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Examining The Stakeholder's Perception on Best Practice Measures to Reduce Road Construction Projects Delay in Tanzania.

*[1]Gabriel, S | [2]Tekka, R | [2]Mwishwa, Y

*ORCID: https://orcid.org/0009-0002-8656-401X

[1]College of Engineering and Technology, [2]College of Architecture and Construction Technology,
[1,2]Mbeya University of Science and Technology, Box 131, Mbeya, Tanzania

*Corresponding author Email: seperatus.kikalagirwa@tarura.go.tz

Abstract
The construction industry is globally recognized as one of the fastest-growing sector contributing directly and indirectly to the development of several other sectors of the economy. Despite its significance importance, and based on persistently reasons, the industry has often overwhelmingly with various challenges including inability to finish the road construction projects within a given schedule. That is road construction delays. This study aimed to examine the stakeholder's perception on prevailing best practice measures to reduce construction projects delay in Tanzania. The study adopted the questionnaire tool and the survey interview to collect the respondent's opinion from 208 respondents having experience of more than five years obtained through purposive sampling. The mean scores and the relative importance index (RII) of the data were computed using SPSS 24 tool to obtain the descriptive information and inferential statistics. The findings have revealed ten potential factors for construction project delays and thirteen best practices that whenever implemented can assists to minimize delays. The identified best practice measures were categorized in clusters to indicate the project participants who plays the significant role in minimizing the delays. The current study proposes the future research to focus on identifying the relationship between the strategic cluster categories in identifying which cluster category correlate highly towards minimizing the construction project delays.

Keywords: *Construction Industry, Road Network, Road Construction Projects, Delays, Best Practices Measures,*

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1.0 INTRODUCTION

The construction industry (CI) is globally believed to be a multiplier sector as it touches the daily lives of every individual and accelerates social-economic development in both developed and developing countries. The sector always touches the daily lives of every individual, and it powerfully affects the economy, the environment, and society when transforming the physical infrastructures [2]. Moreover, the CI stimulates activities in other sectors of the economy, such as providing shelters, infrastructures, employment, and boosting domestic consumption [3]. Furthermore, the sector is assumed to facilitate in accelerating and promoting an income distribution, reducing poverty, provision of a larger small-to-medium business eco-system for their long-term social- economic growth, stability and well-being [4].

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More importantly, the CI have been well-known to serve as a source of society advancement, civilization, urbanization, as well as industrial development. Fundamentally, the construction sector donates significantly to the formation and creation of the Gross Domestic Product (GDP) to nearly to all global nations [5]. Additionally, the construction sector facilitates to improves other global sector's productivity, performance improvement and quality. It creates employment opportunities that offer various job.

Additionally, the construction sector plays a great role on domestic resource consumption in building the infrastructures that helps to facilitates determination for social-economic development and enhances and stimulates the growth and advancement of other linked sectors, enhancing national economic growth [6]. Despite its significance, the sector has been overwhelmed with multiple challenges resulting to various effects leaded by construction project delay. Various measures have been imposed to overcome the challenges unsuccessfully. The prolonged effects have raised and necessitated the need for the study to establish the potential measures for construction project delay minimization. Thus, this study aims to examining the best practice measures to reduce construction projects delay in Tanzania.

2.0 MATERIALS AND METHODS

2.1 Construction Industry

The Tanzania Construction sector has memorably become among the top three sectors superseded by agriculture and trade, contributing expressively to uplift the country Gross Domestic Product (GDP). Its contribution to the country GDP has conquered a stable growth from 8.8% (2008) to 15% (2017) with an average rate of 11.1% [11] and with a high share rate of the gross fixed capital formation (GFCF) ranging between 25% to 34% of GDP [12]. In addition, the sector also offers more than 9% of employment opportunities [13]. Besides, the industry has been stimulating other sectors of the economy. The construction industry in Tanzania, is among the fast growing sectors comprising both formal and informal organizations, private and government engineering institutions and persons like companies, firms and individuals who work as contractors, sub-contractors or consultants, merchants, engineers and technicians and suppliers. As of year 2020, it contributed to about 14.4% to the country Gross Domestic Production (GDP) [14].

