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Construction Phase Challenges and Their Impact on Performance of the Projects: The Case of Siltie Zone Housing Cooperatives

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Abstract Construction industry is criticized due to failures to deliver projects under it on their planned objectives. This situation is severe for projects undertaken by housing cooperatives which are executed with limited saving sources. The purpose of this paper is to assess construction phase challenges of cooperatives' housing projects and the impact on their performances of projects in Siltie Zone, Southern Ethiopia. To achieve the intended objectives mixed design method is used. Thus, 111 questionnaires were distributed to engineers working in urban development and construction department, contractors and members of housing cooperatives. RII and Kendall's coefficient of concordance analysis techniques were applied by using MS Excel and SPSS V-26. Analysis result has revealed that the top five construction phase challenges are stemmed: fluctuation of construction material price; absence of options to get and manage financial shortages from financial challenge clusters; and absence of local financial initiatives; lack of access to infrastructural services; problem of similar design schemes and rigidity from institutional challenge clusters are identified as critical factors. Also, results unearthed that impact severity of construction phase challenges on cost and time performance is as severe as high. Specifically, impact severity of financial challenge cluster is very high on both cost and time performances with 0.8405 and 0.8304 RII results respectively. Furthermore, from study results: cost-effective construction techniques; technical specifications and cost should be properly prepared; mobilizing resources at right time; and hiring competent labor and contractor are the top four mechanisms to improve construction phase performance of housing projects. From the results special attention to housing program by government is recommended as the basic and central to solve the aforementioned construction phase challenges. The results may enable construction project managers, designers, contractors, local government and policymakers in broad to be integrated on enhancing construction phase performance of housing cooperatives in the study area and elsewhere similar to this study.

Keywords Construction Phase Challenges, Housing Cooperatives, Improving Performance

1. Introduction

1.1. Background

Construction is a huge industry where in large capital is invested annually worldwide [1]. Regardless of size, all construction projects have similar phases of development according to [2], and pass through feasibility study, planning and design, construction and operation phases. From those construction phase is where the planning and designing principles are transferred to engineering realities [1,2]. Thus, construction phase is the longest wherein huge amount of construction resources are being utilized and is the critical stage from construction project delivery phases.

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Factors deterring to meet project success criterions are differing from place to place and depend on the political, economic and cultural factors [3]. Correspondingly, projects in construction industry are exposed for performance problems emanating from the performances of parties; resources availability; environmental conditions; involvement of other parties; contractual relations etc. As a result construction projects may delay in the project completion time associated with financial related challenges according to [4]; and cost overruns due to no know how for updated methods and problem of sticking on the conventional methods of construction [5]. Furthermore, [6] had focused on mitigation measures in dealing with delay and cost overrun in public building projects in Dar-Es-Salaam, Tanzania, and identified effective mitigation measures to delay and cost overrun in public building projects. Even though different factors associated with cost and time performance were studied, many construction projects are still failing from cost and time performance

perspectives [7].

The most widely estimated but deviating problems in construction projects are cost and time scopes [3]. Also, construction projects might face different challenges emanating whether from: institutional; financial; construction management problems; absence of collaboration with in stakeholders; environmental; social; etc. according to [4,8,9,10], and exert negative impact separately or jointly. Moreover, literatures done by [11,12,13], had reported construction projects performance depends on stakeholders' commitment and type of discipline to deliver objectives of the project; or from place to place of construction sites; or from time to time where in construction is being done. This is unconditional in construction projects: whether the project is mega or small.

Many studies [14,11,12,15], have identified that time overrun and cost overrun were the two most common effects of performance challenges in the Ethiopian construction projects. Likewise, cost and time control of projects is important in preventing project failure according to Olawale [7], and revealed that factors inhibiting effective cost control are also inhibiting effective time control. But knowledge on construction project performance preventing factors is the first step at ensuring they are avoided and enable the implementation of a more effective project cost and time performance processes in practice [7].

On the other side housing: according to Shrestha and Taniguchi [16] is challenged by rate of urbanization. In Ethiopia, the rate of urbanization or annual population growth is 3.8% and 5.4% respectively [17]. To solve shelter problem of urban poor with "limited objective" type housing cooperatives are formed according to Huba [18] to undertake acquiring and subdividing land, design and construction of the dwellings and other housing construction related objectives of members. This form of housing cooperatives construction projects is undergoing with stagnant construction progress in the current study area. These projects are inviting cooperatives members as client; governmental institutions and contractors from the very beginning to contract closing stage. Currently authors like Zewdu and Teka [19]; and Ramabhadran [13] have studied and recommended future study to focus on the investigation of factors causing projects to cost and time overruns with their mitigation measures to be identified on their respective results. Therefore, this research intends to know and improve critical performance challenging factors associated with housing construction projects in Siltie zone.

1.2. Problem Statement

In most cases, construction industry has been universally criticized due to failures to deliver projects on time and cost perspectives. This performance problem might be associated with employee related; team work and communication related factors. Those factors would finally disrupt projects' predetermined objectives like time and cost which are unsolved critical performance problems in the industry. This situation is severe for cooperatives housing construction projects which are executed with limited saving budget sources taking a longer time and extra costs for the construction to be completed [20]. Also, today construction project implementations are open to all sorts of external influence, unexpected events, ever-growing requirements, changing constraints and fluctuating resource flows which need to be managed effectively and efficiently, unless the chances of failure are high [21]. Specifically, construction of housing cooperatives projects requires coordinated efforts from various participants like government institutions, housing cooperatives members and contractors to play important roles. But when there are multiple bodies handling the same subject, non-coordination results in inaccurate records and delay in projects progress [10]. Studies done by [22,23,10], reported that construction projects by housing coops are mostly challenged by tenure status; financial problems; inadequate legislative framework; lack of knowledge by members and government.

Accordingly, the current study has focused on six challenges categorized based on from where they originate are identified from the existing research findings of [24,9,10,18]. These categories institutional, participation and collective actions, financial, environmental, social, and technical management are broadened to further assessment and inclusion of sub-factors was done. These factors have got focus to be investigated contextually since they are surrounding factors and can pose greater impact to construction of housing projects. Also, housing cooperatives construction projects are different from both public and private building construction projects requesting the collaboration of uncommonly forefront role players. This means government institution acting the consulting and coordinating roles; formal and informal workers are taking part in as contractor; and different multidisciplinary members are acting as owner. Therefore, it is necessary to know critical challenge factors and their impact to be investigated in order to improve performance problems in study area since housing construction demand is endless.

1.3. Objectives of the Study

1.3.1. Main Objective

The main objective of this research is to examine empirically construction phase challenges and the impact extent on cost and time performances and mechanisms to improve construction phase's performances of housing projects in Siltie Zone, Southern Ethiopia.

1.3.2. Specific Objectives

- To identify critical factors affecting construction phase performance of projects.
- To assess impact extents of the identified factors on cost and time performance.
- To assess improvement mechanisms to overcome challenges.

2. Literature Review

This section presents literature review which answers the research questions of this paper on a general level and studies on construction project performance challenging factors, impact of those factors on performance and options to improve construction phase performances in project management perspective. Also, it aimed to identify and fill potential gaps in the current knowledge and points out needs for more detailed studies.

2.1. Factors Affecting Construction Phase

El-Karim et al. [4], stated projects in construction are exposed for performance problems emanating from the performance of construction parties; resources availability; environmental conditions; involvement of other parties; contractual relations. Also, Gyamfi et al. [25], revealed the most destructive risk to the construction industry is related to finances, socio-political and design risk. In another word, Olawale [7] reported that: challenge factors of construction management /project management approach category; and from the project team category identified as causes for poor time and cost performances of construction projects [7]. Moreover, construction projects can be influenced by different factors as identified by different studies [14,8,22,9], associated with construction project performances as: institutional, participation and collective action, financial, environmental, social and project management related.

Additionally, sources of challenges influencing projects' performance in negative ways. These sources are classified according to their nature into physical, environmental, design, logistics, financial, legal, political, construction and operation challenges. Also, these challenges can be classified into internal and external. Internal challenges include financial; design; contractual; construction; personal and operational. Whereas externals include economic; social; political; legal; public; logistical and environmental challenges [26]. Also, housing construction projects of coops are mostly challenged by tenure status; financial problems; inadequate legislative framework; lack of knowledge by members and government [22]. Thus, current research considers challenge factors which are mostly related with construction phase challenges of cooperatives housing projects.

