

# Construction Project Delays in Rwanda: A System Thinking Approach

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**Abstract:-** This study examined the causes of construction delays in Rwanda by setting up a system-thinking approach. It attempted the investigation of the efficiency and mitigation measures through a model that will curb the project delays in the country. Rwanda presents a high rate of project late delivery of which the research investigated the root causes in order to come up with a concrete solution by adopting a model alleviating the issue of delay at hand. In order to boost the company's performance, there is a need to cut off the delay root cause and this will fix the issue of financial losses that many construction companies are facing nowadays. During the study, the researcher adopted the secondary data use via descriptive research responding to the research questions through a quantitative research method. This said that critical causes of projects delay have been analyzed throughout the study and it has been noted that the delay factors include but not limited to consultants, contractors and owners. Therefore, project construction delays contribute to the companies' inability as a hinder to professional performance. Hence comes an issue of balancing the time, quality, and cost. This paper covers the critical causes of construction delays from a substantial connection of contractor, consultant, and owner delay-related factors in Rwanda.

**Keywords:** Construction Project Delays, System-Thinking, Rwanda.

## I. INTRODUCTION

Rwanda as any other country under development, the building sector plays a significant part in developing the economy. After all, the jobs created and the contribution to the national budget show that the timely delivered projects have a huge impact, and any delay has to be taken care of. This is echoed by Rwanda Infrastructure report (2022) which says that 7.6% of GDP industry contribution and it is projected to 9.2% in 2031. In this regard, Rwanda's development is watched across different sectors with considerable input to the country's GDP including construction.

From the above background, delays form a setback to the economy by being a barrier to the people's prosperity due to the project financial problems. This said, projects with acceptably performance contribute a lot to the country's development (Aimable, 2015). Like the other countries, Rwanda still faces the on-time project delivery due to various reasons from the stakeholders. In the project implementation phase, a close monitoring to each and every action leads to the efficient delivery and help to tackle any sign of delay in case there is a potential project risk of falling off the track.

Concerning the law governing public procurement (2018) in Rwanda, works not done are subject to a penalty of 1% each day of delay and potential termination in case the delay damages exceed 5%.

In Rwanda, construction delays are becoming increasingly common as a bad reputation to construction firms. This is totally a threat to the doing business framework as investors may pull interest in coming to Rwanda. To avoid any bad image to the country, a thorough assessment of the root cause has to be initiated so that a solution to the immediate cause is crafted. Therefore, this research aimed at feeding a system thinking approach to alleviate the causes of project delays in Rwanda by specifically analyzing the critical causes of delays, examining the effectiveness and efficient of mitigation measures. Finally, the research suggested a model mitigating construction project delays in Rwanda to avoid unnecessary burdens to the country and the project stakeholders.

## II. LITERATURE REVIEW

Many global trends on project delays have been done, but development objectives are hampered by the delays that the sector is still facing. Amoatey et al. (2015), Aiyetan et al. (2011) in South Africa, Haseeb et al. (2011) in Pakistan, Rahsid et al. (2013) in Pakistan, Alnuaimi et al. (2013) in Oman, Alinaitwe et al. (2013) in Uganda, Aimable (2015) in Rwanda, Abedi et al. (2017) in Malaysia, Yves I., (2021) in Rwanda, James, B., (2021) in Rwanda. Muizz et al. (2022).

Through the past literature review, it is crystal clear that the delays come from the inadequacy of labor force associated with the required skills in line with quality, time, and cost. This explicitly shows that inadequacies of the expertise or resources have a say on the project failure through problems from the client, consultants, and contractors' inability.

### A. Global Trends in Project delays

Muizz et al. (2022) revealed that the construction industry objectives are still facing losses and hiccup due to the fact that the achievements are not well recorded for future references. This prevents any systematic review as far as the trends of project delays are concerned.

The sector sets aspects to refer to when it comes to mitigate the delays however, Ryu et al. (2005) showed that the projects are still not completed on time despite determinations to finish the works. This is due to the fact that the types of construction delays are determined with a clear classification of project liabilities (Menesi, 2007).

Through the research, Pejman (2012) emphasized that any probable risks to a given project are coupled to the objectives drawbacks and have to be assessed with reference to objectives and potential project negative effects. As advised by the researcher, the team has to stick to the planning and strive to ascertain the potential risks by putting in place an adequate measures and methodology to fight against any harm on the project scheduling.

