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Strategies to Mitigate the Occurrence of Errors in Construction Contract Documents

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Abstract

The purpose of this study is identifying the causes of errors and prioritizing the strategies to mitigate the factors resulting in the occurrence of errors in contract documents considering the context of Ethiopian construction industry. Structured hierarchical matrix was developed based on pre-identified causes of errors, and initially evaluated by experienced professionals as part of content validation of the survey. Professionals working in various construction projects in Ethiopia were invited to participate in the survey. A framework based on Fuzzy AHP-TOPSIS was used to prioritize strategies to mitigate errors in contract documents. Kendall's coefficient of concordance was conducted to examine and compare experts' responses. In addition, sensitivity analysis was conducted to evaluate robustness of the prioritized strategies. The findings indicated that the major sources of errors based on their ranking are designer-related factors, client-related factors, management-related factors, and project character-related factors respectively. The prioritized strategies to be adopted to mitigate errors in contract documents are (i) adequate and efficient design team, (ii) design review management, (iii) partnering, (iv) provision of adequate time and money for contract document preparation and (v) realistic client requirements.

Keywords: Construction projects, Design review management, Error in contract documents, Fuzzy AHP, Fuzzy TOPSIS

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1. Introduction

Adequacy of contract document is one of prominent project management-related problem which needs critical attention of the concerned stakeholders during its preparation to achieve its intended goal (Wubet et al., 2021). The development of an effective contract with the necessary contract documents is one of the key steps in a project's success. Slater and Radford (2012) indicated that the quality of design documentation and standards in construction industry has been declining. Due to its strong ties to cost overrun, time overrun, and low quality works, errors in contract document have a significant negative impact on the construction industry's performance (Williams, 2010; Kassaye, 2016). Construction professionals engaged in the preparation of contract documents need to pay careful attention and have a thorough understanding of what they are doing; otherwise, errors in contract documents are inevitable (Sunday and Afolarin, 2013) and results in different consequences. Errors in contract documents are the primary causes of disputes (Bandara, 2018), waste of materials and pieces of equipment (Hampson and Alwi, 2002), variation (Amiruddin et al, 2012), design error induced rework (Love, 2008); (Admasu, 2019), defects (Ayodele, 2017), profit marginalization for contractors (Mohammed, 2007), and consultants' loss of confidence (Sunday & Afolarin, 2013). Error-free construction contract documents eventually contribute to a smooth construction process flow. So, it is critical to know in detail how to enhance accuracy in contract documents. Controlling errors, understanding, and applying strategies during the pre-construction phase is crucial for the improvement of the construction project performance and all the stakeholders would be beneficiaries.

Related studies have been conducted, e.g., types of contract document errors (Mohammed, 2007), factors responsible for contract document errors (Sunday & Afolarin, 2013), and effects of contract document errors on construction projects' performance (Mohammed, 2007; Sunday & Afolarin, 2013). Similarly, various solutions to overcome these factors leading to occurrence of errors in contract documents are suggested by the researchers (Ayodele, 2017; Bandara,

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2018). However, these are fragmentedly found in the literature. Hence, the suggested solutions need to be organized and analyzed together to help the stakeholders in the industry in decision-making to adopt the appropriate integrated solutions. Similarly, in the context of Ethiopia, the topic needs a detailed examination (Zemedkun, 2020). The use of integrated multi-criteria decision-making (MCDM) tools to error minimization in contract documents is found to be scant. As a result, this study goes one step ahead toward identifying dominant types, root causes, and major impacts of errors in contract documents on project performance and develop a framework by prioritizing strategies using Fuzzy AHP-TOPSIS.

2. Literature Review

2.1 Causes of Errors in Contract Documents

Errors are likely to recur if there is no enough information and expertise exercised to understand the causes (Ayodele, 2017). Similarly, Bandara (2018) indicated that construction professionals have failed to learn from the experience, particularly with regard to the adequacy of contract documents. It is feasible to greatly minimize the occurrence of errors in contract documents through the stimulation of significant factors resulting in error development (Mohammed, 2007). The complex interaction among the factors indicates that a slight reduction in the value of some components below their ideal levels would have a considerable effect on the quality of the contract documents. Maintaining the adequacy of the contract documents is one of the strategies that helps in limiting later variations during implementation of the projects. Regulating the factors throughout the development of the contract documents helps to enhance project success. Factors inducing the occurrence of errors in contract documents identified by previous studies are summarized in Table 1. The factors are categorized into four: management related, designers related, clients related and project characters related factors. The categories are made in light of the origins that could contribute to the occurrence of errors in the contract documents.

