

Article

Risk Handling Responsibilities in Tanzanian Project-Based Organisations

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Abstract: Risk handling is one of the elements and essential parts of risk management when properly incorporated into a project. However, there is inadequate knowledge amongst the contractual parties on risk handling responsibilities in road projects, particularly in Sub-Saharan African developing countries. This study is aimed at bridging that knowledge gap by investigating the perceptions of contractors and consultants on the risk handling responsibilities in road projects in Tanzania. The primary data were collected from 80 registered foreign and local civil contractors and engineering consultants based in Dar es Salaam. Descriptive statistics and inferential statistics were used for the data analysis. The results show that both contractors and consultants ranked safety project provision and ensuring quality provision in terms of construction as shared risk responsibilities among contractual parties. The findings further show that consultant-related risk responsibilities are: safety provision, the use of historical cost deviation, ensuring quality provision, and review of knowledge on budgeting. On the other hand, contractor-related risk responsibilities include: safety provision and ensuring quality provision. The findings of this study can be used by the practitioners and stakeholders as important lessons useful for controlling risks and making decisions when they intend to participate in such projects during the construction stage.

Keywords: contractual parties; perceptions; risk handling responsibilities; road projects; Tanzania



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1. Introduction

Risk handling is a desirable strategy for Risk Management (RM) among the contractual parties of construction projects. It is one of the elements and essential parts of risk management, which, when properly incorporated into a project, not only solves problems but also assists in attaining the goals set in road construction projects [1]. Understanding the risk handling responsibilities and their allocations will lead to the achievement of the project quality, time, cost (hard criteria) and safety, environmental sustainability (soft criteria), which are key factors for indicating the success of a road project performance [2–5]. Despite the promising development of the construction industry, risk factors such as: inadequacy in local contractors and consultants capacity, capital, favourable donor conditions; hence poor working environment, inefficient procurement systems, financial mismanagement, application of inappropriate delivery practices, occasional low technological equipment, and erratic work opportunities have hindered the performance of construction projects [6–9]. Although some degree of poor cost and schedule performance is inescapable in construction projects, improvement of risk management through risk handling responsibilities will reduce its impacts, hence improving performance and delivery of road projects. Furthermore, as observed by Perera et al. [10], handling these risk factors is a prerequisite for project success due to major risks that occur in more than one phase of the project life cycle.

The importance of risk handling in construction projects stems from the fact that it influences successful project delivery. Many studies around the globe have focused on

the aftermath of risk handling responsibilities as a reactive approach to address project-delivery-related issues. They focused on challenges, critical success factors, strategies for risk handling responsibilities [11–13]. Countries like Vietnam and Nigeria have benefited from the risk response method as the contractors used risk reduction during project execution, and the risk reduction and retention method in controlling financial risks. Internal risk allocation and risk avoidance were used for some risks that have a major impact on the project such as improper feasibility study and breach of contract facilitate project delivery [14,15]. Even though risk handling strategies are used in project planning by building contractors, yet their application is at a lower level in the Tanzanian construction industry and hence there must be an increase in their degree of usage [16,17]. Other studies have been in SSA for example, a study by Kanoglu and Gulen [16], other developed and developing countries, Alex and Elena [18]; Adams [19], and in Sri Lanka [20]. Equally, the Tanzanian context have highlighted the types, challenges and management strategies, causes and effects of risks in construction projects, Phoya et al. [21] focused on risk management strategies in the informal sector and Sospeter et al. [2] focused on risk factors in construction projects. These studies analysed risks and acknowledged that Tanzanian construction firms are finding it difficult to cope with or mitigate risks when executing construction projects.

The construction industry is a high-risk industry with complex and dynamic project environments creating an atmosphere of high uncertainty. As a result, many projects fail to meet time schedules, targets of budget, and sometimes even the scope of work, probably due to the mishandling of risk responsibilities [4,9]. The Tanzanian construction industry and specifically the road construction sector have emerged to be a major sector for economic growth. Despite its significance, there are a number of risks caused by the misallocation and/or mishandling of responsibilities, which tend to reoccur, impacting the project performance and delivery. Since construction projects are fragmented and several parties get involved in the process, it is important to explore risk handling responsibilities as perceived by both parties. There is a need to understand what the key players of projects perceive about these responsibilities in order to fairly allocate and or handle risk responsibilities for improvement of project delivery in the future. Furthermore, most of the studies have considered building projects and some of the issues studied focused on the side of the contractors only and in developed countries. A few studies have focused on the perceptions of risk handling responsibilities among contractual parties in other countries where the context, business environment, economic setup, and government policies are different. Since projects are unique and risks are higher in the road construction sector, they can only be mitigated if risk handling responsibilities are clear. It is therefore important to investigate risk handling responsibilities as perceived by contractual parties so as to minimize unnecessary problems which may affect the successful project delivery of road construction projects by project-based organisations within the Tanzanian context.

The paper is structured as follows: Section 2 provides a literature review around the ‘construction industry in Tanzania: the context’ and ‘risk handling responsibilities of contractual parties’. Next, the research methodology applied for this study is described. The empirical results are presented in Section 4. Section 5 discusses findings and derives research implications. Section 6 presents the conclusions, contributions, and discussion of the limitations of the study. Finally, Section 6.3 concludes by drawing on the implications and suggesting future research opportunities.

2. Literature Review

During the road construction projects and their total undertakings, a number of risks are encountered and, if not mitigated/eliminated, may hinder the performance of the project. The risks in road projects are classified mainly basing on managerial, economic, financial and political, technical and contractual, as well as external and site conditions [18,19]. A risk of faulty planning and altering of the scope of work may accelerate to poor performance of the project, which may lead to over budget. Low labour and inefficacy of equipment,

issues arising from procurement, defective construction work, as well as contractors have contributed much to the lagging behind of road construction projects particularly in terms of performance [12,16,20]. Studies indicate that cost overrun and delay in the completion time of large infrastructure projects have been among the most common risks influencing project performance [9]. It has been evidenced that identifying risk sources in the road construction industry will facilitate the proper ways to allocate these risks to dispense the risk responsibilities of the stakeholders [16,20]. A study by Phoya et al. [21] on risk management strategies found that for risk manifestation, construction workers have to choose a risk response strategy by using techniques available in their settings. They suggested that further study on the methods for the selection of risk response strategies and risk identification and handling is necessary.