In recent years, Tanzania has witnessed the significant growth in the construction industry to both private projects such as residential and commercial real estate as well as public projects such as construction of roads, railways, bridges, water systems, telecommunications, and air transport networks to mention a few. This has equally shown a consistent, yearly increase in government spending on infrastructure development in past decade which has stimulated the continuous inflows of investments in the construction industry and foreign investors [15]. Despite its significance importance, the construction industry has been overwhelmed with numerous challenges that that have been limiting the growth of the firms and the construction industry in general. The frequently reported construction challenges include intensive competition from foreign firms, lack of experience, low productivity, Lack of skilled workforce, low technology adoption to guide the construction project such as Extranet Project System (EPS) [16] , and poor industry performance history [17], health and safety issues, disputes, corruption, late payments, variations caused by poor design, poor quality of the completed project which does not provide the value for money, low profit gain to contractors, frequently construction project delays [18] and impractical and unfeasible general strategies [19].

All these challenges have been accelerated by ineffective estimates, incompetent designers, contractors and sub-contractors, poor designs, ineffective contract planning and management, poor construction planning techniques and lack of communication between the parties involved in construction [20] to name a few. Thus, the prolonged challenges have caused the sector to attain a continuously non-guaranteed, unsustainable, inadequate, and

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underprivileged performance [21] measured in terms of time and cost overrun, low quality of work constructed, low productivity, poor safety leading to frequent accidents, environmental unsustainability and a prolonged construction project delay [22] that has necessitated an extra efforts and a constant follow-up towards problem resolution.

2.2 Road Construction Project in Tanzania

Road construction projects constitute a large portion of infrastructure that form a significant part of the entire construction sector and acts as a major components that encourage the economic growth. The roads assist to connect people to employment, enabling goods and services delivery, and promoting exchange among different people. The roads helps to create a smooth travel at higher efficiency. It provide quicker connectivity of business premises, better shipping and better distribution time [28]. Frienkly, the road construction project has a fundamental impacts through efficient and cost-effective movement of passengers and freight transport, it improve accessibility to markets and social services for the communities within zones of influence and thus it contributes to the national poverty reduction [19].

Moreover, the road network in various corridors has for a large extent contributed to enhance intra-regional trade and promote integration of the three regional economic communities (RECs). Despite its fundamental significance, the road construction projects are always considered to be complex following its dynamic nature of construction site operations during its stages of planning, design, procurement, construction and maintanance. The projects are mostly facing difficulties and uncertainties due to weather or environmental changes, social-cultural, economic, technical and management related problems to name a few.

The Tanzania geographical location, its huge size and scattered settlement design pattern has to a large extent given roads a considerable role towards national economy integration. In Tanzania, road transport is the most widely used form of transport facility considered to carry over 90% of the passengers and 75% of the carrying goods in the country. The Tanzania road's ability to move goods and passengers quickly, safely, efficiently and cost effectively within to neibouring SADC countries has become of a great important for national and international distribution and trade. The TANZAM road network acts and facilitates as a transit means to the southern corridor land locked countries including Zambia, Malawi and DRC to the Indian Ocean.

Moreover, the Central Corridor joining Iringa-Dodoma Road always facilitate tolink and feed Rwanda, Burundi and eastern Democratic Republic of Congo (DRC) with Dar-esSalaam port [19], Furthermore, the northern Corridor (1800km) joining Mombasa–Voi–Eldoret–Bugiri–Kampala–Masaka– Kigali– Kibuye–Kayanza–Bujumbura and Sumbawanga Corridor(1300km) joining Tunduma–Sumbawanga–Kasulu–Makamba–Nyanza-Lac– Rumonge–Bujumbura has formed the unending foundation that support and sustain social-economic development within the EAC and all its Member States [20]. Generally, it is recognised that the rapid increase in commercial trade within East African Community countries has recognised and hence necessitated the neverending needs that depends on effective, fast, and less cost mode of transportation.

2.3 The Tanzania Road Network

The current Tanzania road network covers 86,472 km of which 12,786 km are trunk roads and 21,105 km are regional roads supervised by Tanzania Roads Agency (Tanroads) [29] under the ministry of labor, transport and communications. The agency was established by an order published in the Government Gazette, Notice No. 293 of 2000 under Section 3 (1) of the Executive Agencies Act No. 30 of 1997, anticipated to witness a substantial improvement in terms of development and maintenance of highways and the regional road network in mainland Tanzania with respect to quality, efficiency and cost-effectiveness. For easy identification and

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control, the Tanzania's main roads are identified by numbers that follow the two-level number system preceded by A- and B-, as is the case throughout East Africa [22].

The remaining 144,429.77 km inhabiting district, urban and feeder/dusty roads are under the supervision of the Tanzania Rural and Urban Roads Agency (TARURA) officially opened on July 2, 2017 following the announcement in Government Gazette No. GN 211 of May 2017. TARURA establishment intended to facilitate the improvements of rural and urban roads network to enable farmers to transport agricultural production (crops) and other items from villages to urban areas (market) and thus to become a key for economic growth by changing people's lives through reducing risks and spend more time on the road [22].