There are different dimensions resulting in ineffectiveness of the overall management during preconstruction phase; e.g., poor team organization (Ayodele, 2017; Sunday & Afolarin, 2013), lack of project manager's experience (Mohammed, 2007; Ayodele, 2017), and changes to key

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project personnel before finalizing the task (Mohammed, 2007; Sultane, 2021). Design consultants with insufficient professional expertise contributes to design deficiencies (Ayodele, 2017). Financial pressure and underpaying design professionals are the main causes of design errors (Mohammed, 2007; Love et al., 2009; Ayodele, 2017). Sunday and Afolarin (2013) indicated as the competence of consultant has an effect on the occurrence of errors. Similarly, it was pointed out that lack of adequate time for design forces consultants to make compromises while diverging from the established principles and practices of the design process, which might result in errors (Dosumu et al., 2017). Design errors and increased frequency of mistakes are caused by a lack of collaboration and integration throughout the contract document preparation (Sunday & Afolarin, 2013). Insufficient data and information results in subpar analysis and interpretation, which ultimately leads to major design flaws (Ayodele, 2017). Shamsudeen and Biodun (Shamsudeen & Biodun, 2016) indicated that clients who did not spend more time and money on the design phase exposed to momentous design risks during construction than those who allocated sufficient money and time to this phase. Project size have an impact in the number of errors (Rowland, 2008), because risks are higher on larger and complex projects, hence, more care must be taken during pre-construction phase.

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Table 1: Factors inducing the occurrence of errors in contract documents

Sub criterion of	Reference
Management related Error	
Poor group organization	(Ayodele, 2017); (Dosumu et al., 2017)
Lack of project manager experience	(Mohammed, 2007); (Ayodele, 2017)
Changes to key project personnel	(Mohammed, 2007); (Sultane, 2021)
Poor organizational structure of each party	(Hollnagel, 2003); (Ayodele, 2017)
Designer related Error	
High workload of the consultant	(Bandara, 2018)
Consultant's professionals' skills	(Dosumu et al., 2017)
Low professionals' salary	(Andi & Minato, 2003)
Lack of designer's technical experience	(Ayodele, 2017); (Dosumu et al., 2017); (Sultane, 2021)
Concurrent design activities of designers	(Lyneis et al., 2001); (Ahmed, 2020)
Unreasonably low design fee	(Mohammed, 2007); (Getachew, 2016)
Lack of information	(Sunday & Afolarin, 2013); (Dosumu et al., 2017)
Lack of transfer of knowledge and experience between parties	(Bandara, 2018)
Poor coordination between contracting parties	(Lopez and Love, 2010); (Bandara, 2018)
Lack of design management experience	(Lopez and, 2012); (Bandara, 2018)
Inadequate number of design professionals	(Mohammed, 2007); (Ayodele, 2017)
Insufficient overall design time	(Lopez and Love, 2010);(Bandara, 2018)
Ethics of the consultant	(Mohammed, 2007;Assaf, 2018)
Client related Error	
Minimum client point of contact with consultants	(Ayodele, 2017)
Lack of identification of project risk	(Ayodele, 2017)
Inadequate financial provision	(Shamsudeen & Biodun, 2016); (Dosumu, 2018)
Poor briefing of project scope	(Dosumu, 2018); (Ryd, 2004)
Lack of client experience	(Hailu, 2016);
Attitude of client	(Emmanuel & Abimbole, 2016)
Project Character-related Error	
Size and complexities of a project	(Rowland, 1981); (Dosumu et al., 2017)
Uniqueness of project	(Andi & Minato, 2003); (Ayodele, 2017)

2.2 Strategies to Mitigate Errors in Contract Documents

Various studies have suggested different strategies to mitigate the factors resulting in the occurrence of error in contract documents; these are summarized in Table 2. There has to be collaboration among the design teams in preparing contract documents (Sunday & Afolarin, 2013). The project performance would be enhanced if adequate field investigation and inspection are conducted, reducing risk and liability and leading to an economical and safe design (Bea, 2005). Effective application of technologies such as building information modelling would increases the quality of the documents and reduce errors contract documents (Mesároš and Mandičák, 2017). Technical design reviews and biddability, constructability, and maintainability reviews during the design phase can aid in detecting omissions, ambiguities, and inadequacies in the design, substantially reducing contract modifications or change orders during the construction phase (Mohammed, 2007).

