

Identifying the Factors Affecting the Cost Management of Road Construction Projects in Tanzania: Review Paper

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Abstract: Among the key factors to take into consideration before the execution of any project is time, cost and quality. Most projects meet Quality and sometimes time but cost management is a real question in the implementation of many construction projects in the world. Poor management of the cost causes the delay of many road construction projects in the world too. In this paper literature review has been conducted to identify different factors that contribute to cost management both positive and negative ones. Different factors were identified that contributed to poor management of cost in highway construction projects such as force majeure factors like weather conditions, political matters and other factors like change in design, change of scope, conflict among the stakeholders, poor leadership, incompetence of project manager and subcontractors, in Tanzania from the literature perspective the challenge of cost overrun is very critical as insisted by different authors in their researches. Most of the projects deviate from their planned budget by even more than 50%. Apart from all causes of cost overrun, delay in these projects is the critical problem which causes the cost increase, the problem of delay is critical in both developing and developed countries, hence mitigating the factors discussed in this paper will minimize the problem of delays and cost overrun too although further research is required in this area to come up with proper mitigation measures to minimize the problem of cost overrun in road construction projects in Tanzania.

Keywords: Cost Management, Highway, Construction Projects

1. Introduction

The construction sector in Tanzania has increasing demand, and its contribution to the Gross Domestic Product (GDP) is increasing during this period of five years from 2016 to 2020. The report shows that during the period of these five years, its contribution to GDP has increased from 11.3% in the year 2016 to 14.4% in the year 2020 [12]. Even though this sector is growing at a significant rate, it faces a lot of challenges in the implementation of its projects one of which is the management of cost in the life cycle of the project. Cost management is an act of planning, estimating and control of the budget in the life cycle of the project [11]; in any project, there are two main types of costs which are direct costs and indirect costs. Direct costs include the cost of materials that are directly used in the project like building

materials if it is a construction project, indirect costs include all overhead expenses such as salaries of the employees [7]. Cost management can also be defined as the process of planning, interpretation, detailing, directing, agreement, cost control and evaluation of a project during its initiation and implementation phases [8]. However, cost management has got different techniques which when used effectively, can be very helpful in managing the cost of highway roads construction projects, these techniques are; cost planning, cost control, budgeting, cash flow forecasting, financial and cost reporting, cost code systems, value management and final judgment [11].

1.1. Statement of the Problem

For many years since independence to now, Tanzania is struggling to connect all angles of the country with these roads,

but there is a big challenge in the management of the cost of these projects, most of the contractors fail to complete their projects or the projects are completed in the expense of high costs hence end up with a minimal profit or even loss and also result in failure to meet project quality. The study about causes of failure in construction projects conducted by Aljohani, A. et al. [3] shows that several reasons have contributed to the poor performance of these projects but one of the leading factors is poor cost management. So due to that, there is a need to research their practices on how to manage the projects' costs and come up with recommendations about the issue even though this study will only focus on one area of the construction industry which is road construction.

1.2. The Objective of the Study

The main objective of the study is to identify the factors affecting cost management in highway roads construction projects, other objectives include the following;

- a) To examine the cost management practices performed by other construction sectors in the world through a literature review.
- b) Examine how these practices affect the cost management in their particular organizations.
- c) Identify the impacts of these factors in managing the cost of different construction projects.

A suggestion of the ways on how to rove the cost management in construction projects specifically on highway roads.

2. Literature Review

Many scholars in different countries in the world have done research about cost management in construction projects. Cost management is a vital part of the project lifecycle, this chapter will identify different factors that affect cost management and a conclusion will be drawn from the identified factors to lay a foundation on how to research in Tanzania since there is a gap in this area, this will help our growing construction sector industry in Tanzania.

The construction sector is composed of different areas which include house building projects, infrastructure building projects, railway construction projects and others [5], but the industry is facing a lot of challenges. According to Albtoush, A. M. F. et al. and Jongo, J. S. et al. [2, 10], they explained that the most influential factors that affect cost management in the construction industry are the competence of the project manager, poor leadership, inefficient utilization of resources on-site, repetitive work while the project is going on, conflicts among project participants, all above-mentioned reasons can result into cost overrun and hence poor project performance based on cost management.

Furthermore, Cantarelli, C. C. et al. [5] insisted that the size of the project can also affect the process of cost management in the project, in his research pointed out that, small and medium-sized construction projects suffer more cost overruns than complex projects. While the change of scope, wrong cost estimation, design change, and inaccurate time calculation

were the common factors that affected cost management too which resulted in cost overrun at the end of the project [5, 7]. Other factors like delay in payment, delay in site certificates clearances, workers motivation, delay in top management level in decision making, theft of materials on the site, poor communication means on the site, default machines are the common factors that cause a delay in these projects hence results into poor cost management in construction projects [2, 3, 10].