The road transport network in Tanzania faces different challenges such as insufficient funds for rehabilitation, upgrading for routine maintenance, high rates of accidents on the roads occur due to poor state of the roads, weak institutional arrangement coordination in the road transport, and high costs of roads construction and maintenance [30]. Tanzania roads maintenance for both paved and unpaved roads is done through five customs. The first custom is called routine and regular maintenance that primarily involves grass cutting, reshape roads and cleaning of sewage system. The second custom is called periodic maintenance. The third one is spot improvement and includes rutting and portholes. The last two covers bridge preventive maintenance, repair and bridge major repair.

2.4 Construction Project Delay

The issue of construction project delay has become a world's chronic problem and a topic of concern as noted from majority of construction projects [23]. Generally, construction project delay is described as the project time overrun beyond the scheduled project. Else, it is an activity that extends the time required to deliver the project, which manifests itself as additional days of work. Delays is one of the critical problem that occur in almost every construction project. However, its magnitude varies considerably from one project to the other. Some projects experiences only a few days behind the schedule while other projects delayed for even over a year [24]. Various number of factors have been stated to facilitate construction project delays.

Various literatures have categorized the delay factor into internal and external related factors. Further, have been categorized into material related, labor related, finance relate and, equipment. However, factors have been furthermore classified under contractor, clients and consultant related factors [24]. Generally, factors such as weather condition, Poor communication, coordination and conflicts among stakeholders, ineffective/improper planning, material and equipment/plant shortages, financial problem, payment delay, lack of project stakeholders' experience/ qualification/competence, construction labor shortage and poor site management to mention a few were mentioned in various literatures and highly ranked in ascending in significantly influencing project schedule delay [25].

Moreover, the first study on construction project delay conducted in USA recognized the shortage of labor and construction material, equipment related problems, weather changes, the changes of design, lack of the documentation of design documents and errors or defects that occur during project's implementation as the foremost contributors to delays [26].

A study conducted in Sudan indicated that the uppermost ranked causes of delay include prices fluctuation for the construction materials, shortage of materials, inaccurate time estimation, and errors occurring during construction to mention a few. The causes has contributed to cost overrun, extension of losses, time overrun, negative perception of the country's construction industry, rise of shame to local construction companies, contractors, consultants and engineer with associated risks including too exerted a considerable pressure on project participants, price inflation of materials, revenue drop, overall cost increase, rise of disputes amongst project stake holders and eventually project abandonment [27]. Another

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study by (Belachew,2017) recognized that price fluctuation of construction material, construction cost underestimates, delay in supply of raw materials by the supplier, inadequate review of contract documents, lack of coordination and cost planning during design phase and pre- and post- contract stage respectively have indicated the highest significant impacts on the project performance from the client's, consultants' and contractors' perspective [28].

A critical review study covering different developing countries to analyze the construction delay acknowledged multiple factors categorized in various clusters depending on delay sources. While other studies classified source of delays as owner (client), consultant, and contractors related; few studies categorized them in relation to resources, construction materials, equipment, and labors related. Beyond the aforementioned related sources of delay, others recognized in multiple literatures to include contractual relationships, changes in design, environmental factor, financial, managerial, government rules and regulations, internal and external factors related [29]. Generally, construction projects delays in developing countries have revealed the negative impacts on construction business for both users, clients, financiers, contractors and developers. It has led to degrading the reputation of both international and local firms, has publicized an increased construction cost when considering the influence of numerous factors such as an increases of construction resources price, economic recession, extreme weather condition, technical aspects, and political reasons to mention a few.

The Tanzania construction industry suffers frequently from the problem of delay in completing road construction projects. A study conducted on 80 randomly selected road construction projects from 2004 to 2008 showed that 72.5% of projects were delayed. This represents a significant burden on the course of economic development that hampers the development plans of the country, and has a negative impact on the economy in general (Habtoor, 2001). Moreover, a study conducted by (Ngowi, 2014) analyzing the performance of TANROADS construction projects within eight years (2005 to 2013), recognized that out of ninety three (93) studied projects, 68% representing 65 projects went beyond the contracted time that proved inadequate performance [26].