2.1. The Construction Industry in Tanzania: The Context

The construction industry in Tanzania comprises seven classes of contractors who fall into five categories such as; building, civil, electrical and mechanical contractors, and specialist contractors. Although Class I and II are well structured and have experience in undertaking complex projects, which are associated with high risks, they still find it difficult to handle risks. It is a problem because if risks are not handled well, they may result in cost and time overruns or project failure. Studies have not specifically addressed the issue of risk handling responsibilities as a desirable strategy for risk management (RM) among the contractual parties, which is the main reason why many problems in road works keep recurring. Since construction projects are fragmented and several parties get involved in the process, it is a good idea to explore risk handling responsibilities as perceived by both parties. A few studies with risk handling responsibilities are focused on the Model for Managing the Contractual Risks of Construction Firms Imposed by the Procurement System [15,16]. Other authors conducted research on the risk management in construction projects in Pakistan and arranged risk responsibility into: client responsibility, contractor responsibility, and shared responsibility [11]. Some authors even concluded that workers choose a risk response strategy by using techniques available in their settings [21]. This study aims at investigating the risk handling responsibilities as perceived by contractual parties involved in road projects within the Tanzanian context. Little knowledge is known about the perceptions of contractual parties in Tanzanian construction projects.

2.2. Risk Handling Responsibilities of Contractual Parties

Risks in construction projects cannot be eliminated; they can be transferred or shared from one part of the contract through contract clauses [22]. Allocation of risks based on who is to handle what is part of RM and contractors should accept and acknowledge a certain degree of risk during construction project undertaking. On the other hand, risks need to be considered on the client's side as well. Some studies focused on the root causes of the occurrence of risks and tracked their roots throughout the project to their consequences [23]. Thompson and Perry [24] illustrated a proper allocation of responsibilities made up from a precise drawn up contract that highlighted all the procedures that identify the method of tendering to be used for a particular project and the type of contract, role of each constitutes in the contract such as bills of quantities, preamble notes, and drawings. The allocation of responsibilities did not consider how contractual parties perceive them. In some incidences, risks can be transferred beyond the limits of contract clauses but with the consensus of both parties [25].

In Tanzania, conditions of contract such as the Public Procurement Regulatory Authority (PPRA) and National Construction Council (NCC) do allocate risks among the project participants. However, risk allocation through conditions of contract alone may lead to misinterpretations of the contract clauses and disagreements among the project participants due to unclear stipulations and unfairness of risk allocation. In most construction projects, only certain areas of the risks are allocated by the contract while other risks are apportioned simply by common practice. For the purpose of this study, a consultant usually works

to accomplish the client's mission. As a result, there are no contractual relations with the contractor rather than working relations; thus, the responsibility is ultimately shifted to the client and is considered as his/hers. The rationale for the specific study in Tanzania is that what might be perceived by a contractor to be a risk handling responsibility and therefore manageable in a developed countries context could clearly be differently perceived by a contractor operating in developing countries context where the industry is structured differently and has different legal constraints. As supported by Iqbal et al. [11], risk management in construction projects has been applied differently from project to project, using various models. Furthermore, due to the differences in the risk management implementation of construction projects, it is pertinent to investigate the risk handling responsibilities among contractual parties in road projects.

From the review of existing studies, it is evident that limited studies have focused on addressing the dilemma of risk handling responsibilities amongst contractual parties in road projects. Rather, the focus has been on the assessment of types of risks, management of risks, techniques for handling risks with little knowledge on how the project contractual parties perceive risk handling responsibilities. Therefore, the determination of how contractual parties perceive risk handling responsibilities as means of managing those risks from the root cause becomes critical. Based on the identified knowledge gap, this study is thus aimed at investigating risk handling responsibilities among contractual parties in road projects in Tanzania.

3. Research Methodology

This section discusses the methods used to gather and analyse data.

3.1. Research Approach and Study Area

To investigate the perceptions of contractors and consultants on the risk handling responsibilities in road projects in Tanzania, explanatory empirical research was undertaken in the study. The research approach comprised the following four steps: (1) scoping review; (2) pilot survey; (3) questionnaire survey; and (4) statistical analysis such as measuring the central tendencies and inferential statistics such as independent *t*-tests. A descriptive research design along with a quantitative research approach was used [26,27]. Further, the approach was useful for establishing the perceptions that shed light on risk handling responsibilities as perceived by contractors and consultants. For step 3, the data were collected through the survey method in Dar es Salaam. Such an approach has previously been used in Tanzanian-specific studies such as Chileshe and Kikwasi [13] and Sri Lankan studies [20].

3.2. Survey Administration

Data were collected in Dar es Salaam because it is one of the largest cities and a large number of both foreign and local civil contractors are undertaking their projects there. According to the Contractors Registration Board CRB [28], the general distribution of contractors is: a majority of registered contractors are in classes IV to VII (small contractors). The rest are divided between Class I and II (large contractors), accounting for 8.3%, and Classes III to V (medium contractors), accounting for 17.6%. The class in which a contractor is registered is important for determining the maximum value of any single contract that this firm can access. Foreign contractors account for only 2.4% of the total number of contractors but represent almost half of the contractors in Class I (46%). Class I contractors are allowed to undertake works of unlimited value, while the rest are restricted to certain thresholds per contract. Class I contractors and civil engineering works are associated with huge risks. Therefore, understanding their perspectives on risk handling responsibilities is very important.

3.3. Sampling Technique and Sample Size

A stratified random sampling approach was applied due to the heterogeneous nature of the population to be studied (Foreign and Local Civil Contractors Class I to II and Engineering Consultants) involved in road projects. In order to ensure that each sample has an equal chance of being selected, a fishbowl technique was used by naming and writing each foreign and local civil contractor and engineering consultants gathered in the sampling list on pieces of paper with one number for each particular population member [27]. Then, the pieces of paper were folded and shuffled in the bowl. The population was categorized into two groups basing on type and class. Then, the folded papers were taken twice for each group of the population, thus the researcher obtained four categories as a sample for the study. This approach has been adopted by other researchers who used stratified sampling as one of the probability sampling techniques [29]. The rationale for this is that the targeted population is divided into groups by characteristics appropriate for the research questions (e.g., Class I and II) with a sample selected from each group [30]. The sample size for the study was determined as indicated in Table 1.