The roads construction projects are faced with different factors that affect not only time but also cost management, these factors include; plans modification, incompetence of a project manager, lack of project coordination, material price fluctuation, leadership problems, delay in decision making while the project is going on, payment delays, poor communication, project complexity, land acquisition delay issues, weather condition during the implementation stage of these projects and Terrain condition [1, 15]. The above were the most influential factors, even though there were other factors which also have an impact on cost management issues as said by Al-Hazim & Abusalem [1] which are; availability of labour, reworks, fluctuating government requirements, political situation, resources availability and quality of equipment and raw materials.

Sohu et al. [16] in his research in Pakistan, identified 64 factors that contributed to the factors affecting cost management in highway projects, but after the analysis of those factors he found that the most influential factors were; material cost fluctuation, change in the design along with the project, delay in supply of materials, poor contract management, conflicts among the project stakeholders, currency change, improper time evaluation of the whole project, late payment of the completed works, the experience of the project manager and sub-contractors, inaccurate cost estimation, and poor management and supervision on site. Almost the same factors concluded by Sohu et al. [16], were also declared by Creedy et al. Wong [6] in his research to evaluate the factors for cost overrun in Australian highway construction projects except that he added more by concluding that, the smaller sized projects incur more cost overrun issues compared to large-sized projects, furthermore, he added factors like technical complexity of the project and cost of service relocation were also influential factors that affect cost management in these projects.

In the research conducted by Azis et al. [4] in Australia concerning construction projects, seven critical factors were identified which affect cost management in this sector which was; contractors site management, improper communication channel on the site, project management and contract administration, labours' related factors, materials and machinery management, design factors and documentation and external factors such political affairs, floods which are unpredictable. Other factors such as incompetent subcontractors, poor site management and supervision, schedule delay, inadequate planning and scheduling, incomplete design and payment delay were concluded by Ismail et al. [9]. In Slovakia, research done by Ellingerová [8]

found that the main factors affecting the cost management were, cost planning during the initiation phase of the construction project, cost estimation for the construction materials, operating packages, and final estimated price based on the construction documents such as drawings specifications and bill of quantities, control of finished works and their costs and finally, calculation of final account, final technical and economical assessment of different services. It was asserted by Rauzana [14] in her research from Indonesia that the most influential factors that affect cost management are, inaccuracy of the cost estimation and this is caused by incomplete information about the project, inaccuracy estimation about the contingency that can be used to compensate the added costs and using wrong estimation techniques, another factor is incomplete project documents such as incomplete specification, design changes and incomplete contract documents which all lead to wrong budget estimation, and the final influential factor according to her was work-related issues such as incompetent project

manager and subcontractors, work repetition, slow decision making during the project implementation, unclear communication between the project stakeholders. But in research conducted in the UK to 250 construction project organizations out of many factors that lead to poor cost control, these factors seemed to be more influential which are, design changes, risk management, inaccurate evaluation of project time, work complexity, non-performance of subcontractors, the insufficient experience of project manager, delay of final payments for completed works, conflicts between the parties, unpredictable weather condition, and dependency on imported materials [13].

2.1. The Situation of Cost Overrun in Tanzania

The previous research in Tanzania shows that most of the highway projects suffer from cost overrun. This has been shown in the table below in various projects done below the year 2010 [17].

Table 1. Cost deviation of Highway construction projects in Tanzania.

Road name	Original budget (Billion Tshs)	Final budget (Billion Tshs)
Shelui – Nzega	20.7	19.5
Somanga - Matandu	12.3	12.0
Muhutwe- Kagoma	4.4	4.7
Mwanza town	16.4	18.2
Kyabakari-Butiama	1.7	1.9
Mutukula–Muhutwe	13.8	17.6
Songwe – Tunduma	10.2	14.1
Morogoro –Dodoma	25.3	43.9
Nzega–Tinde– Isaka	20.6	44.2
Tinde-Shinyanga/Mwanza	28.3	65.2

The table above shows the criticality of the problem in the country. Proper cost control measures have to be in place to minimize the costs of these projects. In the research conducted by MTAWA, S. [18], it has also identified different factors that cause cost overrun, moreover he concluded that the problem of cost overrun is very significant in the country in which among the factors which cause this, the delay is a challenge.

2.2. Summary of the Literature Review

Many authors in their research made different contributions in their researches in different countries, but there were number of *strength and weaknesses* in their works, to start with, this paper has identified some of the *weaknesses* such as; some researchers made their conclusions on the factors that affect cost management in construction projects only by using secondary data collected from literature review, so a bit more research on the factors is needed because for a critical thinking and analysing, one must not only rely on what other scholars suggested until is proven by conducting more researches, most of researchers were conducting their researches from big construction companies to collect their data and this is called *survivorship bias*, there could be some other experienced stakeholders from small and medium industries too who could contribute their views regarding the matter, the study also saw

a weakness in the sample size, most of researchers conducted research in a fewer number than the targeted quantity, the response from the targeted group was slow and they decided to make conclusion from available responses and could lead to unrepresentative sample, furthermore, most of the research works done to identify these factors focused on construction company as a whole, according to Cantarelli et al. [5], the construction industry consist of house building sector, infrastructure building sector and others, few works has been done to analyse in this particular area. Even though the authors had some weaknesses in their research, still they laid a better understanding of the future research; most of them identified different factors affecting cost management according to their areas and priorities. Some researchers like Creedy et al. [6] conducted research and he analysed almost 231 highway projects to identify the factors relating to cost issues, Olawale & M [13] in the UK, he also conducted research in 250 construction industries to identify cost-related factors too and many others, this shows the strength of the arguments of some of the authors to be more conducive to be used for further research.