In addition, a recent study by (Donati. et al,2022) acknowledged that, road construction projects delays in Tanzania are a common problem that has extended on delayed to about 110% of the contracted time [27]. Another study conducted to evaluate the construction project performance models using multiple countries Tanzania inclusive concluded that the construction project delay or time overruns are triggered through various causes such as changes in design, contractor's late payment, information sharing delays, financial concerns, poor project management, compensation matters, disagreements as well as conflicts over the valuation of the completed project [32]. Thus, it can be concluded that, Tanzania occupies almost similar factors leading to construction project delays as of other developing countries as summarized in the Table 2 below.

Table 2: A Summarized Factors for Construction Project Delay

Factor Cluster	No	Code	Contributing Factors	References
Construction Project Management Factor	1	CPM1	Ineffective or strategic planning and scheduling	Abdullah, M.R et al. (2009)
	2	CPM2		
	3	CPM3	Poor contract management	Aibinu, A.& Odeyinka, H. (2006)
	4	CPM4	Mistake and discrepancies in the contract document	Abd El-Razek et al (2008)
	5	CPM5	A policy of lowest-cost bidding policy	Owolabi James et al. (2014)
	6	CPM6		
	7	CPM7	Bureaucracy in tendering method	
	8	CPM8	Inadequate monitoring and control	

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	9 10	CPM9 CPM10	Mode of financing, bonds and payments Economic instability Lack of constructability Late obtaining permits from governmental agencies Inaccurate site investigation	Assaf, S.A., and Al-Hejji, S.(2006)
Economic Factor	12 13 14 15 16	EC1 EC2 EC3 EC4 EC5	Late or delayed payment by each part (client/contractor) Financial difficulties to contractors (with poor cash flow management) Inadequate of poor fund allocation High interest rate imposed by institutions Currency fluctuation/inflation	(Ansah, S., 2011; Alshihri, S. et al.,2022; Obodoh and Chikasi,2016; Tesha,D.N. et al., 2017; Kavishe,N. et al.,2019; Aftab Hameed et al.,2023).
Technical/Design Factor	17 18 19 20 21 22 23	TE1 TE2 TE3 TE4 TE5 TE6 TE7	Frequently change of design due to mistakes and errors Poor or delayed design Complicated design Poorly adopted construction method Lack of professionalism Inadequate project time and cost estimate Delay in inspection and approval of completed design drawing by consultant	(Ocen.S.J. et al., 2011; Basheka,B.C. et al., 2012; Lindhard and Wandahl, 2014; Kenyatta, 2016; Momade, 2020; Bentall,P. et al., 2020)
Management factor	24 25 26 27 28 29 30 31	MG1 MG2 MG3 MG4 MG5 MG6 MG7 MG8	Lack of chain of commands Lack or poor organizational structure Lack or less motivation and training Awarding contract to lowest but unexperienced and incapable bidder Lack of management & supervision skills Slow decision making between parties Unnecessary interference by the project owner Ineffective procurement planning and incapable supplier	(Ansah, S., 2011; Nhabinde,V. et al., 2012; Doloi, H. et al. ,2012; Thabani,N. and Wellington,G.B, 2017; Arditi, D., et al., 2017; Serdar, D. and Hosseini,M.R., 2018, Cruz,A.S.et al., 2018)
Resource Factor	32 33 34	R1 R2 R3	Shortage or poor quality of construction materials Late order and delivery of materials	(Nhabinde,V. et al., 2012; Ssegawa, 2013; Ardonceau, 2018;

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	35 36 37	 R4 R5	Lack or shortage of workforce and skilled personnel Inadequate of modern technology Frequently equipment breakdown	Marteye,N.T. et al., 2018, Cruz,A.S.et al., 2018)
Information and Communication	38 39 40 41	IC1 IC2 IC3 IC4	Lack of coordination between parties Lack of communication between arties Slow information flow between parties Bullwhip effects during resource ordering	Majid, I. A. (2007) Odeh, A.& Battaineh , H. (2022) Acharya,N.K.,et al. (2006)
External factors	42 43 44	E1 E2 E3	Unethical practices and kickbacks (Malpractices) Unforeseen conditions (Changes of weather conditions, society strike and conflicts) Political interference	(Lindhard and Wandahl, 2014; Chilongo Sylvia,C. and Mbetwa,S., 2017; Akarowhe, 2018; Omopariola,D. et al., 2019; Bentall,P. et al., 2020)

2.5 Measures to Reduce Delays

Literatures have documented various measures to minimize or eradicate overwhelmingly and unfavorable negative factors that hamper or pose as terrorizations to interfere with the project completion and hence leading to construction delays. Despite of many studies undertaken to indicate whether causes, factors and effects, very few has conclusively provided a comprehensive measures or solutions to minimize delay in the construction projects. Most of the derived conclusions as measures were not adequately presentation the measures as the solution as compared to the delay problem stated. Measures including embracing of adequate and effective strategic planning during project inception and design phases, presence of sufficient resources, competent and skilled selected consultant, contractors and experienced project manager,
accurately estimated project cost, enforcing the liquidated damages and motivation early and timely completion projects, project construction postponement until financial is available, ensuring effective communication among project stakeholders were stated [27].