Clients should allocate adequate time for the preparation of contract documents so that there would be time for comprehensive information collection and analysis (Sunday & Afolarin,

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2013). Previous studies have reported that target value design projects have been completed at 15% to 20% below market price without compromising schedule or quality (Ballard & Rybkowski, 2009); (Zimina et al., 2012). Constructability has a significant impact on cost, schedule, quality efficiency or intensity. However, Pulaski and Horman (2005) indicated that only 40% of the constructability issues are addressed at the proper time, where 36% are addressed to late and 23% too early. Contractor involvement at the early phases of design can provide proper constructability information at the proper time. Ryd (2004) has indicated how the project brief requirements are formulated and used for communication between the client and contractor early involvement are very important factors for the success of projects. Contractor early involvement is affected by the adopted project contract type. However, irrespective of the contract type, contractor experience can be included through effective knowledge management.

Sufficient design expertise relevant to the project in hand limits the number and types of errors that would occur in the contract documents (Sunday & Afolarin, 2013). The effectiveness of the design team is highly linked with the ability of the project team to be cohesive. Overall project efficiency will depend on the coordinated efforts of the individual and the group's ability to work together toward common goals within a project organizational system (Lopez and Love, 2012). The practice of selecting consultants based on least design fees affects the level and quality of the service rendered and commonly leads to extra project costs. Quality of contract documents is very much proportional to the design fees (Andi et al, 2003).

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Table 2 Strategies to minimize errors in contract documents

S.N	Strategies to minimize errors in contract documents.	Reference
1	Work as a team /partnering	(Mohammed, 2007); (Hailu, 2016); (Dosumu, 2018)
2	Design review management	(Mohammed, 2007); (Hailu, 2016); (Dosumu, 2018)
3	Identify and analyze of all risk and uncertainty inherent in the project and its circumstance	(Mohammed, 2007); (Hailu, 2016)
4	Standardizing design approval documents and formats	(Dosumu, 2018); (Bandara, 2018)
5	Target Value Design	(Mohammed, 2007); (Hailu, 2016)
6	Application of technologies, e.g., Building Information Modeling	(Wong et al., 2018)
7	Provision of adequate time and money to project planning, design, and contract document preparation	(Sunday & Afolarin, 2013); (Ayodele, 2017) ; (Bandara, 2018)
8	Appropriate staffing	(Ayodele, 2017); (Bandara, 2018)
9	Realistic client requirement	(Ayodele, 2017); (Dosumu, 2018)
10	Transfer of knowledge and experience between designers	(Ayodele, 2017); (Bandara, 2018)
11	The continuing involvement of contractors with experience in the design process	(Valkenburg, 1998); (Dosumu, 2018); (Bandara, 2018)
12	Adequate field investigation and inspection	(Hailu, 2016)
13	Effective communication between all parties	(Valkenburg, 1998); (Dosumu, 2018); (Bandara, 2018)
14	Ensuring continual professional development through relevant training	(Lopez and Love, 2010); (Ambachew, 2018)
15	Adherence to established codes and standards	(Mohammed, 2007); (Hailu, 2016)
16	Reasonable compensation for professionals	(Ayodele, 2017)
17	Limiting minimum consultancy fee to avoid unreasonably low offer	(Ayodele, 2017)
18	Critical consideration of ethical reputability while selecting the consultant	(Mohammed, 2007)
19	Adequate and efficient design team	(Sunday & Afolarin, 2013): (Dosumu, 2018)

3. Research Methodology

Specific objectives of this study are identifying the causes of errors and prioritize the strategies to mitigate the factors resulting in the occurrence of errors in contract documents. Fuzzy AHP-TOPSIS framework was used to prioritize strategies to minimize errors in contract documents. The Fuzzy AHP-TOPSIS calculates the relative performance of each choice straightforwardly; hence, it helps to overcome the weakness of descriptive analysis. The framework is as indicated in Figure 1, it shows the detail process and respective steps in the adopted methodology. The framework has three phases discussed in the subsequent paragraphs. Professionals working in various construction projects in Ethiopia were participated in the survey. The decision group is composed of 22 professional experts which consists of nine contract administrators, four resident engineers, three project managers, two site engineer, two professional architects and two quantity

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surveyors. Among the professionals who participated in the survey, 86.4% of them are having experience of six years and above.

