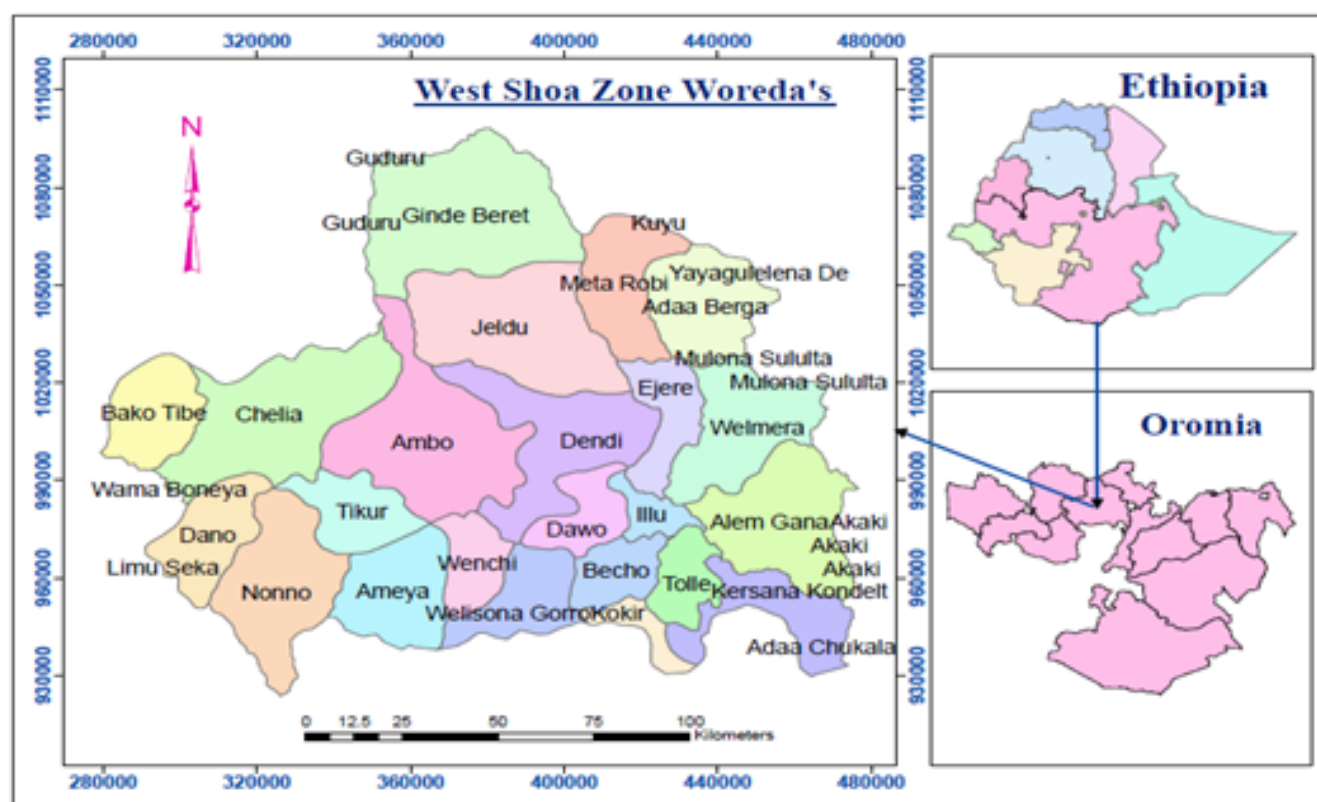


Fig 1. Study Location

2.2 Research Design

West Shoa Zone of Oromia Regional state has 22 Woredas where different building construction projects have been undertaken for social benefit and economic development in the region. Using Purposive sampling techniques, two public building construction projects from each Woreda were identified for investigation. Identification and categorization of the challenges on construction projects were identified using a literature review, desk study, and interview with construction stakeholders (clients, contractors, and consultants) in the region. Fifty three (53) challenges on public building construction project delivery were identified under six groups of factors. The questionnaire was developed to evaluate the frequency of identified problems with the five-point scale of ordinal measures. A total of 44 questionnaires were distributed to construction professionals working on specific projects in each Woreda, with 35 returned, accounting for 79.54% of the questionnaires.