Moreover, Consistent site meetings between the project teams was emphasized to assist in identifying the challenges and recognizing the project needs and the strategies to accommodate them instantly. This approach will offer the project management a chance to design their work more efficiently that will assist also to ensure the smooth flow of the project resources through timely procurement with perfect resource utilization [33]. A study by Rivera. et al. (2020) on exposed two potential measures, adoption of new technologies such as Business Information Modeling (BIM) and embracing training to the project human resources specifically in the field of construction management that could assist to increase skills and competence to project executors who at the end could be able to identify the challenges facing and leading the project to delay and hence finding an immediate solution for the problem [34]. In the same vein, timely delivery of materials, contingency allowance, community participation, less bureaucracy and use of modern technology [27].

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The study of Saiful and Trigunarsyah (2017) in Frimpong et al. (2003) is among the comprehensive study that has proposed multiple measures as a guide to lessen delay in construction projects. Among are contractor should accurately compute the total project cost before construction commencement to circumvent payment delay for project employees, organizing various training to help in improving managerial skills and competence through up-to-date modern management system, ensuring timely, effective and well-organized procurement systems of construction resources (materials and equipment) as well as allocating appropriately adequate contingency to subsidize an increased cost resulted from multiple factors such as inflation of material and other resources within the entire construction period [29].

3.0 METHODOLOGY

3.1. Data Collection

The data collection using a questionnaire tool and an interview was conducted from October 2023 to January 2024. The adopted survey method aimed to gather and weigh the respondent's opinions based on a large collected sample of population within the selected case study region. Before commencement of data collection for the study, a pre-test for the questionnaire tool was conducted to identify errors, mistakes, blunders, incorrect, unnecessarily wordy, and unambiguous terms in the questionnaire that eventually concluded for the test and check for the clear, comprehensiveness, and elaborateness of the questionnaire before it is distributed for data collection.

Later, twenty-five (25) registered professional employees having more than five years of working experience were purposively sampled from different construction projects for a pre-test or pilot survey qualification. After confirming the definite of the tool, a total of 297 employees/respondents computed using the formula below working on various road construction projects were randomly sampled for a questionnaire administering and interview. The selected respondents were considered to have a satisfactory working experience, a good and continuous performance record on road construction projects for more than five years. However, the registered professionals were given the top priority during the respondent selection. Out of 217 (73.06%) returned, only 208 well attended questionnaires were confirmed for data analysis. The sample size was obtained using a precision rate together with the confidence level for a finite population given by the following Equation:

$$n = \frac{N}{1 + N(e)^2}$$

Where: (*n)* stands for the sample size; (*N)* represent the total number of populations, *e* represents the margin of error (e) 5% at the confidence level of 95% for this study (Taherdoost, H., 2017).

3.2 Questionnaire design

A structured questionnaire tool divided into four parts was administered to registered professionals to collect an opinion for the study. Section one intended to obtain the respondent's demographic or characteristics information. While section two and three anticipated to collect the views on the causes and factors for construction project delays respectively. Section four was focused to identify the best practice measures as strategies for reducing the construction project delays. Moreover, a 5-Likert scale ranging from (1= Strongly not influential /Disagree/Not Important to 5= Very strongly influential/very strongly agree/very Important/) were adopted to designate the numerical ranks only. However, it does not represent the absolute quantities nor equality interval between them. A continuous average rating with proposed ordinal values helped to precisely translate the opinion results of respondents as follows: (1 to ≤ 1.8 represented

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Strongly Disagree); (1.81 to ≤2.6 represented Disagree; [2.61 to ≤3.4 described Moderate; (3.41 to ≤4.2 represented Agree) and (4.21≤5 expressed Strongly Agree).

3.3 Data Analysis Methods

The collected questionnaire tool was checked for clarity, edited, coded, descriptively analyzed, and checked for a construct validity and reliability using Statistical Packages for Social Science (SPSS 24) software. The construct validity aimed to measure how accurately the tool measure the same construct. Data reliability facilitated to measure the consistent of the method is in its evaluation in 5-point Likert scale. Thus, the reliability analysis anticipated to check if the questionnaire tool provides equivalent outcomes at different sets of tests. During data analysis SPSS-AMOS was used to perform the confirmatory factor analysis (CFA) whose result facilitated to test for a convergent and discriminant validity and develop the structural model showing the correlation between strategies to facilitate construction project delay.