Institutional Factors

Institutional factors deal with the structural constraints and opportunities in the construction of cooperatives' housing projects [27]. In other words, institutional structure could provide administrative, legal, access to finance, access to land, technical and procedural support, including training to members. These supports are crucial for navigating the housing provision process, obtaining building materials, dealing with contractors, and other construction /finance issues/. As is stated by Huba [18], the weak institutional arrangement leads to the poor operating environment of housing cooperatives societies. Similarly, previous statement is also supported by Malinga [9], as the institutional challenges dealing with all the legislation involved in construction of low income housing i.e. water; access road and sanitation lines were challenges of the Mpumalanga and UMlazi housing projects.

According to Average [23], delivering house to the urban poor through participatory approach found that: such projects require financial assistance especially in the provision of infrastructure so as to create better living conditions. However, housing cooperatives construction projects have been confronted with a number of challenges as was found by Huba [18], include: difficulties in soliciting sustainable ways for resources mobilization including finance, limited government support in terms of policies and legislative arrangements unsecured employment and income as majority members are working in the informal sector and lack of apex organizations to coordinate initiatives from primary and secondary societies including networking. Also, Paul and Dhanuraj [10], had identified: bad design and poor construction quality: lack of privacy problems; poor quality of construction due to corrupt contractors finally need constant maintenance work; non-convergence of different institutes: to solve issues lack of serviced plots of land, tedious approval processes, and delay in construction period of housing project; inaccessible banking services: due to lack of collateral among beneficiaries, low repayment capacity, lack of awareness about banking services, difficult banking procedures and non-flexibility in banking services.

Moreover, prior to construction commencement of cooperatives housing construction projects: it is the responsibility and function of local government institutions to: provide compensation payments to citizens displaced from their land; provide infrastructural established land to cooperatives and follow-up overall housing development program to be implemented appropriately and accordingly [28]. But the question is: Did every stakeholder had achieved its responsibility during construction of cooperatives housing projects accordingly?

Participation and Collective Action Factors

Participation and collective action factors are concerning about the roles of housing cooperatives required to play during housing construction process internally [10,28,18,29]. They are based on the principles to guide co-operatives members as: voluntary and open membership; democratic member control; member economic participation; autonomy and independence; education, training and information; co-operation among co-operatives; and concern for community. Those principles are essentially can address internal integrations and external relationships of any co-operative.

The limitations on collective actions as stated by Abdie [22], are: some households take benefits of the collective without paying their responsibility in the housing development (free rider problem); others have expressed their lack of demand for shared or cooperatively owned properties; the extrusion of one's room in other plot in the

main core; absence of use and social heterogeneity in designing the typology; absence of opportunity costs between being involved in the collective action in housing themselves and other productive income earning activities. But the report stated that purchasing great or bulk volume of material lowers the total cost of construction of core unit [22]. Furthermore, Bredenoord [24], for the financial and other shortages of low-income citizens' house constructions, interdependence; experience sharing's and communication among groups of housing is necessary. Thus, cooperation and trust between the various stakeholders in construction of house are essential factors for better performance [24]. It is considered to be investigated here in this research.

Financial Factors

Finance is the capacity to cooperatives associated with their project's progress pace to be continued without any interruption of difficulties. Thus, financial factors related with construction projects performance deterring are financial claims, late release of budget /funds/, inflation rate, inadequate working capital, unexpected price rise for materials, access to capital and overall financial management [14,8,12,4,9]. According to Gyamfi et al. [25], for public and private projects: delays in payments was higher than all other stated financial risks.

Also, result on impact of environmental factors on building project performance in Delta State, Nigeria by Akanni et al. [14], revealed that economic and financial cluster as the first challenge: from this cluster unexpected price rise of materials was the highest-ranking variable. In addition, Malinga [9] found that financial challenge is one of the significant challenges that is very detrimental to a housing project. According to Zewdu and Teka [19], the top five factors causing cost overrun of construction projects were: poor planning, fluctuation of price of materials, poor productivity, inflationary pressure and project financing in descending order.

In addition, the study on assessment of problems and prospects of residential housing development in Awka, Anambra state of Nigeria by Ndeche et al. [20], revealed that problems include: high cost of construction and building materials, lack of access to land, corruption /bottlenecks in land acquisition and administration/, limited finance, inadequate infrastructure and services, non-conducive economic environment, amongst others.

Environmental Factors

Project environment is the surrounding in which a project is being undertaken. Therefore, it includes air, water, land, natural resources, pollutions, human and virtually everything outside the project. According to [14,4,8], under the physical environment category factors as unfavorable site conditions, unexpected weather challenge during construction, unexpected geological condition, flood and erosion. In the evaluation of low-income housing construction projects' challenges and their impact in completing housing projects on time: case studies of Mpumalanga and uMlazi housing projects by Malinga [9], found that environmental challenges where projects took place were environmentally sensitive especially in UMlazi and construction activities could not be taken place when it had rained and difficult to access to the sites [9].

Social Factors

Social factor is concerned with the social environment within which the project is being operated. Social factors according to [14,8], contained five variables namely: civil conflicts or disturbance or clashes among workers; injuries in construction sites; believes; hidden obstruction; access to med-care; literacy level. Likewise, Akanni et al. [14], had found that social and cultural cluster variables as the second challenge: i.e. civil conflicts or disturbance is the most vital variable; the clusters of legal, political and physical factors ranked third, fourth and fifth respectively.

Construction Management Related Factors

Management related factors are connected to the technology which is available to do the work, both in terms of the design work and the construction work [14,4,8]. Similarly, management support is crucial for housing coops in: obtaining building materials, dealing with contractors, and other construction /finance/ issues [27]. Also, according to [14,27,8], technical factors consisted of five variables which include: shortage of labor; shortage of plant /equipment spare parts/; importation of materials and equipment; strike by the labor force; and late delivery of materials and equipment. Correspondingly, Garomsa et al. [5] had clearly shown that, Ethiopian construction industry is still dependent on conventional methods which exposed the industry to face challenges of delay, poor quality, cost overrun, poor engagement and low satisfaction of stakeholders.

Moreover, according to Mwemezi [30], private residential building clients usually engage in informal construction sector and construction quality control is the ignored function in informal construction sectors [24]. Also, Mbote and Makworo [31], factors attributing to material waste are: substandard materials on site, poor storage practices, poor site layout, inadequate supervision, excessive materials on site, workers' attitude, weather effects, excessive off-cuts, demolition and rework, unskilled or untrained workers, unscheduled materials on site and methods of construction. But Abdie [22], reported that the cooperatives followed the whole work of the core housing development, from site clearing to completion of the project. Thus, administrative and managerial costs were reduced through self-management. This is the problematic attitude to be improved that every activity in construction industry should be left and handled through its own professional actors.

2.2. Impact of Challenges on Performance

Performance deterring factors faced during construction of projects have final effects on the initially intended project objectives: As the absence of formal agreement between

parties in construction lead projects to non-completion of the work; disputes; variation matters; defective work; delay of payment and overall poor performance [30]. Also, Garomsa et al. [5], had clearly shown that delay, poor quality, cost overrun, poor engagement and low satisfaction of stakeholders are characters of Ethiopian construction projects. Similarly, Gyamfi et al. [25], stated that delay in project, rework, cost overrun, relational disputes, difficulty acquiring building permits as major results as they have revealed. Also, time and cost overruns are identified affecting project performance by Akanni et al. [14], revealed that economic and financial and political challenges had significant relationship with time overrun but challenges of social and cultural had significant relationship with cost overrun on building projects.

Moreover, the most ranked impacts of variation orders were completion schedule delay; followed by increase in project cost; and poor safety condition as the least impact of variation orders on public building projects [32]. Unexpected price rise of building materials; weather; access to capital; late delivery of building materials and equipment as well as planning regulate on are the main factors contributing to time overruns of project delivery [8]. Thus, based on the reviewed literatures there is limited study on impact severity of construction phase challenges on cost and time performance of cooperative housing construction projects which is important in preventing project failures. This is due to preventing one of the two performance factors are highly interlinked or inseparable of one to the other [7].