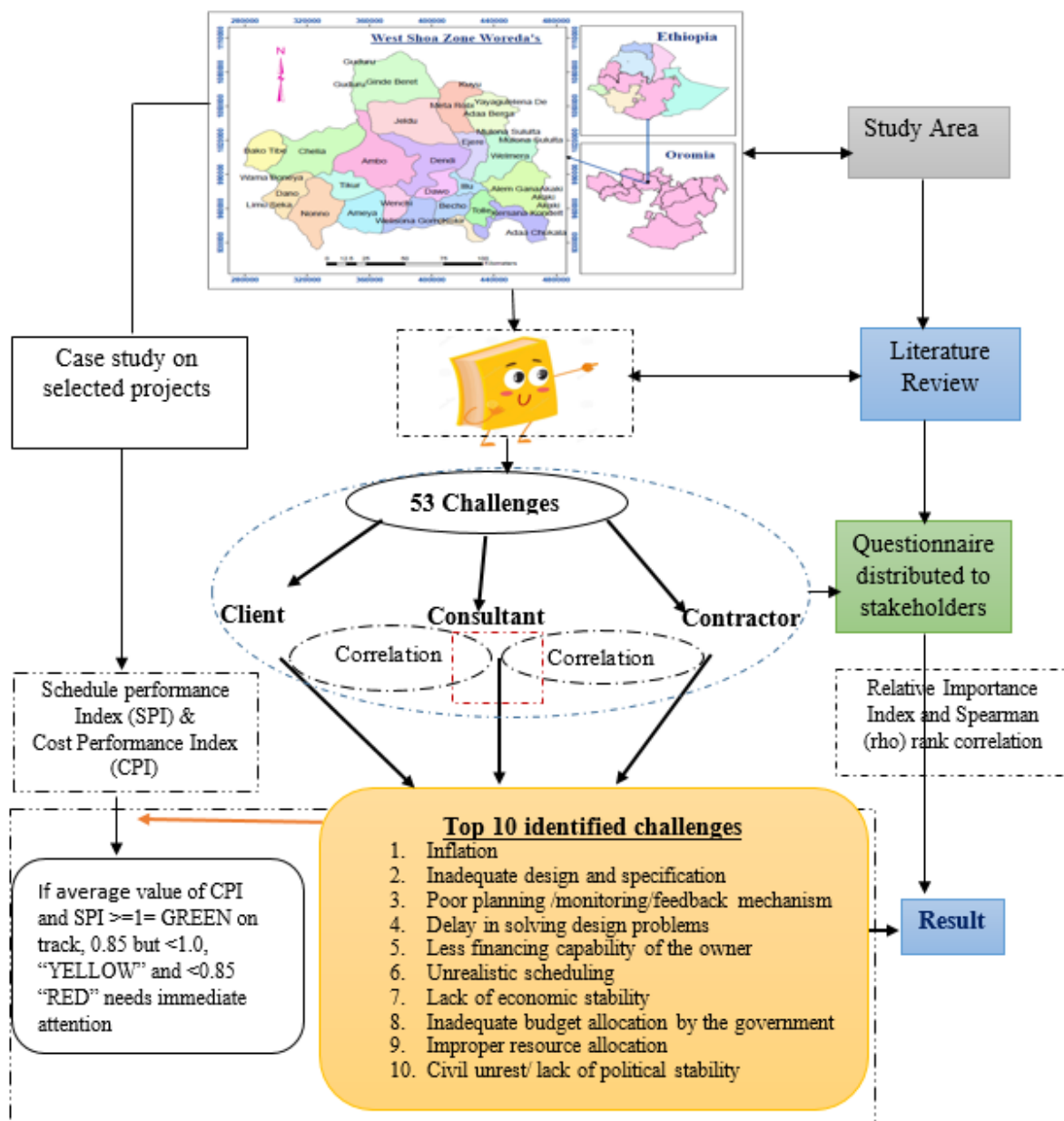


Fig 2. Research Design

2.3 Analysis method

The questionnaire was analyzed by Relative Importance Index (RII), which has been widely used in different articles such as (3,6,8–15,17,18,23–25).

$$RII = \sum \frac{Ni * P}{NRv} \quad (1)$$

Where, RII= Relative importance Index, Ni= number of the respondent that chose pi.

$$P_i = 1 \text{ to } 5 \text{ on Likert scale, } N = \text{total number of questionnaire returned,}$$

Rv= Highest value in Likert scale

The Spearman (rho) rank correlation coefficient, which is used to measure the differences in ranking among the groups of respondents scoring for various factors (i.e. clients versus consultants, clients versus contractors, and consultants versus contractors), was also computed

using the SPSS software 20. The Spearman (rho) rank correlation coefficient for any two groups of ranking is given by the following formula:

$$Rho(\rho_{cal}) = 1 - \frac{6 * (\sum di^2)}{N * (N^2 - 1)} \quad (2)$$

Where, Rho (ρ_{cal}): Spearman's rank correlation coefficient; d_i : the difference in ranking between each pair of factors; and N: number of factors (variables).