Table 1. Distribution of stakeholders by categories and class of December 2017 and 2018.

Stakeholders	Class I			Class II	Total
	Foreign	Local	Total		
Civil Contractor *	33	34	67	18	85
Engineering Consultant	50	153			203
Total	83	187	67	18	288

Notes: * According to CRB [28], the total number of civil work contracting firms in Tanzania is 3161 while 628 are registered in Dar es salaam, of which 67 and 18 constitute Class I and II categories of civil contracting firms, respectively. Further, most local and foreign contractors are limited to Classes I and II.

Since the population under study has heterogeneous characteristics (foreign and local civil contractors Class I to II and engineering consultants), the study adopted a formula for stratified sampling. Therefore, Table 2 shows that a total of 88 contractors was determined as the proposed sample size from the population of 288 (contracting Class I and II and consulting firms) samples. The sample size consisted of 44 civil contractors and 44 consulting engineers in Dar es Salaam. Therefore, Table 2 shows that a total sample of 88 was obtained from the population of 288 (contracting Class I and II and consulting firms) samples.

Table 2. The sample size from each of the registered civil contractors and engineering consultants in Dar es Salaam.

Professional	Civil Contractor			Engineering Consultant		Total
	Foreign	Local I	Local II	Foreign	Local	
Population	33	34	18	50	153	288
Proposed Sample size (Nf)	16	16	12	19	25	88

Examination shows that the proposed sample size consisted of 44 civil contractors and 44 consulting engineers located in Dar es Salaam. Therefore, based on a minimum requirement of 15% of the targeted population ($n = 288$), the proposed sample for this study with a size of 88 registered contractors and engineers (Foreign and Local Civil Contractors Class I to II and Engineering Consultants) is valid as it covers more than 30% of the population. Therefore, the population under study is enough, efficient, and reliable for making a conclusion. Further, the rationale and justification for targeting contractors in higher classes has been used before. For example, the Jordanian study by Hiyassat et al. [31] aimed at assessing and allocating risks in public construction projects

classified contractors into six grades based on company size, equipment, personnel, and experience, where Grade 1 is the highest.

3.4. Research Instrument: The Questionnaire

Quantitative data were collected through a literature review of previous research and questionnaires. Questionnaires were used as they have the advantage of being flexible since they hold both open and closed-ended questions for gathering comprehensive information to ensure relevancy and consistency. Questionnaires were hand-delivered and administered to both civil contractors and engineering consultants located in Dar es Salaam to explore the risk handling responsibilities of contractual parties in road projects in Tanzania. According to Rowley [30], hand-delivery of questionnaire survey is recommended as the best option to enhance the response rate. Therefore, this mode of questionnaire distribution was adopted. Another reason for selecting this approach was the author's first-hand knowledge of the firms' location. Furthermore, the majority of respondents were easily accessible and thus preferred to be contacted directly. In-person delivery provided an opportunity to get a filled questionnaire during the visit hence a high response rate. This approach was previously adopted in similar studies by Chileshe et al. [32,33] in Tanzania. A total of 80 out of 88 questionnaires were fairly returned filled from civil contractor Classes I and II as well as foreign and local consulting engineering firms.

- (1) Section 1 of the questionnaire aimed at collecting general demographic information of the respondents. The kind of information targeted for collection consisted of: position of respondents in the organization, education, gender, and years of experience. The responses were coded to enable cross comparative analysis which is part of a robust data mining protocol [34].
- (2) Section 2 of the questionnaire comprised of the rating of the 10 risk handling responsibilities obtained through literature. The same risk handling responsibilities were asked from both contractors and consultants to indicate their perception and ratings based on the construction phase of the road construction project. The rationale for this is that both contractors and consultants are regarded as key players in the contract. Therefore, the main purpose was to obtain the perceptions of each part between contractor and consultant on the ground of contractors' and consultants' (contractual parties) perspectives regarding risk handling responsibilities.
- (3) Section 3 captured the rating and ranking of the 10 risk handling responsibilities. Respondents were asked to rate how they perceived their risk handling responsibilities using a five-point Likert scale. For both Sections 2 and 3, respondents were asked to rate how they perceived their risk handling responsibilities using a five-point Likert scale (1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high). Drawing on Kavishe et al. [35], this scale was adopted due to its ability to detect the feelings that respondents have about their attitudes [36]. In addition to the 10 risk handling responsibilities, open-ended questions were asked to further identify any other risk handling responsibilities that were not included in the list. Unfortunately, none of the contractors or consultants responded to this question.

3.5. Data Analysis

In order to investigate the perceptions of contractual parties on risk handling responsibilities, the IBM Statistical Package for Social Scientists (SPSS) (version 20) was used for the data analysis. The following statistic tests were employed: 1) Descriptive statistics such as the measures of central tendencies (mean scores, standard deviation). The calculation of the mean score enabled the ranking of the most risk handling responsibilities as perceived by contractual parties [37]. Further, Forza [34] notes that measures of central tendencies are normally conducted to ascertain the number of times various categories of certain phenomena occur. The second test was inferential statistics such as independent samples tests. This was employed to detect the significant differences in the ranking of the risk handling responsibilities by the respondents [34]. For the one-sample *t*-tests, a

test value of 3.5 was selected and such an approach has been used in previous studies Reig-Botella et al. [38] to establish the level of significance by comparing means between the two groups. Independent *t*-test or Student's *t*-test was used for independent samples comparing shipyard naval workers vs. the control group in personality variables and burnout. It has also been used in Tanzanian survey related studies [32,33,35]

4. Findings

4.1. Reliability Analysis

In order to examine the reliability and internal consistency of the survey instrument comprising the 10 risk handling responsibilities, Cronbach's alphas coefficient was employed. This technique is one of the most popular reliability statistics aimed at determining the internal consistency or average correlation of items in a survey instrument to gauge its reliability [39]. The result of the Cronbach's alpha was 0.873 (F -statistic = 8.320, sig. = 0.000) for the risk handling responsibilities survey instrument. This indicated high reliability of scale as the value was > 0.7 [40].