2.3. Improvement Mechanisms to Overcome Performance Challenges

Some solutions stated by Ayalew et al. [11], to fill the gap in the performances of Ethiopian construction industry context are: applying modern project management; stakeholders' collaboration; experience sharing and information capitalization; enhance project finances; training; application of construction management practices; modify regulations set by the government; allocate sufficient time for design and planning and finally building capacities of all stakeholders. Furthermore, Bredenoord [24] has recommended that social sustainability in housing is of utmost importance and demands at least four measures: the involvement of residents in housing and urban development projects; the stimulation and facilitation of community-based initiatives; the involvement of community-based organizations with respect to the improvement of neighborhoods living conditions; and the establishment of save-and-build groups and housing cooperatives [24].

Likewise, factors identified by Mbote and Makworo [31], revealed were: proper supervision of the project activities and materials incorporation; sensitizing the working crew on the best practices on reduction of material wastage during construction; good quality purchases; proper procurement procedures; proper storage practices, and trained and experienced craftsmen have been rated as significant factors which can help to curb material wastage in construction of residential building frames. Also, options to minimize defects in buildings construction projects as recommended by Ahmed [33] as: appropriate funding; proper construction management; proper communication among parties involved and teamwork must be provided and building training and education would be necessary.

Similarly, according to Average [23] in Bulawayo, for low-income citizens housing construction is supported in different ways like by mobilizing construction materials; formation of extra crews to supply materials at affordable cost; negotiating with financial institutions with reasonable rate to fill financial shortages for the poor. Additionally, Abdie [22] recommended to solve problems of low income housing cooperatives construction projects as: government shall give technical and financial assistance like design and consultancy; arrange other non-governmental organizations to provide assistance in the form of aid and soft loan; the design concept shall be flexible core housing which considers the financial capacity of beneficiaries.

2.4. Literature Gap

Most literatures reviewed are proposing housing cooperatives as option to provision of houses to low-income citizens and identifying associated financial challenge factors on housing provision process. Also, those studies had collected their data qualitatively and had not engaged with practitioners and other associated stakeholders in practice. And none of them had concerned low income housing cooperatives construction projects as focus point. As well, there is limited study focusing on housing construction projects compared with other public and private building construction projects to understand the factors, and the impact extent on cost and time performances. On the other side studies associated with construction projects performances were concerned whether more on identification of factors or their overall effect on planned objectives. But there is limited source of knowledge on impact extent on time and cost performances.

Therefore, this study results can fill the literature gaps associated with the limited knowledge identified during literature review by identifying critical factors affecting cooperatives housing projects in practice; impact extent of identified factors on cost and time performance and the provision of improvement mechanisms to overcome factors in the study area which need to be addressed. These make present study unique from others in concerning to the broad base of urban population pyramid suffered by housing crisis in the study area and others related locations.

3. Research Method

3.1. Study Area

This assessment was carried out in Siltie Zone, Southern Ethiopia. Siltie Zone is composed of ten weredas and five

town administrations with total area of 3,047.83 square kilometers. It is located 140kms distance from Addis Ababa with total population was 750,398 of which 364,108 are male and 390,290 females according to CSA [34], and around 47,097 or 6.28% of the population lives in urban areas.

3.2. Research Design

According to Kothari [35] research design is a plan, a road map and blue print strategy of investigations so as to obtain answers to research questions. The research was aimed to identify critical challenge factors and their impact on performance of housing cooperatives' projects. The design intended to follow was both quantitative and qualitative mixed design as shown on figure 3.1. Thus, it is explanatory mixed research design was followed to get strong in-depth results from both methods of data collection to the intended objectives [36,35].

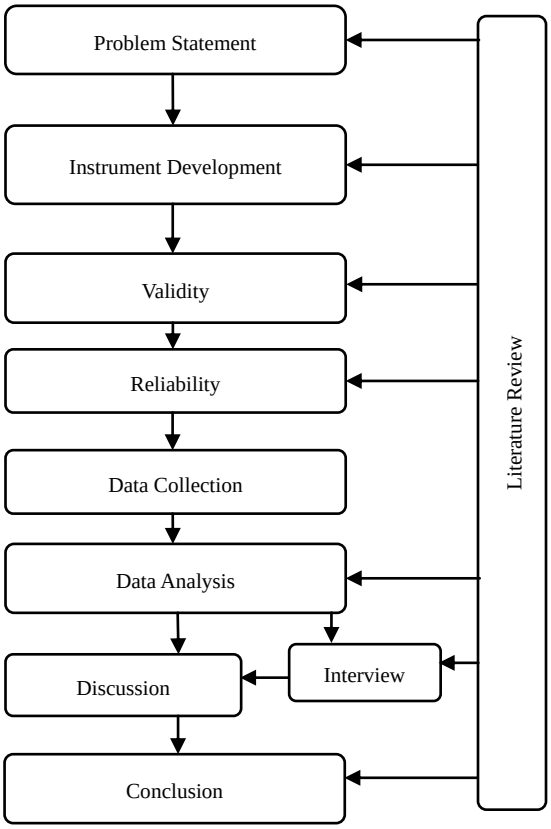

Figure 3.1. Research process followed

3.3. Research Population and Sampling Technique

3.3.1. Research Population

According to [37,35], population is a group of individuals, objects or items from which sample is taken for measurements which have one thing in common. Also, Fowler [37] stated that the first prerequisite in determination of a sample size is an analysis plan. And its key component usually is an outline of the subgroups with in the total population for which separate estimates are required, together with some estimates of fractions that will fall into those subgroups [37].

3.3.2. Population Subgroups

There were three targeted sets of people for this study: the initial was housing cooperatives committee members. This was considered due to committees are representatives of their members and being two per a coop enable to get unbiased information. Next, Siltie zone urban development and construction department engineers. This was because it was consulting and coordinating body to cooperatives housing construction projects simultaneously to government construction projects. Finally, construction enterprises /contractors/ were also included since they are contracting entities.

Thus, information to population subgroups used to this study was obtained from Siltie zone urban development and construction department at zonal level. There were 48 housing cooperatives construction projects. Total population was estimated as follows: cooperatives committee members = 48 cooperatives x 2 committees = 96 committees; construction engineers = 8 engineer's x 1 = 8 engineers; housing development = (head + 3 experts) x 1 = 4 persons; contractor /enterprise/ = 48 individuals were selected. Therefore, total population Size (N) was = 96 + 8 + 4 + 48 = 156 Persons (N).

3.3.3. Sampling Method

According to Kothari [35], if the population from which a sample to be drawn does not constitute a homogeneous study group, then stratified sampling technique should be applied so as to obtain a representative sample from the subgroup participants. Thus, stratified sampling method was used in the present research. Hence, it was considered as precise, and it included all important sub-population; it is free from bias, and it ensures a sample that accurately reflects the population being studied.

3.4. Sample Size and Sampling

An optimum sample is one which fulfills the requirements of efficiency, representativeness, reliability and flexibility [35]. Thus, to determine the sample size for finite population as recommended by Kothari [35], with not known variability in the proportion was adopted using formula 1. Therefore, by assuming p = 0.5 (maximum variability which will give maximum sample size of proposed population). Furthermore, desiring a 95% confidence level and e = ±5% precision error; sample size was calculated as formula 1 [35]. Related studies by [6,19], shows that these values are economical to be used.

$$n = \frac{z^2 * p * q * N}{(N-1) * e^2 + (z^2 * p * q)} = 111 \quad (1)$$

Where, N = the total number of populations; p = variability proportion, $q = 1 - p$; z = the value of the standard variate at a given confidence level and to be worked out from table showing area under Normal Curve is 1.96 for 95% confidence level; e = precision error; and n = size of sample. Sample size of subgroups had followed proportional

distribution of the overall sample as shown on Table 3.1: Therefore, using the subgroups according to their proportion's respondents were selected randomly from their population subgroups.

Table 3.1. Population subgroup distribution

Respondents Category	Population subgroup	Sample subgroups
Urban & Construction Department Engineers	12	9
Contractors	48	34
Cooperatives /Clients/	96	68
Total	156	111

3.5. Method of Data Collection

3.5.1. Quantitative Method

Questionnaire was consisting of four main parts. The first part concerned on respondents' background information. Second part had contained fairly listed factors which required respondents to rate them on frequency of occurrence on housing construction projects of cooperatives. Third part comprised impact severity of sets of construction phase factors on cost and time performance and finally options to improve performance of housing construction projects which have been summarized from existing literatures of (journal articles, books, directives, reports).