Cronbach's Alpha was also used to evaluate the reliability, internal consistency of measurement of the questionnaires. It was used for calculating internal consistency of all questions or a sub-group of questions.

$$\rho_T = \frac{K^2 \delta_{ij}}{\delta_X^2} \quad (3)$$

Where, ρ_T = Tau-equivalent reliability; δ_{ij} = covariance between X_i and X_j ; K= number of items;

δ_X^2 = item variances and inter-item covariance

Finally, the case study was conducted on five randomly selected projects to evaluate the performance of the projects using performance indicators such as scheduled performance index and cost performance index. According to⁽²⁹⁾ the most commonly used performance efficiency indicators are the cost variance and schedule variance of the projects.

$$\text{Schedule Variance (SV)} = EV - PV \quad (4)$$

$$\text{Cost Variance (CV)} = EV - AC \quad (5)$$

Where, EV-earned value, PV-planned value, AC-Actual cost

Schedule performance index (SPI): Measure of the Schedule efficiency of the Project;

$$SPI = \frac{\text{Budgeted cost of Work Scheduled (BCWS)}}{\text{Actual Cost of Work Scheduled (ACWS)}} \quad (6)$$

Cost performance index (CPI): Measure of the cost efficiency of the Project;

$$CPI = \frac{\text{Budgeted cost of Work performed (BCWP)}}{\text{Actual Cost of work performed (ACWP)}} \quad (7)$$

3 Results and Discussions

The questionnaire was analyzed to find out the most vital challenges affecting the public building construction project delivery in West Shoa Zone. Table 2 shows the respondent profile engaged in this study. From the table it can be shown that 28.57% were from the client-side, 31.43% were from the constructor and 40% are from a consultant with B.Sc. and above the educational level in all cases. This indicates that the respondents were reliable for the study.

Table 2. Respondent Profile

Sex		Education Level			Work experience			Stakeholders			
	f	%	f	%		f	%		f	%	
Male	30	85.71	Diploma -	-	0-5	22	62.86	Client	10	28.57	
Female	5	14.29	BSc	31	88.57	05-10	11	31.43	Contractor	11	31.43
			MSc	4	11.43	10-15	1	2.86	Consultant	14	40.00
			PhD	-	-	>15	1	2.86			

Table 3 shows the reliability of the instrument to identify the challenges. Cronbach's alpha method was used to measure the reliability of the questionnaire. According to⁽³⁰⁾ the cut-off points for the reliability test includes; excellent reliability (0.90 and above), high reliability (0.70-0.90), moderate reliability (0.50-0.70), and low reliability (0.50 and below). Therefore, the reliability of this study's questionnaire has high reliability at an individual group of factors and excellent reliability as overall which can be used to measure the extent of the problems.

Table 4 shows the overall respondent ranking for identified challenges on public building construction project delivery. From the respondent score, it can be deduced that the economic-related group of challenges (RII= 0.726) are the most important challenging group to influence building construction project delivery in West Shoa Zone. This was mainly because, Inflation (RII =0.811), less financing capability of the owner (RII=0.760), and lack of economic stability in the country.

The second most influencing group of challenges in the region was the technical -related group of challenges (RII= 0.722), whose most three significant factors are Inadequate design and specification (RII = 0.794), Poor planning, monitoring and feedback mechanism (RII =0.766), and delay in solving design problems (RII = 0.766).

Table 3. Reliability Rest Result

S/N	Group of factors	N of Items	Cronbach's Alpha
1	Economic related challenges	7	0.838
2	Technical related challenges	16	0.952
3	Social related Challenges	6	0.87
4	Legal related Challenges	9	0.902
5	Environmental related Challenges	5	0.753
6	Other Challenges	10	0.888
Overall		53	0.967

The social-related group of challenges (RII =0.675) were the third most significant factor affecting public building construction project delivery in West Shoa Zone. This was due to Civil unrest/ lack of political stability (RII=0.737) in which the region was considered as one of the epicenters for the Ethiopian political movement. Also, poor communication (RII=0.726) between construction stakeholders and the community was also another influencing factor on construction projects.