4.2. Response Rate

The data response rate from contractual parties comprising 44 civil contractors and 36 engineering consulting firms is shown in Table 3. Examination of Table 3 further shows that the overall sample response rate (contractors and consultants) was 90% (80 out of 88).

Table 3. Response rate from contractors and consultants.

Stakeholder	Class of Registration	Questionnaires		Response Rate (%)
		Distributed	Returned	
Civil contractor	Class I	33	33	100
	Class II	11	11	100
Engineering Consulting firms	Local *	33	27	81.82
	Foreign	11	9	81.82
Total population		88	80	90.91

* According to the Contractors Registration Board (CRB), local contracting firms are those whose majority shares are owned by citizens of the United Republic of Tanzania. Firms not meeting these criteria will be registered as foreign.

4.3. The Characteristics of the Sample

The characteristics of the respondents and their organisations are summarised in Table 4.

Table 4. Background information of respondents.

Position	Frequency	Percentage	Cumulative (%)
Low management level	38	47.50%	47.50
Middle management level	39	48.75%	96.25
Top management level	3	5.00%	100.00
Experience (Years)			
1–5	6	7.50%	7.50
5–10	55	69.75%	77.25
Above 10	19	22.75%	100.00
Education			
Masters	34	42.5%	42.50
Bachelor	30	37.5%	80.00
Diploma	16	20%	100.00
Gender			
Female	5	6.25%	6.25
Male	75	93.75%	100.00

4.3.1. Position of the Respondents in the Civil Construction Firm

Examination of Table 4 indicates that respondents' positions on the contractors and consulting firms were at 39 under middle-level management and 38 under lower-level management, which was more practical for the road construction projects. The minority ($n = 3$; 5.00%) were drawn from the top-level management.

4.3.2. Education Level and Gender of Respondents

As shown in Table 4, the majority of them (43%) had obtained a degree while (38%) had a master's degree and (19%) had a diploma, of whom 94% were male and 6% were female. This implies that the responses of the current study were skewed to males because few females own contracting firms (Class 1 and 2), which makes the construction industry a non-traditional industry. The finding is also consistent with the globally held views about females making up a very small proportion of not only construction trades workers but in management positions as well.

4.3.3. Experience of the Respondents in the Civil Construction Firms

Further examination of Table 4 indicates that, out of 80 questionnaires collected, the majority ($n = 55$; 69.75%) had an experience of between 5 to 10 years. This was followed by respondents with experience above 10 years ($n = 19$; 22.72%); and with experience between 1 and 5 years ($n = 6$; 7.50%). This indicates that most of the respondents had adequate experience in road construction projects hence making their responses reliable also gave credence to the data extracted from the field survey by the respondents regarding risk handling responsibilities in road projects. These results are encouraging as earlier studies such as Chileshe and Kikwasi [12] identified low capacity and capability of the local contractors and consultants due to a weak resource base and inadequate experience.

4.4. The Risk Responsibilities of Contractual Parties

Table 5 shows the ranking of the 10 risk handling responsibilities based on the full combined sample of consultants and contractors. Thus the analysis of the ranking shows that the mean scores of the 10 identified risk handling responsibilities ranged from 2.71 (*Preparation contingency for design and construction*) to 3.86 (*Safety provision*). Only two risk handling responsibilities variables had mean scores (>3.50) namely, "*Safety project* (Mean score = 3.86)" and "*Ensure quality project provision* (Mean score = 3.74)".

Table 5. Risk handling responsibilities (Full sample $n = 80$).

Risk Handling Responsibilities	Mean ¹	SD	Rank
Safety provision	3.86	1.385	1
Ensure quality project provision	3.74	1.240	2
Creation of a risk planning approach *	3.46	1.534	3
Review of knowledge on budgeting	3.46	1.359	4
The use of cost deviation history to define contingency funds for future contracts	3.45	1.457	5
To conduct extensive soil survey	3.24	1.352	6
Provision of quality design and construction	3.23	1.378	7
Environmental impact assessment	3.09	1.443	8
Preparation time contingency (Design and construction)	3.00	1.302	9
Preparation contingency (Design and construction)	2.71	1.398	10

Notes: * Plan for adequate resource, risk planning documentation, red flag item lists, risk charters, risk formal management plan; SD = Standard deviation; ¹ Mean score where 1 = Very Low, 2 = Low, 3 = Moderate, 4 = High, and 5 = Very high.

4.5. Ranking of the Risk Responsibilities of Contractual Parties—Contractors

Table 6 shows the mean score analysis of the risk handling responsibilities from the contractor's perspective.

Table 6. Risk handling responsibilities (Contractors, $n = 44$).

Risk Handling Responsibilities	Mean Score	SD	Rank
Safety provision	3.52	1.486	1
Ensure quality project provision	3.50	1.229	2
Review of knowledge on budgeting	3.41	1.499	3
Provision of quality design and construction	3.34	1.430	4
Creation of a risk planning approach *	3.30	1.564	5
To conduct extensive soil survey	3.23	1.379	6
The use of cost deviation history to define contingency funds for future contracts	2.95	1.539	7
Environmental Impact assessment	2.86	1.579	8
Preparation contingency (Design and construction)	2.73	1.468	9
Preparation time contingency (Design and construction)	2.73	1.404	10

Notes: * Plan for adequate resource, risk planning documentation, red flag item lists, risk charters, risk formal management plan; SD = Standard deviation; 1 Mean score where 1 = Very Low, 2 = Low, 3 = Moderate, 4 = High, and 5 = Very high.

Examination of the results reveals that the mean scores of the 10 risk handling responsibilities in road projects during the *construction phase* ranged from 2.73 (Preparation time contingency (Design and construction)) to 3.52 (Safety provision). However, the higher standard deviation values, which ranged from 1.240 (Ensure quality project provision) to 1.534 (Creation of a risk planning approach), indicate the lack of consensus and disparity amongst the contractors in their perception and ranking of these risk handling responsibilities

4.6. Ranking of the Risk Responsibilities of Contractual Parties—Consultants

Table 7 shows the mean score analysis of the risk handling responsibilities from the consultant's perspective.