4.0 RESULTS AND DISCUSSIONS

4.1. Respondent's Characteristics

The respondents' characteristics has been presented in (Figure 3) below. The level of education, working experience and profession of the respondents were considered among the fundamental factor in the decision-making and thus getting the accurate information that helped to reach the conclusion and or generalization of the findings. Most respondents in this study composed various educational level from a diploma (11.1%), degree graduate (54.8%), master's holder with (30.8%) to PhD (3.4%) holder. Moreover, the respondent's characteristics occupies the well-deserved and experienced professionals. Most respondents (81.3%) have worked for more than ten years. In addition, most engineers and surveyors who directly works in most road construction projects provided their opinions.

However, construction site stakeholders including more contractors (59.13%), clients (15.87%), Supplier (12.98%) and consultant (10.10%) participated in the study to provide their views related to the to study in question. This justify that the respondents whose opinion facilitated the findings of the study were professionals, had better education level and enough experience in the industry and thus has provided valuable answers for the study.

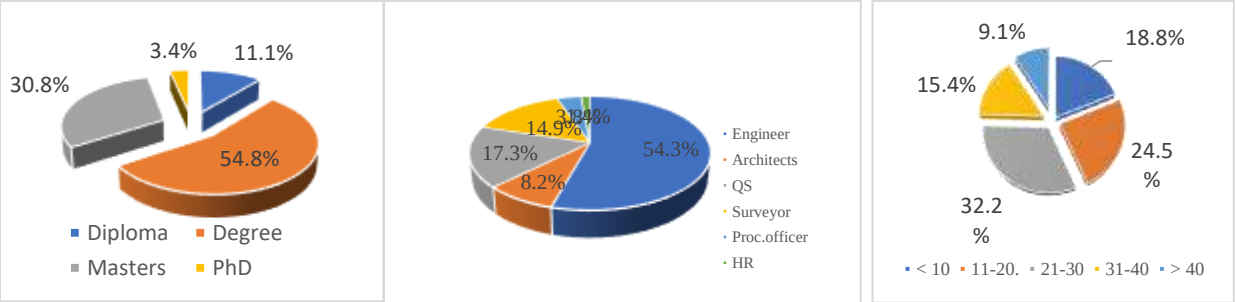

Figure 3: Respondent's Characteristics

4.2 Ranking of Potential Factors for Road Construction Project Delay in Tanzania

After feeding the survey results into SPSS 24.0, ranking the potential factor for road construction project in Tanzania that needed to undergo two processes followed. The first process necessitated the computation of the total score, mean and standard deviation for each factor in order to generate the top most factors having equal or above Likert scale mean value of (3.41) as a criterion representing important or influential as stated in section 3.2 above. Only twenty-six (26) success factors were obtained. However, whenever two or more factors occurred to occupy

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the same mean value, the one having lower standard deviation was assigned a higher ran. Later, the Relative Importance Index (RII) for each success factor was computed using the equation below and consequently ranked as in Table 3.

$$RII = \sum_{i=0}^{n} \frac{W_i}{A \times N} = \sum_{i=0}^{n} \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{5N}$$

where
RII—*is the Relative Importance Index;* **N**—*is the total number of respondents for every variable;*
A—*is the highest weight (i.e., 5 in five-point Likert scale);*
Wi—*is the weight given to each factor by the respondents from 1, 2, 3, 4, and 5*

Table 3: Ranking of Potential Factors

No.	Code	Potential factors Description	Respondent's Frequency (N)						RII	Rank	Factor Cluster
			5	4	3	2	1	ΣW	ΣW/AN		
27	MG4	Awarding contract to lowest but unexperienced and incapable bidder	69	60	54	15	10	787	0.757	4	Management Factor
31	MG8	Ineffective procurement planning and incapable supplier	74	56	26	35	17	759	0.730	7	Management Factor
43	E2	Unforeseen conditions (Changes of weather conditions, society strike and conflicts)	49	51	40	37	31	674	0.648	10	External Factor
17	TE1	Frequently change of design due to mistakes and errors	73	49	35	32	19	749	0.720	8	Technical/Design Factor
23	TE7	Delay in inspection and approval of completed design drawing by consultant	48	47	72	27	14	712	0.685	9	Technical/Design Factor
13	EC2	Financial difficulties to contractors (with poor cash flow management)	94	74	27	7	6	867	0.834	1	Economic Factor
34	R3	Lack or shortage of workforce and skilled personnel	64	56	57	19	12	765	0.736	6	Resource Factor
32	R1	Shortage or poor quality of construction materials	64	57	58	24	5	775	0.745	5	Resource Factor
1	CPM1	Ineffective strategic planning and scheduling	57	87	54	3	7	808	0.777	3	Construct. Project Management Factor
12	EC1	Late or delayed payment by each part (client/contractor)	81	63	44	14	6	823	0.791	2	Economic Factor