Following the social related group of challenges, the Legal-related group of challenges (RII = 0.634) ranks as the fourth most important challenge in construction projects. The influencing factors were lack of skill certification scheme (RII=0.669), difficulties in construct permit approval (RII=0.651), and disputes related to contractual documents (RII=0.646).

Environmental-related group of challenges (RII = 0.631) and another group of challenges (RII=0.575) were the last groups of factors accounts the rank from five to six respectively as shown in Table 5 below.

Table 4. Respondent ranking on identified Challenges

Group of factors	S/No.	Challenges/ Constraints	Overall(N=35)		Contractor(N=11)		Consultant(N=14)		Client(N=10)	
			RII	Rank	RII	Rank	RII	Rank	RII	Rank
Economic related challenges	1	Lack of economic stability	0.749	7	0.740	5	0.771	15	0.727	6
	2	Less financing capability of the owner	0.760	5	0.780	1	0.729	28	0.782	1
	3	Inadequate budget allocation by the government	0.749	7	0.740	5	0.743	25	0.764	3
	4	Inflation (escalation of material price)	0.811	1	0.740	5	0.886	1	0.782	1
	5	Inappropriate contingency allowance	0.617	41	0.500	39	0.729	28	0.582	45
	6	Variation change order	0.709	15	0.560	26	0.800	10	0.727	6
	7	Delay in progress payments	0.686	21	0.600	19	0.714	32	0.727	6
Technical related challenges	1	Improper project cost estimation	0.737	10	0.700	9	0.843	2	0.636	35
	2	Inadequate design and specification	0.794	2	0.700	9	0.843	2	0.727	6
	3	Unrealistic scheduling	0.754	6	0.620	17	0.843	2	0.727	6
	4	Poor planning /monitoring/feedback mechanism	0.766	3	0.760	3	0.814	8	0.709	12
	5	Delay in solving design problems	0.766	3	0.760	3	0.843	2	0.673	27
	6	Material quality availability	0.697	19	0.600	19	0.800	10	0.691	18
	7	poor coordination between parties	0.726	13	0.660	15	0.786	12	0.709	12
	8	imperfect drawing and detailing	0.709	15	0.580	21	0.814	8	0.691	18
	9	inappropriate power delegation	0.703	18	0.560	26	0.843	2	0.655	30
	10	Un availability of skilled engineers and manager	0.686	21	0.540	31	0.786	12	0.691	18
	11	Improper resource allocation	0.743	9	0.720	8	0.786	12	0.709	12
	12	Slow decision making	0.709	15	0.660	15	0.743	25	0.709	12
	13	Delay in conflict resolution	0.669	26	0.500	39	0.743	25	0.691	18
	14	Lack of progress meeting	0.669	26	0.560	26	0.686	42	0.745	4
	15	Delay in material delivery	0.697	19	0.680	14	0.729	28	0.673	27
	16	Variance in the contract document	0.731	12	0.560	26	0.843	2	0.745	4
Legal related challenges	1	Difficulties in land acquisition	0.606	44	0.540	31	0.686	42	0.691	18
	2	Building regulation	0.611	43	0.460	45	0.729	28	0.636	35
	3	Difficulties in construct permit approval	0.651	32	0.540	31	0.757	22	0.655	30
	4	Safety regulation	0.629	38	0.500	39	0.671	44	0.691	18