Table 7. Risk handling responsibilities (Consultant's, $n = 36$).

Risk Handling Responsibilities	Mean	SD	Rank
Safety provision	4.28	1.137	1
The use of cost deviation history to define contingency funds for future contracts	4.06	1.094	2
Ensure quality project provision	4.03	1.207	3
Creation of a risk planning approach *	3.67	1.493	4
Review of knowledge on budgeting	3.53	1.183	5
Environmental impact assessment	3.36	1.222	6
Preparation time contingency (Design and construction)	3.33	1.095	7
To conduct extensive soil survey	3.25	1.339	8
Provision of quality design and construction	3.08	1.317	9
Preparation contingency (Design and construction)	2.69	1.327	10

Notes: Mean score of the RH variable where 1 = Very Low, 2 = Low, 3 = Moderate, 4 = High, and 5 = Very high; SD = Standard deviation. The higher the mean score the more critical the risk handling responsibility; * Plan for adequate resource, risk planning documentation, red flag item lists, risk charters, risk formal management plan.

Examination of the results reveal that the mean scores of the 10 risk handling responsibilities in road projects during the *construction phase* ranged from 'Preparation contingency (Design and construction)' (mean score = 2.69, SD = 1.327) to 'Safety provision' (mean score = 4.28, SD = 1.137). The main risk handling responsibility variables based on criticality cut off value of 3.50 are: (1) Safety provision (mean score = 4.28); (2) The use of cost deviation history to define contingency funds for future contracts (Mean score = 4.06); (3) Ensuring quality project provision (Mean score = 4.03); (4) Creation of a risk planning approach (Mean score = 3.67); and (5) Review of knowledge on budgeting (Mean score = 3.53).

4.7. Differences in the Ranking of the Risk Responsibilities of Contractual Parties—Consultants and Contractors

An independent sample *t*-test was conducted to explore the differences and compare the mean scores of the contractors and consultants. The respondents were divided into the following two groups: (1: Contractors and 2: consultants). Table 8 summarises the results of the independent sample *t*-tests. This analysis includes Levene's Test for Equality of Variances, which, according to Pallant [41], is used to test if *k* samples have equal variances. A *p*-value less than 0.05 indicates that the two groups have different opinions on the risk handling responsibilities. Examination of Table 8 shows that the mean score for contractors (mean score = 2.95, rank = 7th) was significantly different ($t(-3.608)$, $p = 0.001 < 0.05$) from that of the consultants (mean score = 4.06, rank = 2nd) for the risk handling of 'the use of cost deviation history to define contingency funds for future contracts' with a mean difference of -1.101^* .

Table 8. Independent one-sample *t*-tests.

RH ¹	Levene's Test for Equality of Variances		<i>t</i> -Test for Equality of Means					95% Confidence Interval of the Difference	
	<i>F</i>	Sig.	<i>t</i>	<i>df</i>	Sig. (2-Tailed)	Mean Difference	Std. Error Difference	Lower	Upper
RH1	4.790	0.032	−0.387	78	0.700	−0.119	0.307	−0.730	0.493
			−0.396	77.913	0.693	−0.119	0.300	−0.716	0.478
RH2	3.545	0.063	−3.608	78	0.001 *	−1.101 *	0.305	−1.708	−0.494
			−3.730	76.607	0.000	−1.101	0.295	−1.689	−0.513
RH3	1.238	0.269	−1.926	78	0.058	−0.528	0.274	−1.073	0.018
			−1.930	75.417	0.057	−0.528	0.274	−1.073	0.017
RH4	0.681	0.412	0.830	78	0.409	0.258	0.310	−0.360	0.875
			0.837	76.859	0.405	0.258	0.308	−0.355	0.870
RH5	8.139	0.006	−2.506	78	0.014	−0.755 *	0.301	−1.355	−0.155
			−2.573	77.682	0.012	−0.755	0.293	−1.339	−0.171
RH6	4.332	0.041	−1.548	78	0.126	−0.497	0.321	−1.137	0.142
			−1.588	77.790	0.116	−0.497	0.313	−1.121	0.126
RH7 ^a	0.025	0.874	−1.078	78	0.284	−0.371	0.344	−1.057	0.314
			−1.083	76.118	0.282	−0.371	0.343	−1.054	0.311
RH8	0.183	0.670	−0.074	78	0.941	−0.023	0.306	−0.632	0.586
			−0.075	75.695	0.941	−0.023	0.305	−0.630	0.585
RH9	4.782	0.032	−2.116	78	0.038	−0.606 *	0.286	−1.176	−0.036
			−2.168	77.848	0.033	−0.606	0.279	−1.163	−0.050
RH10	0.089	0.766	0.104	78	0.918	0.033	0.316	−0.597	0.662
			0.105	77.194	0.917	0.033	0.313	−0.590	0.656

Notes: ¹ RH = Risk handling responsibility, ^a Plan for adequate resource, risk planning documentation, red flag item lists, risk charters, risk formal management plan; RH1 = Review of knowledge on budgeting; RH2 = The use of cost deviation history to define contingency funds for future contracts; RH3 = Ensure quality project provision; RH4 = Provision of quality design and construction; RH5 = Safety provision; RH6 Environmental Impact assessment; RH7 = Creation of a risk planning approach; RH8 = To conduct extensive soil survey; RH9 = Preparation time contingency (Design and construction); and RH10 = Preparation contingency (Design and construction). The first and second values relate to equal variances assumed and equal variances not assumed; * The two groups being compared are significantly different from one another at $p < 0.05$.

Further examination of Table 8 shows that the mean score for contractors (mean score = 3.52, rank = 1st) was significant different ($t(-2.506)$, $p = 0.014 < 0.05$) from that of the consultants (mean score = 4.28 rank = 1st) for the risk handling of 'safety provision' with a mean difference of -0.755^* . Finally, the mean score for contractors (mean score = 2.73, rank = 10th) was significant different ($t(-2.116)$, $p = 0.038 < 0.05$) from that of the consultants (mean score = 3.33, rank = 8th) for the risk handling of 'preparation time contingency' with a mean difference of -0.606^* . This risk handling responsibility variable was also the least ranked for the contractors.