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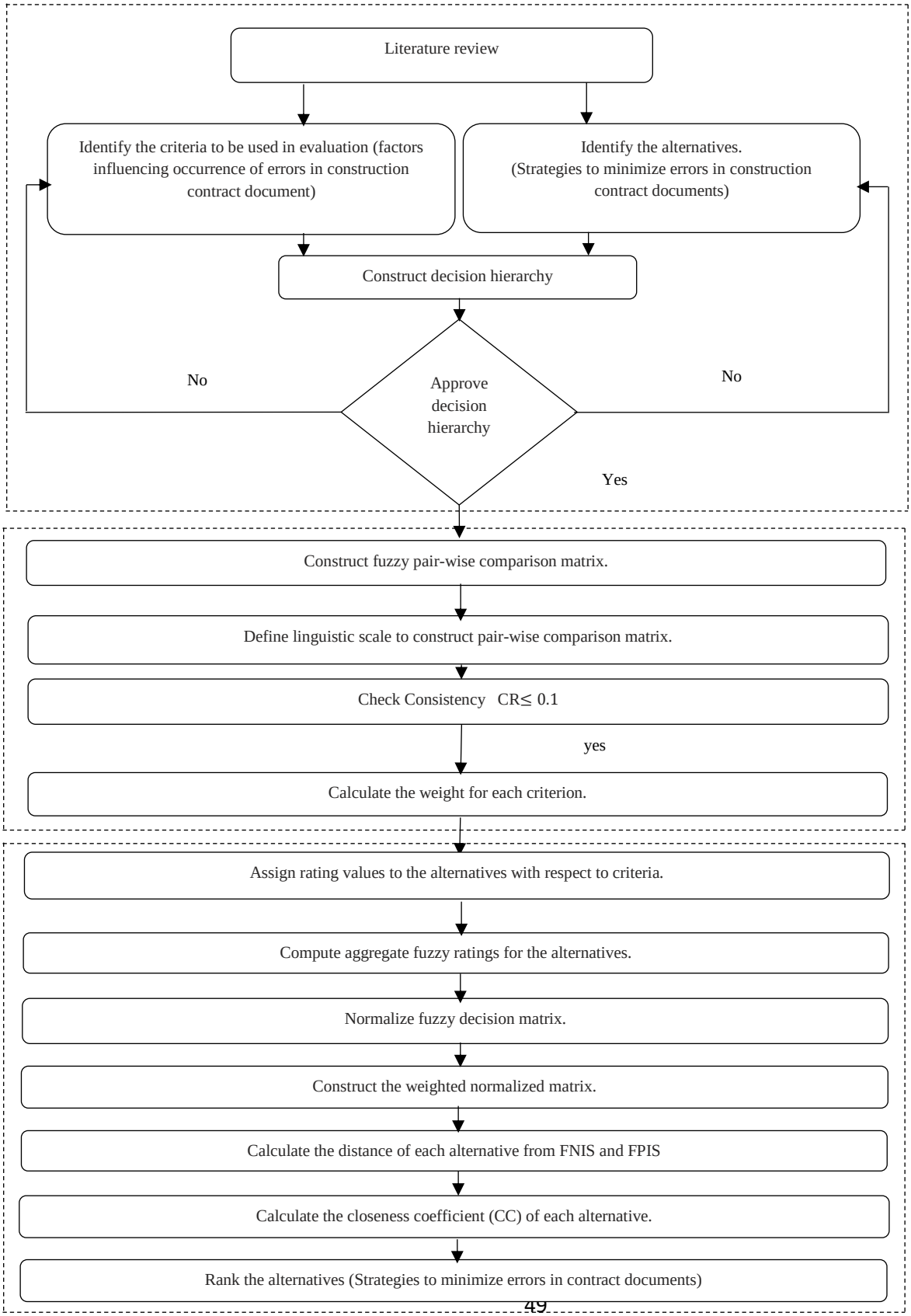

Figure 1 Fuzzy AHP-TOPSIS framework to prioritize strategies to minimize contract document errors.