3.5.2. Qualitative Method

Based on analysis results from quantitative part, semi structured interview was conducted to qualitative part of data collection. Since it is being more economical, providing a safe basis for generalization and requiring relatively lesser skill on the part of the interviewer than unstructured interview [36,35]. Furthermore, housing construction status of coops completing their houses; partial completion of houses; and housing projects facing litigation process of their contract were selected purposively. Accordingly, interviewees were selected because of their experience and position of working on the housing project and availability for interviews audio records were collected.

3.6. Data Quality Strategies

3.6.1. Pilot Study

The purpose of pilot study was to enable the researcher to make necessary changes to items which may be inappropriate and determine the level of ambiguity of the questions for corrections. Ambiguous items were modified and inappropriate items, made appropriate. This was done by: discussions with coworkers, friends who had previous experience on research and reviewing literatures. The pre-test therefore allowed the researcher to review the contents of the instrument to accomplish the reliability and validity criteria which are necessary in scientific research.

3.6.2. Validity

Validity is the degree to which an instrument produces what it is supposed to produce. It was tested by face and content validity of questionnaire. Face validity refers to the likelihood of a question being misunderstood or misinterpreted. Content validity refers to whether the instrument adequately covers all the topics concerned. The validity of the instrument was established through eight experienced expert opinions in construction, literature searches, and pre-testing of questionnaire was done to each objective.

From experts' feedbacks merging of factors which were omitted (lack of government intervention facilitating bank credits; lack of demand for shared or cooperatively owned properties) variables which could be expressed on the rest and addition (plot distribution at the beginning phase of construction), transposing factors from factors clusters to cluster on objective one was done. And instrument layout adjustment on objective two was done to make easy and clear to respondents. After getting and comprising these feedbacks from experts, the instrument was finalized.

3.6.3. Reliability

According to Garson [38], reliability is the degree at which instrument produces constant result. This means instruments without reliability, research results using the instrument are not replicable, and replicability is fundamental to the scientific method. Likewise, Cronbach's alpha is the most commonly used internal consistency reliability coefficient which ranges zero to 1. It is also used as a convergent validity coefficient i.e. whether research design is sound. Alpha equals zero when the true score is not measured at all and there is only an error component or alpha equals 1.0 when all items measure only the true score and there is no error component [38]. Therefore, present research reliability was estimated by internal consistency: and the average value of alpha was 0.800 checked to three objectives; taken as enough since it is greater than the minimum recommended value of 0.7.

3.7. Data Analysis Techniques

Data collected from respondents was analyzed for further interpretation and discussion purposes. Accordingly, it was analyzed using both Microsoft Excel and Statistical Package for the Social Sciences (SPSS) to produce the summaries of the various responses. Microsoft Excel was used to compile data, calculate the relative importance index (RII) for each factor. SPSS was used to analyze others except RII's like: frequency categorization of factors, Cronbach's alpha to internal reliability coefficient, Kendall's coefficient of concordance test analysis of the research.

3.7.1. Relative Importance Index (RII)

Relative importance index was used to determine the importance of the various construction phase challenge

factors; impact severity of those challenges on cost and time performance; and performance improvement strategies from the data collected by using five-point Likert scale due to the nature of the problem under study. Scale ranges from five (Very High /Extremely important/) to one (Very Low /Extremely unimportant/). RII is used for analysis method since nature of the research and existing literatures related with current study followed it. Thus, it is used as appropriate technique. The higher value of the relative important index (RII) represents higher frequency of occurrence of challenge factors, impact severity and importance of options accordingly. It was computed using equation 2 adopted from works done by [12,7,32]:

$$RII = \sum \frac{W_i * F_i}{N * A} \quad (2)$$

Where: i - response category index, W_i - is the weight given by respondents, F_i - is the frequency of respondent for each weight, A - is the highest weight i.e. 5 and N - is the total number of respondents. The relative importance index (RII) result ranges from 0 to 1 (0 not inclusive). Factors impact severity and improvement mechanisms importance index were categorized from 0-0.20, 0.21-0.40, 0.41-0.60, 0.61-0.80 and 0.81-1 as indicated in Table 3.2 adapted from related work [3].

3.7.2. Agreement in Rank Similarity

Kendall's coefficient of concordance (W) was used to significance test of agreement among the respondents. Also, Kendall's coefficient of concordance was used to check the agreement among respondents of more than two sets to ordinal scale data.

Table 3.2. Significance Scale

Scale	00-0.20	0.21-0.40	0.41-0.60	0.61-0.80	0.81-1
Degree of Severity	Very Low	Low	Moderate	High	Very High
Degree of Importance	Extremely Unimportant	Unimportant	Somewhat Important	Important	Extremely Important

Thus, the value of W is ranged from 0 to 1 and with result near to 1 is highly agreed [38,35] computed using Equation 3:

$$W = \frac{S^2}{\frac{k^2(N^3-N)}{12} - kT} \quad (3)$$

Where: W is Kendall's coefficient of concordance, $s = \sum(R_j - R_{average})^2$, where R_j is sum of ranks to each object assigned by all the k judges, $R_{average}$ is average rank of sums, k is number of sets of rank, N is number of objects ranked and T is correction factor for tied ranks calculated as $T = \sum \frac{(t^3-t)}{12}$ where: t = number of observations in a group tied for a given rank. Hence, where tied ranks occur, the average method of assigning ranks was adopted i.e., assigning to each member the average rank which the tied observations occupied was taken place. Consequently, the result obtained from direct calculations in Kendall's coefficient of concordance shall be checked to significance. Therefore, if object number "N" greater than 7, significance of Kendall's coefficient of concordance (W) was checked with chi square $/\chi^2/$ result as: if calculated value is greater than critical table values, there is significance relation among variables of test. This is confirmed by the formula $\chi^2 = k(N-1)*W$ [35] Where, (N-1) is degree of freedom.

4. Results and Discussions

This section covers general profiles about respondents that enabled the research to get necessary information. Also, results from quantitative data were reinforced by interview which is evaluated at content level and existing literatures.

4.1. General Profile

The developed instrument was distributed to each group of study participant and corresponding response rate is listed as shown on Table 4.1. Thus, out of 111 questionnaires distributed 79 were responded with rate of response 71.17%. It is considered as good rate of response and enabling to further analysis and result discussions.

Table 4.1. Response rate

Respondents Category	Distributed Questionnaires	Responded Questionnaires	Response Rates
Urban & Construction Department Staffs	9	9	100.00%
Contractors	34	22	64.71%
Cooperatives /Clients/	68	48	70.59%
Total	111	79	71.17%

As per Table 4.2 shows the demographic information of respondents classified based on their category of responsibility to construction of housing projects. Furthermore, respondents' category and educational level was analyzed by cross tabulation. As a result, there are 9 respondents /11.4%/ have educational level of master's degree. And total sum of 68 respondents /86.1%/ have bachelor's degree educational level and lastly 2 respondents /2.5%/ have other level of education. Thus, from Table 4.2 it is possible to say that majority 86.1% of respondents had at least bachelor degree of educational level. This impresses that they can understand objectives of the research simply. This also had strengthened the obtained results are highly related with study objectives.

Table 4.2. Respondents' category and educational level cross tabulation

		Educational Level					Total
		MSC	MA	BSC	BA	Others	
Respondents Category	Urban Development and Construction Department	0	0	7	2	0	9
		0.0%	0.0%	77.8%	22.2%	0.0%	100.0%
	Contractors /Enterprises/	1	0	19	0	2	22
		4.5%	0.0%	86.4%	0.0%	9.1%	100.0%
	Cooperative Committees /Clients/	4	4	27	13	0	48
		8.3%	8.3%	56.3%	27.1%	0.0%	100.0%
Total		5	4	53	15	2	79
		6.3%	5.1%	67.1%	19.0%	2.5%	100.0%

4.2. Critical Factors Affecting Construction Phase

Factors are categorized under six clusters based on their stems. The average RII based on the overall result was 0.6305. Table 4.3 represents factors with their RII. The degree of significance is assumed that factors with RII more than the average RII for all factors i.e. the difference with average in RII greater than zero, are considered as "significant", while factors with RII less than the average RII of all factors are considered "non-significant". Accordingly, the nine critical construction phase challenge factors scoring RII above the average (0.6305) are considered for further discussion.