Examination of Tables 5–7 shows that the risk handling responsibility of 'Ensuring quality project provision' was ranked second based on the overall sample (mean score 3.74, SD = 1.240) and second and third by the contractors (mean score = 3.50, SD = 1.229)

and consultants (Mean score = 4.03, SD = 1.207), respectively. However, there was no significant difference between the contractors and consultants in the ranking of 'Ensuring quality project provision'. However, the difference between the contractors and consultants in the ranking of 'Ensuring quality project provision' was not statistically significant ($t(31) = -1.928, p = 0.058 > 0.05$).

5. Discussion of Findings

Examination of results in Tables 5–8 shows that there are several risk handling responsibilities of contractual parties in road projects that need to be emphasized among project participants. The discussion of findings groups the risk responsibilities of contractual parties in road projects into two categories to be worked on for controlling risks. The first group is based on the full sample comprising the consultants and contractors, whereas the second is for an individual group that is related to either consultants or contractors. The following section discusses the risk handling responsibilities of both parties (full sample) as shown in Table 5, whereby safety provision and ensuring quality project provision were the top two highly ranked among the 10 risk handling responsibilities. Therefore, for brevity, the discussion presented is just for the risk handling responsibilities in the top quartiles.

5.1. Risk Handling by Both Parties (Contractors and Consultants)

5.1.1. Safety Project Provision

Within the Tanzanian context, it is acknowledged that many accidents and diseases occur in the industry because of its inherent hazardous nature [42]. Therefore, it is hardly surprising that the highest-ranked risk handling responsibility by a combined sample of contractors and consultants was that of "safety project provision". The results are consistent with previous findings in the literature [11,12,20,43]. For example, in Sri Lanka, a study by Perera et al. [20] that proposed a risk handling framework established that the risk associated with "public security and safety" is allocated to the client and contractor. Likewise, within the Pakistani context, a study by Iqbal et al. [11], found accidents/safety among the top risks which are mostly ignored in Pakistan. The emergent implication from this finding is that steps should be taken by a consultant to work closely in terms of controlling safety issues on-site while also involving the contractor to have correct guidelines and safety tools to avoid problems during the execution of a project. Interestingly, recent Jordanian studies such as Hiyassat et al. [31], found the consultants ranking the risk priority of "inadequate safety measures and weakness of safety awareness" higher than the contractors who ranked this 17th out of 62 risks. The findings of Hiyassat et al. [31] are rather contradictory to our current study. More so, the risk of public security and safety lies with the contractor under (third-party Insurance) it is a risk to both the employer and contractor. Furthermore, earlier studies such as Peckiene et al. [43] have shown that shifting the risk onto one of the parties to a construction contract agreement is inequitable and unreasonable. In case of missing safety aspects that may cause the actual risk allocation, the responsibility of ensuring safety provision falls to both stakeholders in construction projects.

5.1.2. Ensuring Quality Project Provision

The second-ranked risk handling responsibility was that of "ensuring quality project provision". The finding is also consistent with previous studies [3,12,20]. For instance, studies by Perera and Dhanasinghe [12]; Perera, et al. [20] established that risk is a threat to construction projects and that it is proper allocation may enhance effective risk management practices. When a client employs a contractor to perform construction work, the client is regarded as an employer. The contractor should understand well the design and the requirement for construction before its implementation and or provide suggestions on its practicability before the construction process begins. The contractor carries out the actual physical construction of the structure according to project specifications. While she/he is fully responsible for finishing the project work on time, in accordance with the cost and quality stipulated in the contract, the client is responsible for setting project requirements

in terms of design. That is why it was evidenced by the current study that the actual allocation of the risk responsibility of ensuring quality project provision (construction) falls on both stakeholders in construction projects.

5.2. Consultants' Risk Handling Responsibilities

5.2.1. Safety Project Provision

Safety provision was ranked first and a significantly consultant-related risk handling responsibility. It could not be underestimated since it could certainly lead to poor performance of the completed road. However, in actuality, this risk should be shared by both parties. This result is consistent with previous findings in the literature [11,12]. Consequently, emergent implications are that steps should be taken by a consultant to work closely, in terms of controlling safety issues on-site, with the contractor to have correct guidelines and safety tools to avoid problems during the execution of a project. The risk of public security and safety lies with the contractor under third-party insurance. It is a risk to both the employer and contractor. Interestingly, the study by Perera et al. [20] offers some contradictory findings with the "Public security and safety" risk allocated only to the employer (client) and contractors.

5.2.2. The Use of Cost Deviation History to Define Contingency Funds for Future Contracts

The risk handling responsibility of "use of historical cost deviation to define contingency funds for future contracts" was ranked second and it is a significant risk responsibility. The emergent implication is that this can be a risk factor in that projects are unique and cost deviations for one component may not necessarily be similar to components of another road project, hence they are unrealistic. This finding is also consistent with previous literature [20,44]. For example, within the Gaza Strip context, Enshassi and Ayyash [44] established that factors such as border and tunnels closure were ranked as the most important factors that impact the cost contingency amount; it was also ranked by the respondents in the first position that is considered by a local contractor in the bid estimation process. The implication of this finding is that the Tanzanian contractors should be factoring in these factors when handling the risks.

5.2.3. To Ensure Quality Project Provision

The significance of engaging contractors early in the project to ensure safe, efficient, and quality projects is acknowledged in the literature [45]. Therefore, "to ensure quality project provision" was ranked third as one of the consultant-related risk handling responsibilities. The findings further offer contradictory and supportive evidence with previous studies [11,15,31]. For instance, previous studies have acknowledged and appreciated this risk handling responsibilities among the consultants [11]. However, recent Jordanian studies such as Hiyassat et al. [31], though they did not specifically refer to "quality", found the consultants ranking the risk priority of "unclear specifications" higher than the contractors who ranked this 14th out of 62 risks, in comparison to the contractors ranking of seventh. Likewise, within the Zambian context, which also shares geographical and economic conditions with Tanzania, "clarity of drawings and technical specifications" and "poor quality materials" were ranked higher (2nd and 9th respectively out of 55) as risks influencing performance [46]. The essence of a consultant's job during the construction stage is to supervise the project to completion. The consultants are therefore responsible for the successful delivery of the project because factors of risks remain unavoidable in any circumstances of an economy including the construction sector [15].