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Phase 1: Identification of the Causes and Strategies to Mitigate Errors in Contract Documents

Twenty-five factors inducing the occurrence of errors and nineteen error mitigation strategies were identified through thorough literature as indicated in Table 1 and 2. Structured hierarchical matrix was developed based on pre-identified causes of errors and initially evaluated by experienced professionals as part of content validation of the survey. Then the hierarchy is established as indicated in Figure 2. Four levels are established in this study as the decision hierarchy structure; Level 1 (Goal), Level 2 (Criteria), Level 3(Sub criteria), and Level 4 (Alternatives). The overall goal of decision process is "ranking error mitigation strategies to overcome its influencing factors", this is the first level of the hierarchy. The main factors named as criteria are on the second level, the subfactors named as sub criteria for the decision are at third level and the alternative error mitigation strategies are in the fourth level of the hierarchy.

Phase 2: Calculating the Weight of Factors Causing Errors Using Fuzzy AHP

Fuzzy AHP was used to estimate the factor weights after the decision hierarchy was established. Using linguistic scale and expert input, a comparison matrix was created for the four main categories of causes (the criteria) and 25 sub-factors (the sub criteria). The fuzzy AHP approach uses Saaty's AHP (Saaty, 1980) in conjunction with fuzzy set theory to solve hierarchical fuzzy difficulties. The capacity to capture experts' doubt and imprecise judgment by controlling language elements is the benefit of the fuzzy AHP approach. After the series of fuzzy AHP steps, the sub criteria weightages were calculated. The sub criteria weightages are summarized as indicated in Table 3. The detailed steps are excluded for brevity.

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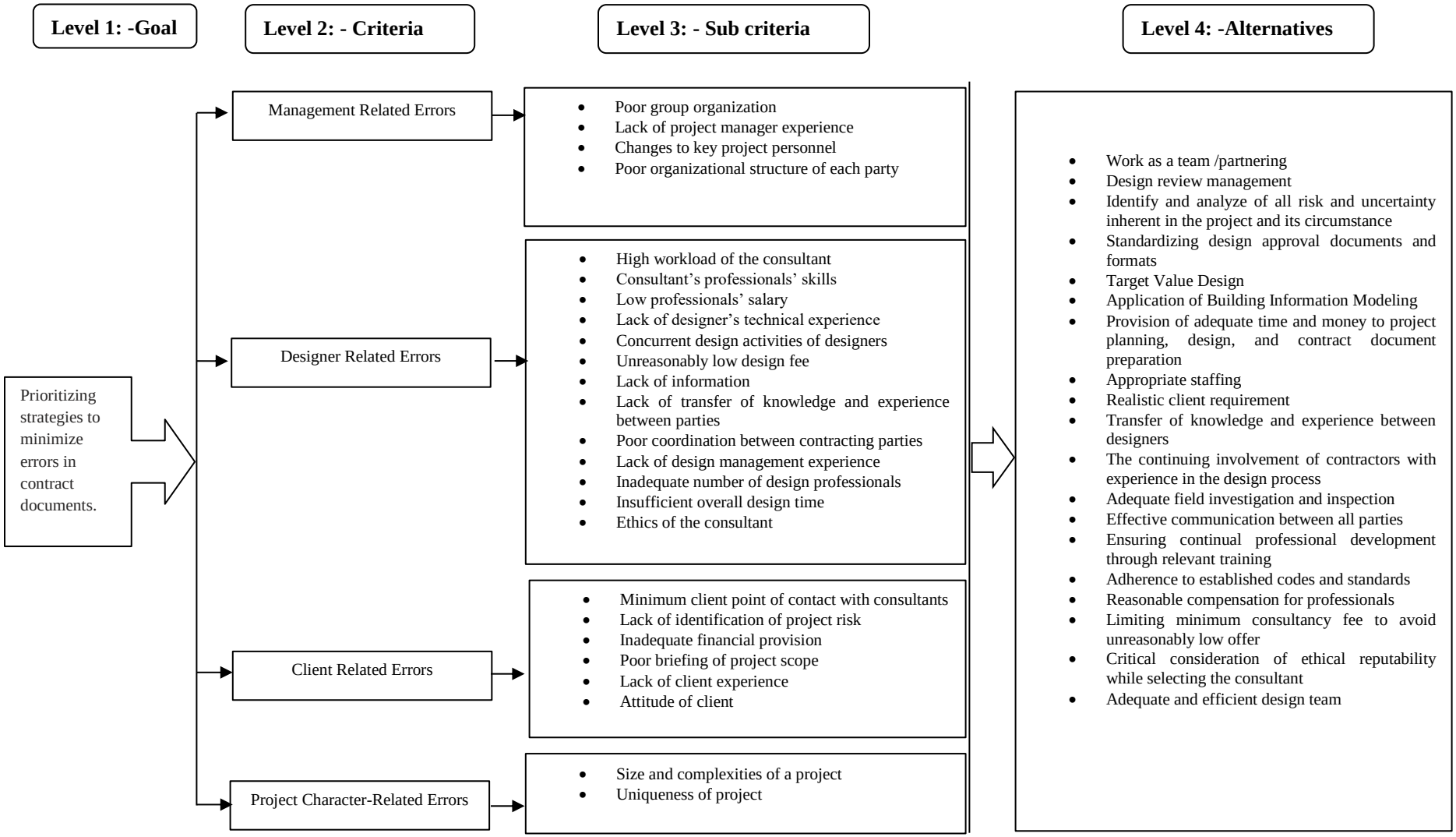