With the help of the client team, a positive impact on the smooth run of the project is always observed as per Long (2014) assumptions. That is why keeping an eye on the risks that hinder the project implementation through its life cycle cast a way to meeting the targets (Nerija and Banaitis, 2012).

In order to be sure that the project will be implemented on the right path and meet the target on time, the choice of the contractor plays a crucial role. Pongpeng and Liston (2003) underlined that any project with bad scheduling, cost understatement and other challenges leading to legal battles result from the bad contractor. Having a contractor or a team experienced and presenting an adequate project expertise ensure a notable quality control and assurance during construction and this enables the application of the adequate standards and competence from the contractor and consultants' side.

The construction delays are not necessarily observed during the implementation but by the way the project initiation is crafted. For instance, Lim and Ling (2002) proved that the client project understanding poses a big threat to the project objectives if the explanation provided to the team is not adequate. This explained that project to meet the

objectives requires a client team fully understanding what do they so that the players can easily depict from the start what is required to be done in order to achieve the intended purpose. A project successfully passing through all stages of proper monitoring is implemented in a way giving an assurance that the standards and compliance are met by the implementors. This will not allow the development of poor designs and no effect on the project performance.

Again, the ability of the client team to ascertain what is required to have the project objectives met, has a big influence and always lead to the project delays if the processes from the start up to the completion do not meet the required and set standards of quality as noted by Sambasivan and Soon (2007).

Enshassi et al. (2019) labeled the consultant solely responsible for guiding the client on the smooth project implementation and measures to be taken for any harm likely to hinder the project objectives. Therefore, lack of appropriate actions to bring the project on track contribute to the high risk of missing the project deliverables and potential financial losses on the client side.

*B. The System Thinking Theory*

Providing solutions to the issues at hand by gathering the necessary information is also termed as a system thinking. As concluded by Dominici (2012), the system directs the ideas of addressing the concerns and the scenarios of factors contributing to the issue in question. This said, a Systems thinking is a set of combined skills to recognize and detect the actions to be taken towards a positive status different from the one strayed from.