5.2.4. Creation of a Risk Planning Approach

The risk handling responsibility of "Creation of a risk planning approach" was ranked fourth. The implication of this finding is that construction as a risk sector and associated road works, which are more risky, require a coordinated risk planning approach. Other researchers acknowledge that risk factors influence the success of public-private part-

nership (PPP) projects and if well managed, they can minimize the financial burden of both the government and private companies [9]. The issues around the creation of a risk planning approach not only affect contractors and consultants in developed countries but developing countries as well. For instance, a study by Pevez et al. [47] undertaken in South East Queensland, Australia found that there is a lack of use of formal risk management methods. Consultants should have a risk log and know how to mitigate all the potential risks. Inappropriate planning of potential risks may cause stoppage or unnecessary delay. This kind of risk has been considered among the cause of delay in construction projects [13]. Similarly, within the Zambian context, ineffective monitoring of risks was found to have a moderate impact on project performance [46].

5.2.5. Review of Knowledge on Budgeting

Lack of procurement contract management capacity has been identified as one of the capacity-building challenges among the Tanzanian local government, contractors, and consultants [32]. Therefore, it is hardly surprising that ‘Review of knowledge on budgeting’ was ranked fifth as one of the consultant-related risk handling responsibilities. The implication of this finding is that whilst the reviewing is undertaken during the planning stage, this remains a critical risk handling responsibility that the indigenous contractors are unable to cope with, although hardly a critical issue to the consultants. This is because a consultant needs to conduct sufficient estimation of the project although, in actuality, the contractor also needs to review the budget of the existing work to be within the estimated cost. This result is also consistent with previous findings within the context of developing countries [1,20,32,46,48]. For example, a study by Kamal et al. [1], aimed at investigating the risk factors that influence project objectives within the Pakistani construction industry and drawing on the perspectives of contractors, clients, and consultants, found that inadequate project management is the most critical factor affecting the time performance of construction projects, budgeting is embedded within the project management body of knowledge. Likewise, a study by Yirenkyi-Fiango and Chileshe [48] undertaken within the Ghanaian context revealed that despite the contractors’ awareness of risk assessment and management processes (RAMP), there was still a need for translating this “awareness of RAMP knowledge” into the usage of the practices. Inadequate risk management capabilities are also prevalent in other developing countries such as Zambia [46]. The same study by Tembo-Silungwe and Khatleli [46], found the risk of ‘contractor’s underestimate of construction cost’ to have a high impact on performance. Similarly, within the Sri Lankan context, Perera, et al. [20] concluded that the issue of budget is a responsibility of both client and contractor. They both need to be aware of what should be agreed upon in order to avoid unnecessary variations.

5.3. Contractors’ Risk Handling Responsibilities

5.3.1. Safety Project Provision

The highest-ranked risk handling responsibilities by the contractors was that of “safety project provisions”. The implication of this finding is that inadequate safety at construction sites may cause accidents, injury, death, loss of or damage to property and hence may cause delays in delivering the project. Safety provision is a risk handling responsibility by the contractor and supported by the findings within the developing country context [11,20]. Further, the contractor has the risk responsibility of overseeing healthy and safety issues as stipulated in H&S guidelines since it needs special attention to overcome this type of risk. For instance, the Perera et al. [20] study in Sri Lanka found public security and safety to be very important for pursuing social capital development projects with the actual risk allocation attributed to the contractors, despite the engineer having the risk allocation through contract clauses. Likewise, Iqbal, et al. [11] identified the contractor as being responsible for the management of most risks occurring at sites during the implementation phase. Safety project provision is one such risk. The inference from the findings is that the Health and safety (H&S) management by the contractor has a positive effect on project delivery.

5.3.2. Ensuring Quality Project Provision

The risk handling responsibility of “enhancing quality project provision” was the second-highest ranked by the contractors. The implication of this finding is that, ensuring a quality project is the expectation of all project stakeholders. Further, the contractor is responsible for the provision of materials and equipment and executes the project as per specifications. This activity is under the direct control of contractors and needs to be closely supervised by the consultant in order to deliver the project as per the agreed upon success parameters. Challenges of using defective materials and poor workmanship were seen as main contributors to risk factors related to quality. This finding is consistent with the observations of Iqbal et al. [11] that defective materials and poor workmanship are among the main contributing risk factors to quality issues for construction projects in Pakistan. It is the contractor’s risk handling responsibility since it affects the quality of the finished product. Further study of this finding can be found in the study by Perera et al. [20], which attributed the source of risk of “defective design” with the ‘actual risk allocation assigned to both the employer (client) and contractors.

The above findings, where significant differences have emerged, should nevertheless be treated with caution as the goal of theory development is not mere significance but meaningfulness [49]. Furthermore, according to the same study, the significance differences whether by gender, experience, or, in this case, different classes of contractors and consultants will always emerge.

6. Conclusions

Risk handling is acknowledged in the literature as a key and essential component of risk management, which, when properly incorporated into a project, leads to enhanced project performance. However, despite the proliferation of studies in developed economies on risk allocation or handling among the contractual parties, there is inadequate knowledge amongst the contractual parties on risk handling responsibilities in road projects, particularly in Sub-Saharan Africa. To address this knowledge gap, this study sought to investigate the perceptions of contractors and consultants on the risk handling responsibilities in road construction projects in Tanzania. Data were collected using survey-based questionnaires from the contracting Class I and II and consulting firms based in Dar es Salaam, Tanzania. The main aim was to rank and determine the criticality levels of risk handling responsibilities.

The overall ranking of the risk handling responsibilities of the registered foreign and local (indigenous) Civil Contractors and engineering Consultants’ indicated that safety provision, ensure quality project provision, creation of a risk planning approach, review of knowledge on budgeting and the use of cost deviation history to define contingency funds for future contracts were the five top-ranked risk handling responsibilities affecting project delivery in Tanzania. The least ranked risk handling responsibilities were as follows: provision of quality design and construction, environmental impact assessment, preparation time contingency (Design and construction), and preparation contingency (Design and construction).