Figure 2 Decision hierarchy to prioritize strategies to minimize errors in contract documents

Table 3 Summary of sub-criteria weight

Sub criterion of	**Code**	Relative Weight	Global Weight	Rank
Management related Error	**0.11965**			
Poor group organization	MRF-1	0.2256	0.0270	16
Lack of project manager experience	MRF-2	0.4235	0.0507	8
Changes to key project personnel	MRF-3	0.1009	0.0121	25
Poor organizational structure of each party	MRF-4	0.2500	0.0300	14
Designer related Error	**0.512146**			
High workload of the consultant	DRF-1	0.0348	0.0178	21
Consultant's professionals' skills	DRF-2	0.0717	0.0367	12
Low professionals' salary	DRF-3	0.0465	0.0238	18
Lack of designer's technical experience	DRF-4	0.0465	0.0238	18
Concurrent design activities of designers	DRF-5	0.1034	0.0530	7
Unreasonably low design fee	DRF-6	0.0441	0.0226	21
Lack of information	DRF-7	0.1372	0.0702	4
Lack of transfer of knowledge and experience between parties	DRF-8	0.0483	0.0248	17
Poor coordination between contracting parties	DRF-9	0.1303	0.0667	5
Lack of design management experience	DRF-10	0.1520	0.0778	2
Inadequate number of design professionals	DRF-11	0.0576	0.0295	15
Insufficient overall design time	DRF-12	0.0827	0.0423	10
Ethics of the consultant	DRF-13	0.0449	0.0230	20
Client related Error	**0.2690**			
Minimum client point of contact with consultants	CRF-1	0.0638	0.0171	23
Lack of identification of project risk	CRF-2	0.1862	0.0501	9
Inadequate financial provision	CRF-3	0.2917	0.0785	1
Poor briefing of project scope	CRF-4	0.2671	0.0718	3
Lack of client experience	CRF-5	0.1340	0.0360	13
Attitude of client	CRF-6	0.0573	0.0154	24
Project Character-related Error	**0.099229**			
Size and complexities of a project	PCRF-1	0.58102494	0.0577	6
Uniqueness of project	PCRF-2	0.4190	0.0416	11

In addition, using Kendall's coefficient of concordance(ω), the degree of experts' opinion agreement among diverse stakeholders was investigated and it was found that there is an agreement or concordance in the ranking regarding types of errors in contract document among different experts.

Phase 3: Evaluation and Ranking of the Strategies to Mitigate Errors Using Fuzzy TOPSIS

The fundamental tenet of Technique for Order Preference by Similarity to an Ideal Solution (TOPSIS) is that the preferable alternative should be the one that is most likely the positive ideal solution (PIS) and the least like the unfavorable ideal solution (NIS) (Hwang & Yoon, 1981). In the formulation of the typical TOPSIS approach, subjective evaluations are represented by discrete values. In actual life, it is not always possible to measure with exact proportions. Using linguistic value rather than crisp value is the recommended tactic. The fuzzy set theory can be

used to express linguistic value. The fuzzy TOPSIS approach is ideal for tackling issues in real-world applications that are fuzzy in nature (Vinodh et al., 2014); (Roudini, 2015);(Basahel & Taylan, 2016); (Yazdi et al., 2020). The Fuzzy TOPSIS method is used to rate the solutions for errors at the final phase. Using the linguistic variables, the solutions were rated. The coefficients of closeness (CCi) are used to rank the solutions. After the series of fuzzy TOPSIS steps, the solutions are computed and summarized in Table 4. All the alternatives (i.e., mitigation strategies) are ranked based on their closeness coefficient (CC_i) in descending order. Similarly, the detailed steps are excluded for brevity.