The findings of the study have recognized ten potential factors contributing significantly to construction project delay categorized under six clusters management factor, external factor, technical/design factor, economic factor, resource factor and construction project management factor. The significance of the factors towards construction delay contribution has been shown using the RII. The high the RII (Table 3) the most potential the factor is considered in contribution delay. Thus, economic factor was highly ranked (EC2, **R=0.834**) and (EC1, **R=0.791**), followed by construction project management factor (CPM1, **R=0.777**). While the fourth potential factor was management factor (MG4, **R= 0.757**) the fifth was noted to be (R1, **R=0.745**) followed with (R3, R=**0.736**) both noted to be resource related factor. The seventh identified potential factor was concerned with management factor (MG8, R=**0.730).**

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Conversely, there were two technical or design factors (TE1, **R=0.720** and TE7, **R= 0.685)** and ending with external factor (E2, **R=0.648).** The findings of this study is in line with findings of other recent studies including [38, 39, 40]. The findings of this research provides a good lesson to many developing countries' construction industries where there is high demand of new and complex construction projects but facing a great challenges of an economic constraints that necessitate them to depend on loan from the financial institution that always impose high interest rate together with a challenge of skilled workforce that force to depends on foreign experts. Additionally, the study is alarming to consider the general management and construction project management skills and knowledge in particular as an important occupation necessary to be possessed by the project manager in any of construction project and neglecting the merely consideration of possession of engineering profession only.

4.3 The Best Practice Measures to mitigate Construction Project Delay

The prevailing best practice measures in Tanzania to mitigate the construction project delay were assessed through the descriptive analysis and a one sample -t-test by computing the mean scores after checking the reliability and validity of the latent variables. Subsequently, using a mean score, the standard deviation, T-values and confidence interval (CI), the best practice measures to be adopted were ranked. Considering the threshold value of grade 3.41 of the 5-Likert scale that represent important of the best delay measures, measures occupying a mean score of or above 3.41 as a criterion for selection were considered significant towards minimization of construction project delay.

Thus, It can be seen from Table 4 that 13 best delay measuresmet this criterion and were grouped in their occurring related group categories including client (4) related best practices, contractor (6), consultant (2), Contractor and supplier (2), client and contractor (7), client and consultant (3), contractor and consultant (2) as well client, contractor and consultant (1) related best practices. It is noteworthy to note that, if two or more measures coincide by having identical scale mean value, the one having lower standard deviation was highly ranked. However, since it is not practical to discuss the implication of all best measures, only the highly ranked top ten best measures were considered for the discussion.

The findings of the study (Table 4) acknowledged the client related delay measure-procuring a skilled, competent and experienced contractor the highest ranked the best measures for minimization of construction project delay Scoring a mean (M=4.53) followed by three client-contractor related best measures-ensuring a proper project finance and cash flow (M=4.47), warranting a timely payment to contactor's & supplier (M=4.41) and establishing a regular training to capacitate employees & leaders (M=4.37). The finding of the study coincides with that of Kikwasi (2012) who declared that, although Tanzania have many local construction firm and multiple and huge construction projects, it faces a challenges of having low number of competent and experienced local firms that are frequently facing the financial calamities and thus causing more complex projects to be occupied by foreign firms [41].

Moreover, the current research also identified the client related-exercising the liquidated damages (M=4.34) and ranked the fifth, the sixth being client-contractor related-establishment of Tanzania construction bank scoring (M=4.31) to facilitate easily fund accessibility and effective flow of funds, effective and timely procurement of project resources (M=4.23)-client-supplier related ranked the seventh. Besides, the findings recognized the eighth-client-contractor related-appointing a skilled project manager and competent workforce (4.15), client-consultant-set the maximum deadline for approving changes in design scoring (M=4.09) ranked the 9th and the last being the client-contractor related encompassing entailing motivation to project executors (M=4.01). The findings of the current study identified in Tanzania construction industry were previously identified in other developing countries. This has led to a generalization of the most

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identified delay best measures to be adopted in almost all developing counties having similar working environment and market as that of Tanzania.