Thus, fluctuation of construction material price is continuous variation or increasing of construction materials cost around the project environment. It is the first ranking challenge factor according to the overall respondents' perceptions. It is the bottleneck to housing cooperatives' projects to incur extra cost on the initially estimated price and lead the project progress pace to be delayed. This is confirmed by scoring 0.9038 RII result. Additionally, the wide range of RII score from its successor variables implies that all respondents' have perceived it as the most challenging factor with very high frequency of occurrence. Also, the result to the factor implies that construction is the most challenged sector by different challenge factors and stakeholders are victims of those challenges. Thus, material price fluctuation is the first and unsolved problem of this study subjects which needs to be managed.

Similarly, fluctuation of construction material price is also confirmed during the interview as one of the interviewees said "…*our initial cost of contract was 86,000 ETB up to roof cover; … but it costs 107,000 ETB to roof cover per member per coop; …after plot distribution individuals build their house and it costs up to additional 67,000 ETB…" and "…material price (reinforcement bar, cement, roof cover) fluctuation is our bottleneck problem; due to lack of credit facility our construction process takes lengthy time duration*…".

This result is similar to studies on assessment of problems and prospects of residential housing development in Awka, Anambra State of Nigeria [20]. And is similar with result obtained by Gebrehiwet and Luo [12], which is ranked third. Correspondingly, Yada and Yadeta [39], had revealed this challenge on the second rank next to design changes. Moreover, Zewdu and Teka [19], found fluctuation of price of materials is identified as the second factor to causes of cost overrun. Also, Akanni et al. [14], had reported: from financial cluster unexpected price rise of materials was the highest scoring variable. Those results show that slight differences in the ranks of previous studies because fluctuation of construction material price happened at different period of time and geographical locations.

Financial initiatives are programs focusing on giving financial assistance to urban poor to ensure easy access to housing construction. The second ranking challenge emanating from institutional cluster with RII of 0.7848 is: absence of local financial initiatives which have contributions to poor performance of housing construction of cooperatives. This indicates that housing cooperatives are challenged by lacking financial backup factors which might be raised due to stakeholders' specifically government is abstained to counter this factor.

Also, it is confirmed by interviewees as *"…due to absence of credit facility to housing development program locally… no roof cover is done till now by some members in our coop…".*

The third ranking challenge is absence of options to get and manage financial shortages with RII of 0.7671 contributing to poor construction phase performance of housing cooperatives' projects. This challenge is again emanating from financial challenge cluster of factors. There might be options to solve financial shortages unlike that of study area as was found by different authors previously. In parallel to organizing low income citizens it was possible to organize brigades which can provide construction materials with fair price as practiced in Bulawayo, Zimbabwe [23]. Similarly, Jamaludin's et al. [40], result revealed that high cost of sustainable development, financial constraints of developers, lack of design, technology and expertise, financial constraints, lack of government enforcement and incentives, lack of commitment from stakeholders are the key challenges in developing affordable and sustainable housing. Also, report by Gyamfi et al. [25], revealed that for public and private projects; delays in payments was higher

than all other stated financial risks.

Absence of infrastructural services had scored RII of 0.7519 is also critical challenge from the institutional cluster. Nonexistence of infrastructural serviced access is severe constraint to construction projects performance regardless of type, size and location wherever they are available. This implies that local government institutions are failed to act on infrastructural challenges which are critical factors exerting negative influence on performance of construction projects in study area. Also, from the interview part it is confirmed as *"…infrastructural (road, water, topography) access problems exposed us to extra cost of construction…*".

Those results are similar with study of Ndeche et al. [20], found that the frontier difficulties faced were: high cost of construction and building materials, lack of access to land, corruption /bottlenecks in land acquisition and administration/, limited finance, inadequate infrastructure and services, non-conducive economic environment, amongst others. In addition, absence of site facilities had led delay ranked in second in the study result of Gebrehiwet and Luo [12]. Also, Malinga [9] report revealed that in construction of low-income housing water; access road and sanitation lines were challenges of the study area.

Table 4.3. Critical Factors Affecting Construction Phase

Challenges Factors	Construction Engineers		Contractors		Coops		Overall	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Institutional Factors								
Land right of way problem	0.6667	14	0.6364	10	0.6125	10	0.6253	12
Land zonal use claim during construction	0.5556	21	0.5727	16	0.5875	15	0.5797	18
Lack of technical assistance	0.4667	22	0.5818	15	0.6833	7	0.6304	10
Absence of local financial initiatives	0.8000	4	0.7636	3	0.7917	2	0.7848	2
Problem of similar design schemes and rigidity	0.7111	11	0.6818	7	0.7083	4	0.7013	5
Lack of access to infrastructural services	0.8000	4	0.8364	2	0.7042	5	0.7519	4
Participation and Collective Action Factors								
Plot distribution at beginning phase of construction	0.6444	16	0.5909	14	0.5458	20	0.5696	20
Absence of bulk purchase of materials collectively by cooperatives	0.7778	7	0.6545	8	0.6500	9	0.6658	7
Lack of cooperation among members	0.8667	2	0.6364	10	0.6125	10	0.6481	8
Tendency of taking benefits of the collective without participating in the housing development (Free rider problem)	0.7333	10	0.6455	9	0.5917	14	0.6228	13
Financial Factors								
Absence of options to get and manage financial shortages	0.8444	3	0.7636	3	0.7542	3	0.7671	3
Wastage of construction materials	0.6444	16	0.6273	12	0.5958	13	0.6101	14
Cost of construction is beyond reach of cooperatives' income	0.7778	7	0.7455	5	0.5667	18	0.6405	9
Absence of regular auditing of cooperatives' finance	0.7111	11	0.7091	6	0.6875	6	0.6962	6
Fluctuation of construction material price	0.9111	1	0.8636	1	0.9208	1	0.9038	1
Environmental Factors								
Unexpected weather challenge during construction	0.6000	19	0.5273	21	0.6792	8	0.6278	11
Unforeseen challenges like flood, land slide and earthquake	0.4000	23	0.3909	24	0.5042	23	0.4608	23
Social Factors								
Protests from the community during construction	0.5778	20	0.5182	22	0.5208	22	0.5266	22
Clash between cooperatives and workers during construction	0.7111	11	0.5455	19	0.5583	19	0.5722	19
Injuries on the construction site	0.3333	24	0.4091	23	0.4042	24	0.3975	24
Management Related Factors								
The construction being done by unskilled labor	0.8000	4	0.5455	19	0.5750	17	0.5924	17
Defects due to design modification	0.6667	14	0.6000	13	0.5875	15	0.6000	15
Absence of written agreement between cooperative and contractor for housing construction	0.7556	9	0.5636	18	0.5250	21	0.5620	21
Problem in integration of Interfaces	0.6222	18	0.5727	16	0.6000	12	0.5949	16
Average	0.6824		0.6242		0.6236		0.6305	

Housing cooperatives are invited to construct their houses by provision of similar design schemes from government based their income irrespective of their family size. Design is one of the key elements which play part in housing development. If its role is not considered very well, the result will be not good. During construction coops are compelled to modify and rework according to their routine needs which finally lead to extra cost of construction which need attention to be managed. This challenge is the fifth ranking with 0.7013 RII emanating from institutional cluster. This implies that coops are victims of typical design schemes and rigidity with its negative consequence of poor performance.

It is confirmed by the interview phase of the research from interviewees as *"…omission and rework of construction process were faced; …no burden sharing culture among members of neighborhoods; …material wastage is also critical issue…*"

Similarly, it is also by statement as: Variation works are raised due to frequent and unlimited change orders by owners during construction process of a project as founded by [33,41,32], which finally expose to rework and material wastages. Also, report by [22,10], the role of design in the housing development was not considered.

The sixth ranking challenge factor is absence of regular auditing of cooperatives finance. This is from the financial cluster with RII of 0.6962 score. It is due to lacking the values of coops where as it is the center for mutual benefit and responsibility. But it is the bottleneck for housing cooperatives to perform poorly on cost and time performance. This variable is critical since its absence lets time-bomb creating mistrust and blame culture among coop members and finally expose the project progress pace to be freeze.

Absence of bulk purchase of materials collectively by cooperatives is from participation and collective action challenge cluster; it is ranked seventh with RII 0.6658 from the overall. This challenge is the result of losing mutual benefit by cooperatives and lack of integration by concerned institutions. But from previous studies by [31,18,22], bulk purchasing of construction materials might have discounts from suppliers with some proportion orders and can reduce administrative costs by purchasing materials in a pull.