Table 4 Rank of the Strategies to minimize errors in contract document based on closeness coefficient (CCi)

Code	Strategies	dj^+	dj^-	CC_i	Rank
S1	Work as a team /Partnering/	0.4841	24.8526	0.9809	2*
S2	Design review management	0.4956	24.8384	0.9804	5*
S3	Identify and analyze all risk and uncertainty inherent in the project and its circumstance	0.5847	24.8457	0.9770	15
S4	Standardizing design approval documents and formats	0.5359	24.8288	0.9789	9
S5	Target Value Design	0.5715	24.7975	0.9775	12
S6	Application of Building Information Modeling	0.5756	24.7955	0.9773	13
S7	Provision of adequate time and money to project planning, design, and contract document preparation	0.4889	24.8660	0.9807	3*
S8	Appropriate staffing	0.5111	24.8509	0.9798	7
S9	Realistic client requirement	0.5222	24.8375	0.9794	8*
S10	Transfer of knowledge and experience between designers	0.5879	24.8436	0.9769	16
S11	The continuing involvement of contractors with experience in the design process	0.5490	24.8050	0.9783	11
S12	Adequate field investigation and inspection	0.4933	24.8463	0.9805	4
S13	Effective communication between parties	0.5045	24.8323	0.9801	6
S14	Ensuring continual professional development through relevant training	0.5885	24.7856	0.9768	17
S15	Adherence to established codes and standards	0.5925	24.7837	0.9767	19
S16	Reasonable compensation for professionals	0.5783	25.8502	0.9773	14
S17	Increasing the poor consultancy fees	0.5911	24.8416	0.9768	18
S18	Critical consideration of ethical reputability while selecting the consultants	0.5387	24.8252	0.9788	10
S19	Adequate and efficient design team	0.4771	24.8575	0.9812	1*

Note: *indicates the selected error minimization strategies after sensitivity analysis.

4. Discussion

Considering all the main factors summarized in Table 3, the findings indicate that DRF > CRF >MRF > PCRF based on their weights. Category of designer-related factors is ranked as the root cause among all category of the causes. Client-related factors were the next ranked cause. While management related cause of error is ranked third, project character-related is ranked last in the causes of error category. The ranking of the error minimization strategies is obtained by the

Fuzzy TOPSIS method based on their closeness coefficient (CCi) as given in Table 4. The ranking found shows in descending order as: S19-S1-S7-S12-S2-S13-S8-S9-S4-S18-S11-S5-S6-S16-S3-S10-S14-S17-S15. However, the importance accorded to each criterion will have a significant impact on the overall priorities. Hence, a sensitivity analysis is conducted to monitor robustness of the mitigation strategies ranking to changes in causes of contract document error weights and also the role of sensitivity analysis is to validate the obtained results and justify the accuracy of decision outcome (Yazdi et al., 2020).

Twenty-seven experiments were conducted. In the first 25 experiments, the weight of each cause of the error is set as higher one by one others are set to low and equal values. For example, in experiment 1 weight of causes of error MRC1 (WMRC1) = 0.60, and the weight of the remaining 26 causes (WMRC2– WPCRC2) are assumed to be of equal importance, therefore they are allocated equal weight = 0.016667. In experiment 26, the weight of all the causes of error is equal to 0.04. In experiment 27, the weight of causes of contract document error is (WMRC1–WCRC3) = 0.05, and the other document error weight was equal to 0. Then, it was found that S19 (adequate and efficient design team), S2 (design review management), S1 (working as a team), S7 (provision of adequate time and money to project planning, design, and contract document preparation), and S9 (realistic client requirement) are the top ranked insensitive priorities. Other strategies' ranking changes significantly as the causes of document error weights change. This indicates, ranking of the error minimization strategies of construction documents is relatively sensitive to the causes' weight. Hence, based on the sensitivity analysis the major strategies are (i) adequate and efficient design team, (ii) design review management, (iii) partnering, (iv) provision of adequate time and money to project planning, design, and contract document preparation and (v) realistic client requirement consecutively.