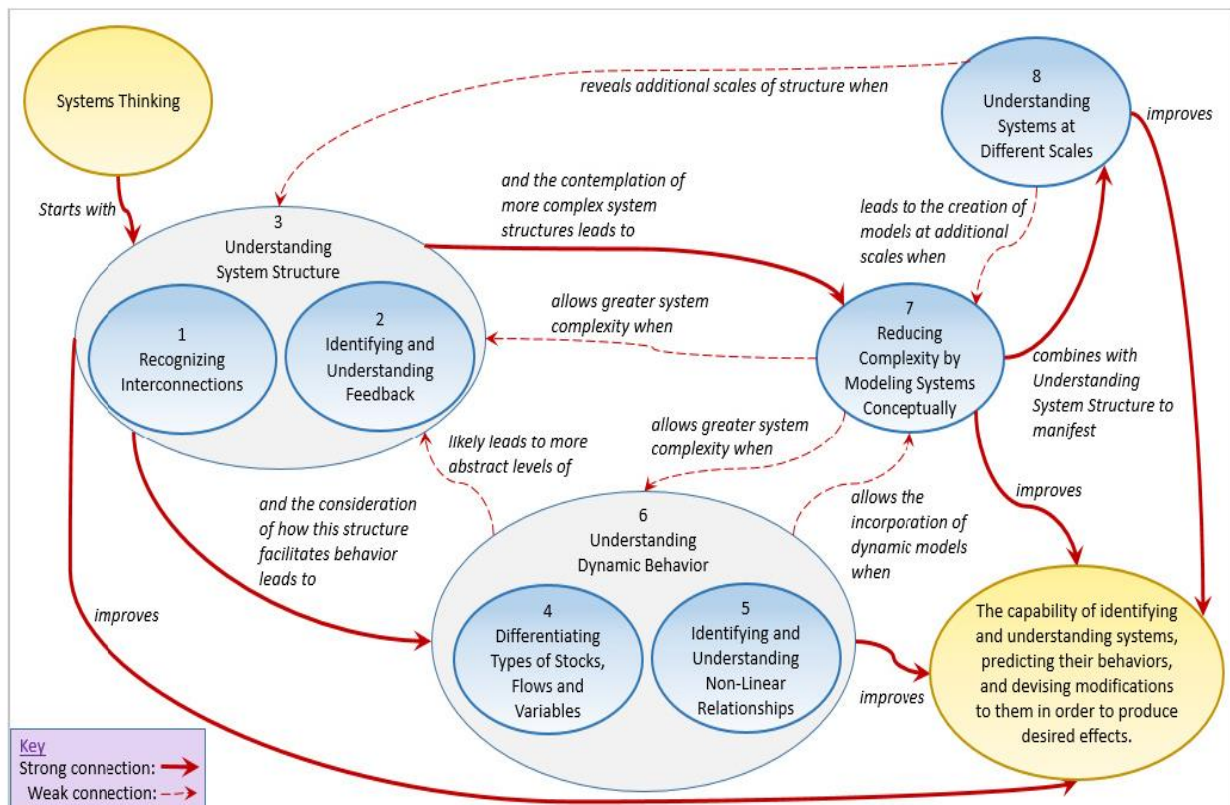


Fig. 1: System Think Systemigram according to Arnold and Wade (2015)

### C. Present approaches to Project delivery

Based on the measures being adopted by different players in the construction sector, a well structured option is to exploit any method allowing the minimization of project delays as noted by David and Andrew (2010). This action is the trusted one because it avoids at all costs any losses and it is unlikely to change the nature of project deliverables.

To this effect, the major causes of project delays termed as critical have to be examined little by little so that a patentable and accessible model is in place for the sake of the project deliverables.

With adequate measures in line with the project implementation, there is a hope to not face any negative effects on its intent. For client and contractor who are the main man in the project path to success, Zarei, Sharifi and Yahya (2017) advised them that failure to put in place required risk management tools, losses will hit every side involved in the project.

Therefore, the practitioners in the construction sector have to preserve the status quo laid out during the project initiation stage by the client intent so that it reaches over the project stages leading to for a satisfactory project performance.

### D. Construction Project Delay Factors.

Rachid et al., (2018) explicitly proved that a project to face delays encounters various factors as a contributor to the delays. They clearly mentioned that cost overruns, falling behind the planned timeline, client late payment and lack of skilled human resources have a significant impact on the project implementation and completion as well. It is in this regard; the client is the sole key agent with a prime focus aligned with the project intent and any endeavor has to match the project deliverables.

The above was echoed by Akintoye (2002), Taken and Majid (2016) where they clearly highlighted that a project to be called successful must meet the planned budget and this is only achievable in case of adequate management tools allowing to preserve the client targets in a timely manner.

Many projects face delays due to the disruption of the supply chain. Serdar et al. (2017) showed that lack of construction materials and skilled work in Cambodia is ranked as the major cause of the project delay and it is associated with the bad scheduling and where available, materials are delivered late still hindering the project timeline.

To effectively deal with the project delays issues, stakeholders have to understand their role in the smooth run of the project especially the client when it comes to timely payments and quick decision making. This was explained by Fugar and Baah (2010) in their survey related to project delays in which they found out that stakeholders play a big impact in causing delays or mitigating them notwithstanding that the owner is the most influencing factor when it comes to observed delays.

Below are the factors to the project delays but not limited to:

#### ➤ Contractor's Linked Factors

From the implementation point of view, Enshassi et al., (2019: 126-151), detailed that bad site management coupled with the unavailability of budget for the supplies are the most ranked. Therefore, contractor's cash flow concern is the most factor affecting the project progress.

However, in Rwanda, the office of Auditor General for state finances (OAG) reported that some Government projects are abandoned and or halted by the contractors even after getting paid This issue reported on Government projects constitutes litigation wasteful expenditure as well (Office of the Auditor General, 2021).

#### ➤ Consultants' linked factors

The consultant is the one with an utmost role of advising the client or overseeing the implementation on behalf of the owner. However, consultants with inadequate experience and skills pose a threat to the project implementation rather crafting the way forward on emerging or potential project risks. Based on this, Enshassi et al., (2019) drew a list of delays associated with the consultancy assignment namely lack of knowledge, understaffing, inexperience and delay in making decisions.