Also, the eighth ranked challenge with relative importance index result of 0.6481 is from participation and collective action cluster. This implies that cooperatives are not working cooperatively according to their organization values and believes or the principle of "the heart of co-operatives are not independent of each other" in mutual benefit perspective of cooperatives' objectives with in a coop are not working properly.

Additionally, interviewees said that *"…also members were reluctant to grant their contribution during construction;" and "…most members considered they are constructing house but what is needed and missed in quality technically is not known by them; "…no burden sharing culture among members of neighborhoods; …material wastage is also critical issue…"*

This might be from absence of collaboration of stakeholders and members with in coop and intra coops which could be solved by striving for mutual and final goal activities by respective stakeholders as was reported by Abdie [22]. Also, cooperatives members shall believe and act in the ethical values /honesty, openness, social responsibility, and caring for others/ as stated by FDRE [29], are not used as tools of solution during construction of housing coops in Siltie Zone. Similar study result factor was revealed by Paul and Dhanuraj [10], as lack of beneficiary participation is the major impediment to meeting the needs and demands of households on the eighth rank from study of deciphering the challenges in housing for urban poor.

The ninth ranked performance challenge factor to housing projects of cooperatives is cost of construction being beyond reach of coops' income capacity. This indicates that the initially estimated cost of house and prepared documents is being the drivers for this challenge. Due incomplete, rigid and typical design schemes and specification, coops became victim of variation orders and delay of construction. On the other side housing projects are exposed to shortage of construction budget. Therefore, almost all housing cooperatives construction processes are hesitated due to discrepancy of the intended plan of housing cost which finally lead the low-income housing construction to delay the project and to continual escalation of construction cost problems.

This is similar with study done by Huba [18], on access to housing through cooperatives: potentials and challenges from Tanzania. Further analysis of financial risks by Gyamfi et al. [25], relating to public and private projects shows, delays in payments, under-budgeting, freeze in capital, bankruptcy of stakeholders, and corruption. Also, Abdie [22] found that factors initiating to dissatisfaction of members like taking benefits of collectives; ignoring responsibility; house shifting to others cause reluctances to coops; extrusion of room cause privacy problems are common dissatisfaction factors of social housing in Bahir Dar.

Furthermore, three challenges ranking from twelfth to fourteenth in the overall are identified at mid-level by all category of respondents i.e. from tenth to fourteenth rank. These are: land right of way problem; tendency of taking benefits of the collective without participating in the housing development (free rider problem); wastage of construction materials with 0.6253; 0.6228; and 0.6101 RII values emanating from institutional, participation and collective action and financial clusters respectively. These challenges are countering the construction progress of housing cooperatives projects at mid-level which need to be solved so far.

4.3. Impact of Challenge Clusters on Cost and Time

It is obvious from Table 4.4 that challenge clusters' which have high impact on both cost and time performance are financial; institutional; participation and collective action; and management related factors. These clusters had scored high impact index values above i.e. 0.61 (High impact) on both time and cost overruns.

Accordingly, financial factors have scored highest RII value on both time and cost performance and exerted 0.8405 and 0.8304 impact extent on cost and time performances respectively. Thus, financial factors like fluctuation of construction material price; absence of options to get and manage financial shortages; absence of regular auditing of cooperatives' finance are the main responsible factors to poor cost and time performance of housing projects in Siltie Zone.

Also, the largest impact of those challenges as an interviewee stated is "…*members are victims of not being owner of house*…" and on the other side interviewees said: "…*even though we had planned to complete our construction in two years, we have completed our construction in four years due to both financial shortage and contractor problem since 2016; … also not all members have completed their houses till now* …".

This result is similar with studies done by Ramabhadran [13], on the third level; Gyamfi et al. [25], the most destructive risk to the construction industry is related to finances; and with Malinga's [9], study report supports financial challenge similarly. But Akanni et al. [14], revealed in opposing this result as: time overrun had significant association with economic and financial and political challenges; and cost overrun with challenges of social and cultural. This difference had confirmed that every construction project is unique due to participants in it, time and project location of construction.

Moreover, both institutional and participation and collective actions clusters' have higher impact on time performance than on cost performance with 0.7063 and 0.7063 on time performance; and 0.6962 and 0.6582 impact scores on cost performance. Under these challenge clusters i.e. from institutional (absence of local financial initiatives; lack of access to infrastructural services; problem of similar design schemes and rigidity) and participation and collective actions (absence of bulk purchase of materials collectively by cooperatives; and lack of cooperation among members) are the forefront powers to poor time performance of housing construction projects. But these challenge clusters need overall collaboration and commitment for successful performance of housing construction.

Also, management related cluster had scored 0.6557 and 0.6633 impact sensitivity value on cost and time performance of housing projects respectively. Along this cluster: defects due to design modification; problem in integration of interfaces; and the construction being done by unskilled labor are the main contributors to both time and cost impact of coops construction projects under study.

Similar results with study reports by [12,7], stated that: from the project team category i.e. (lack of detailed /complete design, lack of trust among the project partners, limited time devoted to project control on site, non-factual reporting/) were identified as challenges to both cost and time overrun of construction projects. Also, it is similar to study result done by Obalola [8], as: unexpected price rise of building materials; weather; access to capital; late delivery of building materials and equipment as well as planning regulation are the main factors contributing to time overruns of project delivery. On the other side, the rest two clusters: social and environmental have moderate impact both on cost and time performance with 0.5063 to 0.5873 impact sensitivity score values respectively.

This implies that construction of coops housing projects are victims of poor cost and time performances due to financial factors from susceptibility of the free market environment; participation and collective action factors internally and abstinence of institutions around the environment on their housing construction.

Table 4.4. Impact of Challenge Clusters

Challenge Clusters	Construction Engineers		Contractors		Cooperativess		Average	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
A. On Cost Overrun								
Institutional Factors	0.7333	4	0.6273	3	0.7208	2	0.6962	2
Participation and Collective Action Factors	0.7556	3	0.6636	2	0.6375	4	0.6582	3
Financial Factors	0.9111	1	0.7909	1	0.8500	1	0.8405	1
Environmental Factors	0.6222	5	0.5182	5	0.6000	5	0.5797	5
Social Factors	0.5556	6	0.4364	6	0.5292	6	0.5063	6
Management Related Factors	0.7778	2	0.6273	3	0.6458	3	0.6557	4
B. On Time Overrun								
Institutional Factors	0.7556	3	0.7000	2	0.7000	2	0.7063	2
Participation and Collective Action Factors	0.8222	2	0.6909	3	0.6917	3	0.7063	2
Financial Factors	0.8444	1	0.8455	1	0.8208	1	0.8304	1
Environmental Factors	0.5778	5	0.5091	5	0.6250	5	0.5873	5
Social Factors	0.5778	5	0.4273	6	0.5625	6	0.5266	6
Management Related Factors	0.6889	4	0.6909	3	0.6458	4	0.6633	4

In overall, from table 4.4 it is possible to say that almost all construction phase challenge clusters except financial challenge cluster have exerted more impact on time than on cost performance based on the result of impact sensitivity analysis.

Thus, it is urgent to manage and solve these challenges faced by low income earning citizens' housing construction projects of study area. Finally, it can be deduced that successful development of housing construction in Siltie Zone may be greatly endangered without effective management and prevention of variable factors under financial, institutional, participation and collective action and management related factor clusters of this study. Therefore, the discussed nine challenge factors in section 4.2 are emanated from these challenge clusters shall be handled and managed to solve the crisis associated with housing construction cost. Since housing is the ever growing and unanswered demand of citizens especially in developing countries like Ethiopia.

4.4. Improvement Mechanisms of Performances

This section is the third objective intended to obtain possible options to improve construction phase performance of cooperatives housing projects specifically and others related construction projects in general. There are nine options collected from literatures as listed in Table 4.5 and analyzed by using RII of respondent's category. All options have scored above 0.7 RII. This implies that the proposed mechanisms can be applied with overall integrations and collaboration in order to improve performance problems of housing projects.

Accordingly, result from Table 4.5 Cost-effective construction techniques was recommended as the first option to improve the performance of housing cooperatives construction process according to most respondents' perception.