The findings revealed that the consultant-related risk handling responsibilities are: safety project provision, the use of cost deviation history to define contingency funds for future contracts, ensure quality provision of project, creation of a risk planning approach, and review of knowledge on budgeting. In contrast, the contractor-related risk handling responsibilities include; safety provision and ensure quality project provision. While the shared risk handling responsibilities are based on quality and safety issues, the consultant’s responsibilities are based on quality, cost, time, and safety.

Finally, the results of the independent sample *t*-test indicated that with the exception of 4 (out of 10) identified risk handling responsibilities, there is no statistically significant difference in the perception of the between contractors and consultants on risk handling responsibilities affecting the road construction projects within the project-based organizations in Tanzania.

6.1. Theoretical Implications

The literature review reveals that no attempt has been made to explore the risk handling responsibilities (or risk allocation) among the contractual parties amongst the contractual parties on risk handling responsibilities in road projects, particularly in Sub-Saharan Africa. Therefore, first, this study makes a significant research contribution by identifying an ordered grouped set of critical risk handling responsibilities affecting the indigenous (local) and foreign contractor's road construction projects in Tanzania. Further, as opined by Summers [50], a study can make significant contributions and add new knowledge by filling in knowledge gaps. Therefore, this research also sheds light and provides insights on the understanding of these critical risks affecting their performance, an area previously under-researched. It also expands the efforts of studying and evaluating the risk handling responsibilities across the developing economies and particularly within the (East) African context. Second, this study is significant because according to Brown and Dant [51], deepening our understanding of existing knowledge is acknowledged as one of the four ways in which studies can enhance the significance of their contributions. Therefore, the identified critical risk handling responsibilities not only deepen our understanding of how such issues are perceived within the developing country context but further contribute to the reduction of tensions between western systems (i.e., risk management practices) and lifeworld such as Tanzanian specific [52]. Third, the findings from empirical investigations on risk handling responsibilities insights from the contractors and consultants are useful and part of effective risk management for the successful delivery of road projects in developing countries. As observed by Perera et al. [20] who observed that, risk handling by lessening their impact is a critical component of risk management.

6.2. Practical Implications

The following important implications are suggested. For *researchers, practitioners, government, and policymakers*, the establishment of perceptions of risk handling responsibilities on risk handling responsibilities in road projects would enable and provide them with an opportunity for the proper allocation of responsibilities among the contractual parties within the Tanzanian environment.

For *researchers (academia)*, this study provides further avenues for investigating the appropriate mitigating strategies for dealing with the identified risk handling responsibilities. Such an approach would enable the development of Tanzanian-specific risk management strategies for road construction projects for project-based organisations. Secondly, future studies should initially examine the differences in risk handling responsibilities among the different Classes of registration among the stakeholders. For example, different Classes of indigenous contractors Class I (large) vs. Classes II and III (medium); and local versus foreign contractors. As observed by Chileshe et al. [32], such kind of implications do not only focus on the dissemination of knowledge but also provide direction on how the findings will change the implementation and adoption of risk management practices of the indigenous contractor during the construction phase.

For *practitioners*, the study's findings could be used to provide the contractual parties such as clients, contractors, and consultants, and other project stakeholders, important lessons and an understanding of which risk handling responsibilities are critical during construction stages. The outcome of this would lead to improved future project delivery. Further, enhanced understanding of how contractual parties perceive risk handling responsibilities is of particular importance to contractors and consultants in effective risk management and decision making when intending to participate in such projects during the construction stage. As observed by Tang et al. [53], conflict negotiation costs will increase with more risks allocated to the contractor. Therefore, the Tanzanian contractors would benefit from minimising these costs based on the enhanced and better management of the critical risks as identified. Furthermore, the Tanzanian construction contractual parties

should consider the perceptions of risk handling responsibilities as a basis for improving project delivery and minimize problems, which may arise due to risk misallocation.

For policymakers and government, the findings could be used to review policies and conditions of contracts related to risk handling issues by PPRA and NCC which among other issues could address risk management, health, and safety issues. Drawing on Chileshe et al. [32], an understanding of significant risk handling responsibilities on risk handling responsibilities of the indigenous and foreign contractors could provide pointers and directions for the formulation and implementation of the Tanzanian risk management techniques and practices, which could be custom-tailored to indigenous small contractors, particularly those in Class IV through VII. Likewise, such sentiments have been shared in previous studies in developing countries. For instance, In Sri Lanka, Perera et al. [20] observed that understanding risk allocation should encourage contractors to obtain a clear understanding of the risks they are allocated. The same holds for the Tanzanian contractual parties.

6.3. Limitations and Future Research

Whilst this research makes a number of significant contributions to academia and the practice, a number of limitations are acknowledged. Firstly, from a *geographical* and *sampling* perspective, the respondents were drawn from one geographical location only, namely Tanzania, in sub-Saharan Africa, and project-based organisations from Class I and II contractors and consulting firms. Therefore, the findings may not generalise to other industries or to organisations operating in other countries. Future studies should be conducted and extended in other regions with emphasis on organisations operating in different industries and countries with the same socio-economic, business environment, political stability, and construction landscape. The second limitation is that the study did not differentiate the views of the foreign and local consulting firms due to the small sample size. Therefore, future studies are required to investigate this aspect further as the risk handling responsibilities between local and foreign consultants might be different due to the different levels of expertise and experience with foreign consultants having an upper hand. The third limitation is that the study did not differentiate the views of the respondents by position and education and determine if their results differ. Therefore, future studies are required to investigate this aspect further as the risk handling responsibilities vary according to the respondent's experiences. Subsequently, data could be tested for normality prior to selecting the appropriate test of equality of means of values or comparison of the mean ranks such as by ANOVA and Kruskal–Wallis. Finally, the fourth limitation was the *cross-sectional* nature of the survey study and assumptions that better risk handling responsibilities could lead to enhanced project performance. However, the causality between them could not be captured.

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