Continued on next page

Table 4 continued

	5	Law and regulation change	0.634	36	0.500	39	0.714	32	0.655	30
	6	Lack of skill certification scheme	0.669	26	0.500	39	0.757	22	0.709	12
	7	Government policy (work law)	0.640	34	0.380	52	0.771	15	0.709	12
	8	Lack of codes and standards	0.623	40	0.520	36	0.771	15	0.618	39
	9	Disputes related to contractual documents	0.646	33	0.520	36	0.714	32	0.673	27
Social related challenges	1	Poor ownership (un belonging)	0.663	31	0.580	21	0.771	15	0.636	35
	2	Inadequate compensation for the land	0.640	34	0.560	26	0.714	32	0.655	30
	3	Poor communication	0.726	13	0.700	9	0.771	15	0.691	18
	4	conflict with other stakeholders	0.669	26	0.580	21	0.771	15	0.618	39
	5	Civil unrest/ lack of political stability	0.737	10	0.700	9	0.771	15	0.727	6
	6	Lack of cultural changes to projects	0.617	41	0.460	45	0.700	40	0.655	30
Environmental related challenges	1	The weather condition on execution activities	0.674	23	0.780	1	0.657	46	0.600	42
	2	Air, water, or ground pollution	0.606	44	0.520	36	0.714	32	0.545	47
	3	Topography and soil condition	0.674	23	0.620	17	0.700	40	0.691	18
	4	Noise and dust pollution	0.526	52	0.380	52	0.614	50	0.545	47
	5	Transport inaccessibility	0.674	23	0.700	9	0.714	32	0.600	42
Other challenges	1	Natural disasters	0.474	53	0.420	49	0.529	53	0.455	53
	2	un expected surface and subsurface condition	0.549	48	0.480	44	0.643	48	0.527	50
	3	inadequate safety/ accident on site	0.537	51	0.400	50	0.614	50	0.564	46
	4	Nature of the project	0.549	48	0.400	50	0.657	46	0.545	47
	5	Low labor productivity	0.566	47	0.580	21	0.614	50	0.527	50
	6	frequent equipment breakdown	0.634	36	0.540	31	0.714	32	0.618	39
	7	frequent change of sub-contractor	0.549	48	0.440	47	0.671	44	0.491	52
	8	rework due to errors	0.600	46	0.440	47	0.714	32	0.600	42
	9	Insufficient utilities around the project (water, elec.)	0.669	26	0.580	21	0.757	22	0.636	35
	10	Ineffective delay penalty practices	0.629	38	0.540	31	0.643	48	0.691	18

Table 5. Ranking of Group of Factors

S/N	Group of factors	RII	Rank
1	Economic related challenges	0.726	1
2	Technical related challenges	0.722	2
3	Social related Challenges	0.675	3
4	Legal related Challenges	0.634	4
5	Environmental related Challenges	0.631	5
6	Other Challenges	0.576	6

Table 6 the top 10 challenging factors affecting successful completion and delivery of construction projects in the West Shoa Zone of Oromia regional state. Inflation (escalation of material price), inadequate design and specification, and poor planning, monitoring, and feedback mechanism were the top three challenging factors.

The Spearman (rho) rank correlation coefficient was used for measuring the differences in ranking between two groups of respondents scoring for various challenges (i.e. clients versus consultants, clients versus contractors, and consultants versus contractors). The result indicates that there is a positive correlation between all stakeholders as shown in Table 7. However, the result shows that the perception of stakeholder on factors challenging successful completion of construction projects were not strong enough on some challenges. This implies that there were disagreement between stakeholders on some challenging factors rather than having a common understanding of the factors that in reality exist and influence public building construction project delivery.

Finally, the case study was conducted on selected projects in West Shoa Zone to assess how much the projects were affected by the identified challenges. Data such as contract document, progress report, payment report of the completed and ongoing projects were collected from the Zonal construction Office as shown in Table 8. In this case, the Scheduled performance index (SPI) and Cost performance index (CPI) was used as performance indicators. The status of the projects was determined depending on the average value of CPI and SPI. If the average value

Table 6. Top10 Building Project Delivery Challenges In West Shoa Zone

S/No	Challenges	Group of factors	RII	Rank
1	Inflation (escalation of material price)	Economic related	0.811	1
2	Inadequate design and specification	Technical related	0.794	2
3	Poor planning /monitoring/feedback mechanism	Technical related	0.766	3
4	Delay in solving design problems	Technical related	0.766	3
5	Less financing capability of the owner	Economic related	0.760	5
6	Unrealistic scheduling	Technical related	0.754	6
7	Lack of economic stability	Economic related	0.749	7
8	Inadequate budget allocation by the government	Economic related	0.749	7
9	Improper resource allocation	Technical related	0.743	9
10	Civil unrest/ lack of political stability	Social related	0.737	10

Table 7. Correlations Coefficients between Stakeholders

			Consultant	Contractors	Client
Spearman's rho	Consultant	Correlation Coefficient	1.000	.516**	.548**
		Sig. (2-tailed)	.	.000	.000
		N	53	53	53
	Contractors	Correlation Coefficient	.516**	1.000	.526**
		Sig. (2-tailed)	.000	.	.000
	Client	Correlation Coefficient	.548**	.526**	1.000
		Sig. (2-tailed)	.000	.000	.