This option is first ranked solution by all respondents' category though with different index but is 0.8684 RII score in the overall perspective. This indicates that housing cooperatives are building their houses with conventional method of construction and construction material other than alternative forms of materials and methods. Therefore, this option might be applied by using alternative construction materials instead of conventional and need appropriate management and construction techniques.

Similarly, this is confirmed by Garomsa et al. [5], as in the conventional method of construction materials wastages, defects and other types of inefficiency are inevitable so is similar in study area.

The second extremely important option to mitigate construction phase challenges is technical specifications and cost should be properly prepared. This indicates that cooperatives are severely challenged by uncompleted and improperly prepared technical specifications; then they have faced fallacy between their initial expectations and separate fact on the ground of construction. Hence, this is also confirmed on challenges identification and their impact on cost and time overrun as: lack of technical assistance; cooperation among coops; construction management of this study.

This is similar with report done by Yada and Yadeta [39], as construction participants should work cooperatively in a complete design and contract document to minimize schedule delays, cost overruns due to variations and there will be improvement of project management and decision-making ability.

The third important factor from the result was mobilizing resources at right time in the overall rank. It is selected in different order of rank by respondents' category as second, fourth and eighth by contractors, coops and urban development and construction engineers respectively. This indicates that contractors and cooperatives have selected the option since they have faced problems un-timely mobilization of resource practically unlike that of urban development and construction engineers. Mobilizing resources at right time can reduce wastage; theft on site; improper material stocking; and weather-related challenges of construction.

Table 4.5. Improvement Mechanisms

Options to solve challenges	Construction Engineers		Contractors		Coops		Overall	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Cost-effective construction techniques	0.7778	1	0.9000	1	0.8708	1	0.8684	1
Design schemes must be flexible and updated	0.7111	5	0.8091	5	0.7833	7	0.7823	6
Effective coordination and communication by government intervention	0.7111	5	0.7636	7	0.8167	5	0.7899	5
Good quality and bulk purchases of materials	0.7333	4	0.7636	7	0.7958	6	0.7797	7
Hiring competent labor and contractor	0.7556	2	0.8182	4	0.8500	3	0.8304	4
Mobilizing resources at right time	0.6667	8	0.8818	2	0.8458	4	0.8354	3
Promoting and facilitating local community-based financial initiatives	0.6444	9	0.7545	9	0.7542	9	0.7418	9
Records for managements of defects should be maintained	0.6889	7	0.7818	6	0.7750	8	0.7671	8
Technical specifications and cost should be properly prepared	0.7556	2	0.8818	2	0.8542	2	0.8506	2

The fourth important solution is hiring competent labor and contractor in the overall category. Since construction industry invites different skills and professions during construction phase: housing constructions were forced to outsource the projects to informal construction workers of incompetent plus unskilled labor and contractors which could expose to improper quality problems as was revealed and recommended by Mwemezi [30], and Bredenoord [24], respectively. Thus, the rank similarity induces that the factor is important to solve challenge factors.

The fifth ranking solution is effective coordination and communication by government intervention is ranked fifth by all categories except contractors' category but they ranked it seventh.

Similarly, effective coordination and communication are critical variables as reported by [40,42,43,18]. These are genuinely important options to solve construction phase challenges because of multidisciplinary and participatory character of housing cooperatives. By applying this factor not only internal and external construction phase challenges of housing coops could be vanished, but also the overall structural construction phase performance challenges could be improved. This is also confirmed as: interdependence; experience sharing's and communication among groups of housing is necessary as Bredenoord [24], recommended.

The sixth option which can improve the construction performance of housing cooperatives projects is Design schemes must be flexible and updated. The design of housing cooperatives is typical and not updated periodically. But there are situations of design modifications by cooperatives themselves during construction. Since coops have exposure to different impressive and updated design with better spatial affordability. Finally, this modification might lead to cost and time overrun, claim may arise and safety problems. This is also confirmed on study: Evaluation of change management efficiency of construction contractors by Anees et al. [44]. So, to solve those design schemes problems, there must be flexible and updated design related consensus according to cooperatives' interest.

The seventh rank to solve construction phase challenges is good quality and bulk purchases of materials according to the overall result. This is necessary to avoid extra wastages and rework of construction material by sharing experiences not to allow defects and wastage among coops again. Since coops have constructed their houses by forming groups it might not be expected from them, but shall be considered and measured by government side stake holders which is fully ignored type of variable.

The last but not the least ranked option to solve performance challenges is Promoting and facilitating local community-based financial initiatives with ninth rank by all respondents. Unlike the rank by respondents, these initiatives are necessary to avoid all the financial shortages by providing access to finance. Housing cooperatives are unlucky of gaining opportunities for financial initiative like other cooperatives. Especially agricultural and marketing type cooperative which are organized, supported and coordinated by central institutional level to facilitate and create the enabling environment. Thus, this option needs the forefront action roles from decision makers. It is also supported by interview appropriately.

This is also confirmed by other authors in Zimbabwe by Average [23], as for low-income citizens housing construction is supported in different ways like by mobilizing construction materials; formation of extra crews to supply materials at affordable cost; negotiating with financial institutions with reasonable rate to fill financial shortages for the poor; in India [10,45]. These improvement mechanisms are recommended to solve the performance challenges of cooperatives housing projects in Siltie Zone, Southern Ethiopia. By applying these options construction phase performance can be improved is ordered by respondents' perception. Thus, their agreement on the options among respondents' is shown by Kendall's coefficient of concordance in section 4.5.

4.5. Test of Rank Agreement

The ranking agreement test result among respondents on twenty-four (24) challenge factors listed on Table 4.3 is done. Accordingly, Kendall's coefficient of concordance result is 0.827 with 0.05 significance level. Test of significance for 23 degree of freedom from chi-square's critical table value for 0.05 significance level is 35.172 and calculated value of $\chi^2 = k(N-1) * W$ is 57.063 which is far greater than critical table value. This test result has confirmed that the ranking among respondents' is significant for identified challenges. In other words, those identified factors in their rank order are critical to housing coops construction which need to be improved.

Also, agreement test on options result is 0.964 Kendall's coefficient of concordance with 0.05 significance level. The significance of this agreement is tested with chi-square critical table values with eight degree of freedom and 0.05 significance level compared with calculated value. The calculated chi-square (χ^2) is 23.136 and table value is 15.507 with eight (8) degrees of freedom and 0.05 level of significance. Hence, calculated value is greater than that of critical table value which signified that agreement among respondent using Kendall's coefficient of concordance is significant. Therefore, it is possible to recommend the listed options as solution to improve construction phase performance of housing cooperatives. Thus, it implies that housing coops construction projects need integrated collaboration among the stakeholders to improve their performances.

5. Conclusions and Recommendations

5.1. Conclusion

Construction industry is confronted and blamed due to its poor performance by its customers. Challenges in construction projects are raised at different phases of its development from its participants and environment. Due to uniqueness of every construction project: it is necessary to

study construction phase challenge factors and their impact on performance to achieve better performance of projects. Therefore, this paper specifically concerned not only challenge factors and their impact severity on performance but also performance improving options to housing cooperatives construction projects. Thus, based on the results obtained the following conclusions are drawn.

Accordingly, the top construction phase performance deterring factors are stemmed from the financial and institutional challenge clusters. Specifically, fluctuation of construction material price is the key performance challenge factor to cooperatives housing construction projects. Also, absence of options to get and manage financial shortages is the second important factor making pace of progress to be stagnant. Moreover, absence of local financial initiatives as backup and support to housing cooperatives is the critical challenge factor as perceived by most respondents. Others like lack of access to infrastructural services and problem of similar design schemes and rigidity challenges are critical factors during construction of cooperatives houses in the study area.

Moreover, impact of construction phase challenges on performance of housing coops is observed as high severity level from the overall challenges' perspectives. Definitely, the financial challenge cluster had exerted very high impact on both cost and time performances of housing coops. Also, institutional and collective action challenge clusters have exerted impact to a high level on time and cost performances. Furthermore, the result has revealed that management related challenge cluster has high impact level on both cost and time performances. From the overall perspective: construction phase challenge clusters have higher impact on time performance than on cost performance.