5.0 CONCLUSIONS

This study analyzed the construction project delay causes and the best practice mitigation measures between various identified group categories. The current study has identified that the client and contractor occupies and plays a significant role in realizing and minimizing the construction project delay measures. Very few has been identified on supplier and consultant sides. Thus, it is urged to construction project's client (whether public or private) and contractors-executors to play their role in minimizing the construction project delay. The construction industry in Tanzania has attained a prolonged suffering from construction project delays that has led to financial losses of most local construction firms, unsteady growth that has minimized their change of competing compared to foreign firms. The findings of the current study have revealed thirteen best practice measures for minimizing the construction project delay most similar to those identifies in other developing countries. The finding has facilitated reaching the conclusion that, most developing counties fall-in and occupies almost the same challenges and same best measure practicing in minimizing the construction project delays.
The novelty of contributions in this study can be reflected in the findings achieved after identifying the cluster categories in construction projects in Tanzania who can play a significant role in minimizing the construction project delays which previous studies have not focused. The current study proposes the future research to focus on identifying the correlations between clusters in identifying which cluster groups correlate highly towards minimizing the construction project delays.

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Code	Best Practicing Measures	Mean	Std. Deviation	T-Scores	95% Confidence		Skewness	Kurtosis	Related Group
					Lower	Upper			Category
1	Procure a skilled, competent and experienced contractors	4.53	1.683	29.708	3.930	5.170	-0.449	-0.4762	CL
2	Ensure a proper project finance and cash flow.	4.47	1.428	26.021	4.087	5.417	-0.399	-0.4262	CL&CO
3	Warranting a timely payment to contactor's & suppliers	4.41	1.408	25.639	2.839	4.149	-0.349	-0.3762	CL&CO
4	Establish regular training to capacitate employees & leaders	4.37	1.718	19.799	3.349	4.969	-0.569	-0.5962	CL&CO
5	Exercise liquidated damages	4.34	1.508	23.172	4.387	5.197	-0.329	-0.8392	CL
6	Establishment of Tanzania construction bank	4.31	1.748	19.01	3.467	5.117	-0.399	-0.5692	CL&CO
7	Effective and timely procurement of project resources	4.23	1.578	21.34	3.407	3.589	-0.359	-0.2078	CO&S
8	Appoint a skilled project manager and competent workforce	4.15	1.398	24.819	2.353	3.653	-0.289	-0.8092	CL&CO
9	Set the maximum deadline for approving changes in design.	4.09	1.648	19.167	3.307	5.227	-0.249	-0.3892	CL&CONS
10	Entails motivation to project executors	4.01	1.588	23.516	3.277	4.737	-0.379	-1.2792	CL& CO
11	Ensure a proper site supply chain and logistics management	3.86	1.658	23.476	4.257	5.277	-0.059	-0.8792	CO&S
12	Contract termination	3.61	1.528	24.096	3.567	4.967	-0.109	-0.8492	CL
13	Warrant a timely strategic planning and scheduling.	3.49	1.688	23.676	3.827	4.108	-0.279	-1.2992	CO
14	Abide to construction ethics and code of conduct	3.39	1.921	24.536	2.608	4.408	0.091	-1.2592	CL,CO&CONS
15	Adopt and use of modern construction technologies & equipment	3.31	1.540	21.782	3.657	5.067	-0.607	-1.097	CO
16	Ensure a timely site meeting to discuss challenges	3.27	1.780	23.169	3.857	5.507	-0.367	-1.327	CO&CONS
17	Ensure a thorough government support	3.22	1.671	23.849	3.567	4.402	-0.537	-1.047	CL&CONS
18	Establish the causes and settle disputes earlier	3.20	1.848	23.709	3.827	4.737	-0.717	-1.887	CL&CO
19	Ensure an efficient communication & corporation	3.17	1.829	16.921	2.922	5.147	-0.497	-1.247	CL
20	Adopt an Integrated team structure.	3.11	1.416	23.359	3.437	4.400	-0.557	-1.077	CO
21	Emphasize on early warning to builder	3.05	1.666	23.789	3.627	5.047	-0.487	-1.437	CL&CONS
22	Prepare risk management plans during contract execution	3.03	1.931	23.962	2.940	4.767	-0.617	-1.187	CO&CONS
23	Ensure accurate cost estimation to ensure project financing.	2.97	1.829	18.629	3.517	4.142	-0.457	-0.947	CL&CO
24	Involve construction management specialist companies.	2.61	1.416	21.729	3.367	4.920	-0.217	-1.177	CO

Table 5: Best Practicing Measures

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