In this paper, research papers have been analysed to see their strength and weaknesses, apart from the strengths and weaknesses, *summary* twenty-nine (29) factors that affect cost management were identified, the factors are shown in the table below:

Table 2. Influential Factors affecting cost management in construction projects.

S/N	Factors	Description
1	Competence of project manager	The more competency the project manager has the more the project will run smoothly hence saving costs by controlling the schedules of the given tasks and the like
2	leadership	This includes general supervision of the site resources, if the supervision is poor this lead to compromised cost management too
3	Inefficient utilization of the resources on site	Bad use of projects resources will increase project cost and hence affect its management.
4	Repetitive works	If the works have recurred results in an increase in the budget
5	Change of scope	In the implementation stage, any change can bring about changes in the cost estimated earlier.
6	Conflicts	Misunderstanding between the project's stakeholders can cause delay of the project; hence more overhead expenses will be incurred.
7	Inaccurate time estimation	This explains the more the delay the more cost to finish up the project and hence more cost.
8	Delay in payments	Site payment delay of the finished works causes a delay in projects and cost overrun
9	Decision-making from the top management level	The quicker the decision from the management during the implementation of the project will result in good cost performance of the project and vice versa is true.
10	Poor communication	If no clear communication between the project stakeholders, it may result in slow decision making, and misunderstanding hence may result in project management and cost implications.
11	Material price fluctuation	During the duration of the project, implementation prices may vary and affect the initially planned costs of materials.
12	Inaccurate cost estimation	This might be due to incomplete project documents and some other reasons that lead to poor cost estimation during the project initiation.
13	Design change	This might be caused by the client deciding to add more specifications to project
14	Delay in site clearance certificates	Site certificates delay leading to long waiting time hence increasing costs.
15	Workers motivation	This will help to stimulate employees' ability to work hard to meet the project time frame and hence reduce project delay and lead to balanced costs.
16	Theft of materials	This causes the increased cost of buying new materials which were not planned before.
17	Default machines	Unavailability of equipment can cause delay and unnecessary maintenance costs and delays in the project and cost implications too.
18	Lack of project coordination	Poor interaction between the project manager, project team and other stakeholders will lead to delays in time and finally compromised cost management.
19	Project complexity	The more the difficult project is, it might intervene cost management
20	Land acquisition delay issues	The delay in land compensation payments may cause time overrun and cost overrun due to increased overhead expenses incurred in waiting time.
21	Weather condition	This includes things like floods and other natural situations that can happen during project implementation
22	Political situation	
23	Delay in the supply of materials	Difficulties in logistics of material transportation may cause a delay in project implementation hence added costs
24	Poor contract management	Poor management of contracts can lead to disputes between the project stakeholders and may increase the cost.
25	Experience in subcontract management	When employees have enough experience with the project, this reduces reworks and delays in schedule and may affect cost management positively
26	Cost of service relocation	This can increase the cost if not well planned from the beginning of the project.
27	Schedule delay	This might be caused due to reworks, slow decision making hence may cause the effect to cost management.
28	Incomplete design	Incomplete design documents may lead to wrong cost estimation.
29	Inaccurate estimation of the contingency.	This is emergency money to cover unpredictable situations that might happen during the project implementation to cover extra expenses, wrong estimation may cause cost overrun.

Source: Author.

2.3. Research Direction

Apart from passing through the literature survey conducted in this paper, there is a need to do more and more literature review to come up with as many factors as possible, though most countries share almost the same factors that affect cost management, still, there is a huge gap of research articles concerning the issue of cost management in Tanzania, very few scholars talked about the factors that affect cost management in the construction industry, particularly in highway roads. Furthermore, not only more literature review should be conducted on this crucial topic in project management but also further real-life research should be

conducted in this area, especially in Tanzania where there is a big gap to identify the challenges in this sector and to recommend the possible ways to improve the industry.

3. Conclusion and Recommendation

From the literature review and the summary of these fifteen research papers, it can be deductively concluded that, the construction industry has got the challenges in the area of cost management in different projects, there is no doubt that the above-identified factors compromise the cost management in different countries in the world, however, it can be very early to conclude to what extent these factors affect the highway

road construction projects in Tanzania, but according to the literatures, factors like *competence of project manager and subcontractors, change of scope, change in design, conflicts among the stakeholders, communication issues, inaccurate time and cost estimation, project complexity* are among the very influential factors that should have a close look during the implementation of these projects, although further research is needed to prove these assertion on how and to what extent these factors and the rest of the factors affect the cost management in highway construction projects in Tanzania and this can help to identify the particular recommendations to improve the construction industries.

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