** . Correlation is significant at the 0.01 level (2-tailed).

of CPI and SPI ≥ 1 , “GREEN” = on track, 0.85 but < 1.0 , “YELLOW” = slightly behind schedule/ budget and < 0.85 “RED” = needs immediate attention. From Table 9 it can be concluded that Shenan Sectorial office construction (G+2) is in good progress whereas Noonnoo Sectorial offices (G+3) were running slightly out of schedule and cost. However, Jeldu Woreda's office (G+2), Liiban Jaawwii Woreda Court office, and D/Iccinnii Sectorial Office (G+2) were affected.

Table 8. Case Study on Selected Projects

S/No.	Project Name	Location (Woreda /Town)	Date of commencement	Contract Amount ((Birr.)	To date cost	stage of the project should attain	current stage	planned schedule (work-ing day)	Remark
1	Shenan Sectorial office construction (G+2)	Shanan	06-08-11	10,309,078.42	4,752,030.63	80%	58%	780	Ongoing
2	Jadu Woreda office(G+2)	Goojjoo	15-10-10	5,825,327.88	5,000,051.12	100%	100%	225	Completed
3	Liban Jaawwii Woreda Court office	Babich	19-07-10	5,834,303.42	5,680,160.08	100%	100%	346	Completed
4	Noonnoo Sectorial offices(G+3)	S/Ambaa	10-01-08	16,580,461.16	11,959,280.80	95%	76%	1,095	Ongoing
5	D/Iccinnii Sectorial Office(G+2)	Infiniti	07-06-08	7,307,664.19	2,537,240.36	100%	38%	420	Ongoing

Table 9. Status of Selected Projects

S/No.	Project Name	Cost Variables			Schedule Variable							Status
		PV	EV	EV-AC	CPI= EV/AC	AS	EV	Pv	SV= (EV- Pv)	SPI= EV/Pv	(CPI+SPI)/2	
1	Shenan Sectorial office construction (G+2)	8,247,262.74	5,979,265.48	1,227,234.85	1.26	780	624	440	184	1.42	1.338	Green
2	Jeldu Woreda office (G+2)	5,825,327.88	582,532.79	-4,417,518.33	0.12	225	225	660	-435	0.34	0.229	Red
3	Liiban Jaawwii Woreda Court office	5,834,303.42	5,834,303.42	154,143.34	1.03	346	346	726	-380	0.48	0.752	Red
4	Noonnoo Sectorial offices (G+3)	15,751,438.10	12,601,150.48	641,869.68	1.05	1,095	1040.25	1408	-367.75	0.74	0.896	Yellow
5	D/Iccinnii Sectorial Office (G+2)	7,307,664.19	2,776,912.39	239,672.03	1.09	420	420	1276	-856	0.33	0.712	Red

4 Conclusion

Unsuccessful project completion and delivery harms the economic development of one country. Identifying challenges on construction project delivery is the first step to minimize bottlenecks associated with construction projects. This study aimed to identify challenges and on public building construction projects in the West Shoa Zone of Ethiopia and how many projects were affected by the challenges. 53 challenges were identified during the literature review and examined by construction stakeholders (client, contractor, and consultant) with the help of the relative importance index method. The result shows that 10 of the most frequent challenges on construction project delivery were identified. These are, Inflation, Inadequate design, and specification; Poor planning, monitoring and feedback mechanism; delay in solving design problems; less financing capability of the owner; unrealistic scheduling; lack of economic stability; inadequate budget allocation by the government; improper resource allocation and civil unrest/ lack of political stability are challenges influencing construction project delivery. The case study was conducted on selected projects as control values to assess how many of the projects were affected by the identified challenges using performance indicators such as scheduled performance index and cost performance index. The result reveals that, from 5 projects selected for case study, three projects were in critical condition that needed immediate attention and intervention.

Acknowledgments

The author thanks West Shoa Construction office and Ambo Woreda Construction Office for their support in providing me all the supportive documents. In addition, all organizations and individuals who contributed directly or indirectly by providing the necessary materials and support for the realization of this study.

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