4.1 Adequate and Efficient Design Team

Building a competent and efficient design team helps to reduce or avoid contract document errors. This reaffirms assertion of (Abdalaziz, 2009) which states that putting together an experienced design team is the best way to improve the caliber of the design and contract documents. The presence of adequate, productive design team indicates enhanced task planning and team member communication (Mohammed, 2007). It is crucial for clients to make a thoughtful selection of a competent consultant. The presence of such an effective design team

would limit the possibility of errors arising during the pre-contract phases since these teams will maximize and improve upon their members' abilities and the work will be changed and refined over time (Ayodele, 2017; Admasu, 2019).

4.2 Partnering

In an effort to dramatically improve project performance through improved contract documents, researchers and industry experts in the area of construction have advocated working together to rectify contract document problems before construction begins (Mohammed, 2007; Sunday & Afolarin, 2013). These quality enhancements are the result of the designer and contractor exchanging constructability and buildability information and skills. Partnering has developed into a standard procedure for attaining a number of project goals, including dispute resolution, safety, quality improvement, and time and cost savings. Communication, participant promotion, and contractual relationships can all be enhanced through partnering.

4.3 Provision of Adequate Time and Money for Contract Documents Preparation

The commitment to devote adequate time and resources to contract documents preparation ranks third among the strategies to mitigate the chance of contract document errors. The same is asserted by different previous studies (Sunday & Afolarin 2013; Dosumu, 2018; Sultane, 2021) that indicated as consultants need reasonably adequate time and money from clients to generate concept and conduct comprehensive design analysis in order to reduce errors in contract documents. Clients must be prepared to put up the required time and money the development of contract documents and project planning in order to ensure project success. Most commonly, insufficient time and financial resources are allocated for contract document preparation in public construction projects, often due to political considerations.

4.4 Realistic Client Requirements

Realistic client requirements are the fourth-best technique to reduce contract document errors. Clients' inadequate scope definition causes many design modifications throughout the execution phase, which results in scope creep, involves additional work, and ultimately increases costs and time (Matusala, 2020). Unreasonable customer demands were one of the main reasons for design change (Asmerom, 2021). These documents later undergo a lot of changes, which requires

additional time and money. Similarly, Mohamad et al. (2008) have indicated that one of the primary causes of design changes that results in errors in contract documents is unrealistic client requirements. Clients must clarify their needs before contract agreements are created. This is highly associated with provision of adequate time and many for design document preparation.

4.5 Design Review Management

The fifth best way to mitigate contract document errors is design review management. Design review management is the most effective way to lower contract document errors (Mohammed, 2007; Sunday & Afolarin, 2013; Hailu, 2016). The most efficient method of finding problems and incorporating changes into construction contract documents has proven to be the implementation of a systematic design review programme managed by trained specialists. It is generally acknowledged that the effective completion of professional design services depends on the process of checking construction documents for accuracy, completeness, and errors. A design review is expected to come after each stage of the design procedure. If not, the design process' final step will result in unclear information and extraneous components (Ambachew, 2018)

5. Conclusion

Due to errors in contract documents, construction projects experience poor performance. Hence, identifying the factors and provide strategies is important. In this study employing a hybrid fuzzy AHP-TOPSIS approach made it more thorough and systematic. Fuzzy AHP was used to derive the weights of the sources of errors, and fuzzy TOPSIS was used to rank the solutions using the weights. The findings indicate that the major sources of errors based on their ranking are designer-related factors, client-related factors, management related factor and project character-related factors respectively. The prior strategies to be adopted to minimize errors in construction contract documents are (i) adequate and efficient design team, (ii) design review management, (iii) partnering, (iv) provision of adequate time and money for contract document preparation and (v) realistic client requirement. Identifying the causes inducing the occurrence of errors and implementation of error minimization mechanisms in developing countries' construction industry is low. Improving construction project performance needs improving the management practice throughout the phases of construction projects. Preconstruction phase is critical as the problems have the potential to propagate into the next phases. Hence, minimizing errors in

contract document helps to improve the overall performance of construction projects. The prioritization of options for the successful minimization of contract document errors is aided by ranking the strategies, which the construction stakeholders may use to guide their decision-making.

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