Consistently, construction phase performance improving mechanisms are proposed from the study results. Accordingly, cost-effective construction techniques are selected as the top important strategy to improve construction phase performance of housing cooperatives. The next important option is technical specifications and cost should be properly prepared as an option to improve performances. These options are tended to solve problems associated with variations from initially planned objectives according to most respondents' perceptions. Also, mobilizing resources at right time is important for improving performance problems. The fourth performance improving important option is hiring competent labor and contractor as very important factor in construction industry since construction is the most susceptible sector to hire unskilled labor, contractors and other participants whom expose it to performance problems which shall be improved by applying the proposed options.

Finally, construction phase challenges have exposed housing coops not to own their houses and become figure of meaninglessness of being user in coop housing program to solve housing problems. Therefore, identified construction phase challenges shall be solved by applying the proposed options since housing is ever-growing basic need. Thus, measures aimed at reducing construction cost of housing cooperatives in study area can be translated into significant benefits to urban poor housing problem if then enhance government programs of providing house to low income citizens.

5.2. Recommendations

It is important to recommend stakeholders to minimize impacts of performance challenge factors associated with housing projects. This shall be done to solve the increasing demand and its accessibility challenges of the basic need house for urban poor. Important recommendations to concerned bodies are described as follows.

Construction materials price fluctuation takes highest value from its successors. This implies that it shall get focus from government by promoting initiatives which can back up the housing construction.

Special attention to the housing cooperative program by government is the basic and central to solve the aforementioned construction phase challenges and to apply the improvement mechanisms in the study area. Almost all institutional challenge factors are associated with government responsibilities such as: absence of local financial initiatives; lack of access to infrastructural services; problem of similar design schemes and rigidity are recommended to be improved by government side responsibilities of housing cooperatives program.

Moreover, cooperatives' common values and believes should be came into practice with continuous assessment by government bodies to improve construction phase performance. Also, attentions and assistance to housing construction projects shall be offered from government side as much as like other sectors' coops.

There is also challenge factors associated with housing cooperatives themselves internally such as: absence of regular auditing of cooperatives' finance which exposes members to lose trust and led to blaming of each other's and finally lead the construction progress to cease. This shall be improved by auditing cooperatives' finance and construction performance evaluations to create transparency among members. Also, cooperation among members is the main strategy to build economical capacity among members in housing projects. Therefore, cooperation shall be enhanced to improve construction phase performances of housing projects.

This study has scope limitations as it is considered only cooperatives housing construction projects. Also, it has considered small amount of sample size with general analysis results discussions. Moreover, number of cooperatives' members in the sample size is higher compared to other subgroups. Finally, based on the findings of this study further research can be done in other study areas on: challenge factors and their impact on performance of housing cooperatives in order to generalize findings. Also, it is possible to study and confirm the performance improvement mechanisms in order to validate the findings of the present research.

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Appendix

Questionnaire

Re: Challenges of Housing Cooperatives and the Impact on Performance of the Projects: The Case of Siltie Zone Housing Cooperatives.

Dear Cooperative Committee /Contractor /Supervisor/ Housing Development Experts:

The objective of this survey is to obtain primary data on construction phase challenges, impact of these challenges on performance of cooperatives houses projects in Siltie zone and recommend possible remedial measures that improve their performance. The information obtained will help the Arba Minch University engineers and Master of Science students doing their research plan future outreach efforts in enhancing the efficiency of construction of cooperative housing projects and their performance in Siltie zone and its surroundings.

This survey being conducted under the guidelines established by Arba Minch University. Your participation is strictly voluntary, and confidentially is guaranteed. All replies are anonymous; only summaries of the completed results will be made public.

Please complete the questionnaire forms as indicated and return it in the envelope. The results of the survey will be compiled by the researcher, and copies of the results will be available to the public. If you would like a copy, or have any questions or concerns, please contact Mr. Mohammed Hamza at 0913086745.

I appreciate your cooperation and prompt reply. Thank you.

Sincerely,

Mohammed Hamza
MSc Student and Researcher
Construction Technology and Management Program

QUESTIONNAIRE

SECTION ONE: GENERAL PROFILE OF RESPONDENT

Please fill the needed information as required in the blank space and use (√) mark where questions are multiple choices to answer your respond.

1.1. Name of organization

Cooperatives Committee	☐	Contractor/Enterprise/	☐
Construction Engineer	☐	Housing Development	☐

1.2. Professional background_____

1.3. Educational background level

Diploma	☐	BSc/BA	☐
MSc/MA	☐	Other	☐

SECTION TWO: CONSTRUCTION PHASE CHALLENGE FACTORS OF HOUSING PROJECTS

Some of major construction phase challenges associated with cooperatives houses projects are listed below.

In your experience, knowledge and opinion, please rate each of these identified construction challenge factors in terms of their degree of challenge as they are associated with construction phase performance of cooperative housing projects.

Use check (√) mark to rate 5 = Very High, 4 = High, 3 = Medium, 2 = Low, 1 = Very Low.

Item No	Construction phase challenges factors	Very High	High	Medium	Low	Very Low
		5	4	3	2	1
1	**Institutional Factors**					
1.1	Land right of way problem					
1.2	Land zonal use claim during construction					
1.3	Lack of technical assistance					
1.4	Absence of local financial initiatives					
1.5	Problem of similar design schemes and rigidity					
1.6	Lack of access to infrastructural services					
2	**Participation and Collective Action Factors**					
2.1	Plot distribution at beginning phase of construction					
2.2	Absence of bulk purchase of materials collectively by cooperatives					
2.3	Lack of cooperation among members					
2.4	Tendency of taking benefits of the collective without participating in the housing development (Free rider problem)					
3	**Financial Factors**					
3.1	Absence of options to get and manage financial shortages					
3.2	Wastage of construction materials					
3.3	Cost of construction is beyond reach of cooperatives' income					
3.4	Absence of regular auditing of cooperatives' finance					
3.5	Fluctuation of construction material price					
4	**Environmental Factors**					
4.1	Unexpected weather challenge during construction					
4.2	Unforeseen challenges like flood, land slide and earthquake					
5	**Social Factors**					
5.1	Protests from the community during construction					
5.2	Clash between cooperatives and workers during construction					
5.3	Injuries on the construction site					
6	**Management Related Factors**					
6.1	The construction being done by unskilled labor					
6.2	Defects due to design modification					
6.3	Absence of written agreement between cooperative and contractor for housing construction					
6.4	Problem in integration of interfaces					

SECTION THREE: IMPACT EXTENT OF CONSTRUCTION PHASE CHALLENGE FACTORS ON COST AND TIME PERFORMANCES OF HOUSING PROJECTS

Below are construction phase challenge groups and their impact on cost and time performance of cooperatives housing construction projects.

Based on your experience, knowledge and opinion, please rate each challenge cluster by considering factors you have ranked in section two above to show whether the impact extent on cost overrun and time overrun is 5 = Very High, 4 = High, 3 = Moderate, 2 = Low, 1 = Very Low. Use check (√) mark to select.

Item No	Impact of Challenges Groups	Very High	High	Moderate	Low	Very Low
		5	4	3	2	1
	A. Impact on Cost Performance					
1	Institutional Factors					
2	Participation and Collective Action Factors					
3	Financial Factors					
4	Environmental Factors					
5	Social Factors					
6	Management Related Factors					

Item No	Impact of Challenges Groups	Very High	High	Moderate	Low	Very Low
		5	4	3	2	1
	B. Impact on Time Performance					
1	Institutional Factors					
2	Participation and Collective Action Factors					
3	Financial Factors					
4	Environmental Factors					
5	Social Factors					
6	Management Related Factors					

SECTION FOUR: MEASURES WHICH CAN IMPROVE CONSTRUCTION PHASE PERFORMANCE OF HOUSING PROJECTS

Please rate the importance of each option to show whether it can be solution or not by selecting 5 = Extremely Important, 4 = Important, 3 = Somewhat Important, 2 = Unimportant, 1 = Extremely Unimportant. Use (√) to your selection.

No	Mechanisms to improve construction phase performance	5	4	3	2	1
1	Cost-effective construction techniques					
2	Design schemes must be flexible and updated					
3	Effective coordination and communication by government intervention					
4	Good quality and bulk purchases of materials					
5	Hiring competent labor and contractor					
6	Mobilizing resources at right time					
7	Promoting and facilitating local community-based financial initiatives					
8	Records for managements of defects should be maintained					
9	Technical specifications and cost should be properly prepared					

End of questionnaire
Thank You Very Much!!

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