#### ➤ Client Linked Factors

Normally, the project intent showed the client will and for it, to be met there has to be a notable contribution from the client decision being quick decision and giving a path to follow towards the successful implementation. Ultimately, several reasons that hinder the progress such as budget readiness, variation orders, bad scheduling and timely decisions stand on the owner's side. Various research identified client late payment as a big threat to the project delivery because subcontractors and suppliers' obligations are not assumed. Therefore, the bearer of the project intent should make whatever is required to spearhead the project deliverables in a timely manner.

### III. RESEARCH METHODOLOGY

The strategy was to collect, re-evaluate, and respond to the research topic to produce accurate results. Through the research design, the root causes of the project delays have been examined. In order to come up with tangible results to base on the conclusion, matters such as availability of data, study duration, techniques to be used, required resources, and ethical behavior have been considered during the study design. This allowed a strong note on the methodological choice to lay strategy responding to the problem at hand that triggered the research. In the study, three methodological choices namely qualitative research designs, quantitative research designs, and mixed research designs are considered from which the required data have been gathered from an entity in charge of housing sector regulations in Rwanda with the consideration of other professionals in the industry. In this research, a statistical analysis technique aiming on the project delay facts was adopted to develop measurable results through descriptive statistics.

#### IV. FINDINGS AND DIS

Rwanda put in place the housing regulations tackling the issue of unprofessionalism and the capacity of the industry practitioners in order to adhere to the required standards. However, regulations in place do not strike out when it comes to on-site implementation as challenges are still observable. Any process leading to undertaking a project in Rwanda is clearly defined from the budget planning all the way to the final stage of implementation but still, for an observable delay, questions are still asked for a given factor which proved to have a solution to it in consideration the project packages that were set in the early days of the project initiation.

Given the current status of construction project implementation, the harm raised on the contractor's selection, ability to withstand the project demand, consultants' expertise and the client commitment to address any potential risks likely to happen. Generally, projects face the delays due to the know-how from the concerned stakeholders, quality not taken care of, bad scheduling and changing the contractor which led to significant delays procurement process is restarted in such case.

Based on the project delay factors, a model curbing the delays was illustrated through an insight of can be ensured towards the project objectives delivery. The study monitored and verified a rate of 69% delayed construction projects in 2013-2020. 16% of these projects faced a cost overrun due to inadequate designs, contractor's financial muscles, late payments and the global pandemic Covid-19 which affected the supply chain.

##### A. Factors contributing to project delays.

The research examined the following as project delays factors:

- Factors linked to Government.
- Factors linked to contractor and consultant.
- Factors linked to materials and equipment.
- Factors linked to budget provisions.
- Factors linked to project planning and time control.
- Factors linked to stakeholders.

##### B. Analysis of Project Delays

During the research, it was noted that the consultant's lack of experience contributes to the project delays at a level of 39.6%. On the other project side, the lack of skilled labor from the contractor is termed as one of the major causes' delays whereas poor site management contributes to the construction delay at a rate of 67%. However, inadequate pricing poses also strong arguments on the delays that impact considerably the project completion. This has been confirmed by the Office of the Auditor General which showed that the rate of 16% faced addendums (RHA, 2021).

During the research, factors linked to stakeholder's delay occupy a rate of 71% whereas 23% agree with a caution. Factors linked to the contractor has a rate of 63% towards the project delay contribution whereas the consultant's factor occupy a rate of 35.8% as opposed to client factor scoring a rate of 52.3%.

To have a smooth project implementation aligned with the project deliverables, contract documents play an important role. However, 34.2% emerged as a delay factor between the contract document and delayed project.

##### C. Easing Measures for the Project Delays

Rwanda like other countries all over the world, the Government occupies the primary position as the projects. Given that the factors for project delays are similar but may be different depending on the country where the private sector has a notable involvement. Creating mitigation measures aimed to minimize the delays presents some difficulties as far as the budget availability and the level of understanding from the players in the industry are concerned. Consequently, the researcher explored the critical causes and found out that the most prevalent factors that are excusable are from the contractor and consultant. However, being excusable but inter-linked with the owner's cash flow availability poses a big threat when it comes to mitigating the delays or alleviate the causes. Therefore, findings showed how delays impact the project on-time delivery and the most efficient method is to resort to the adequate selection of contractors and consultant through an employer's requirements highlighting the required expertise financially and technically.

D. Suggested Model to Ease the Construction Project Delays in Rwanda

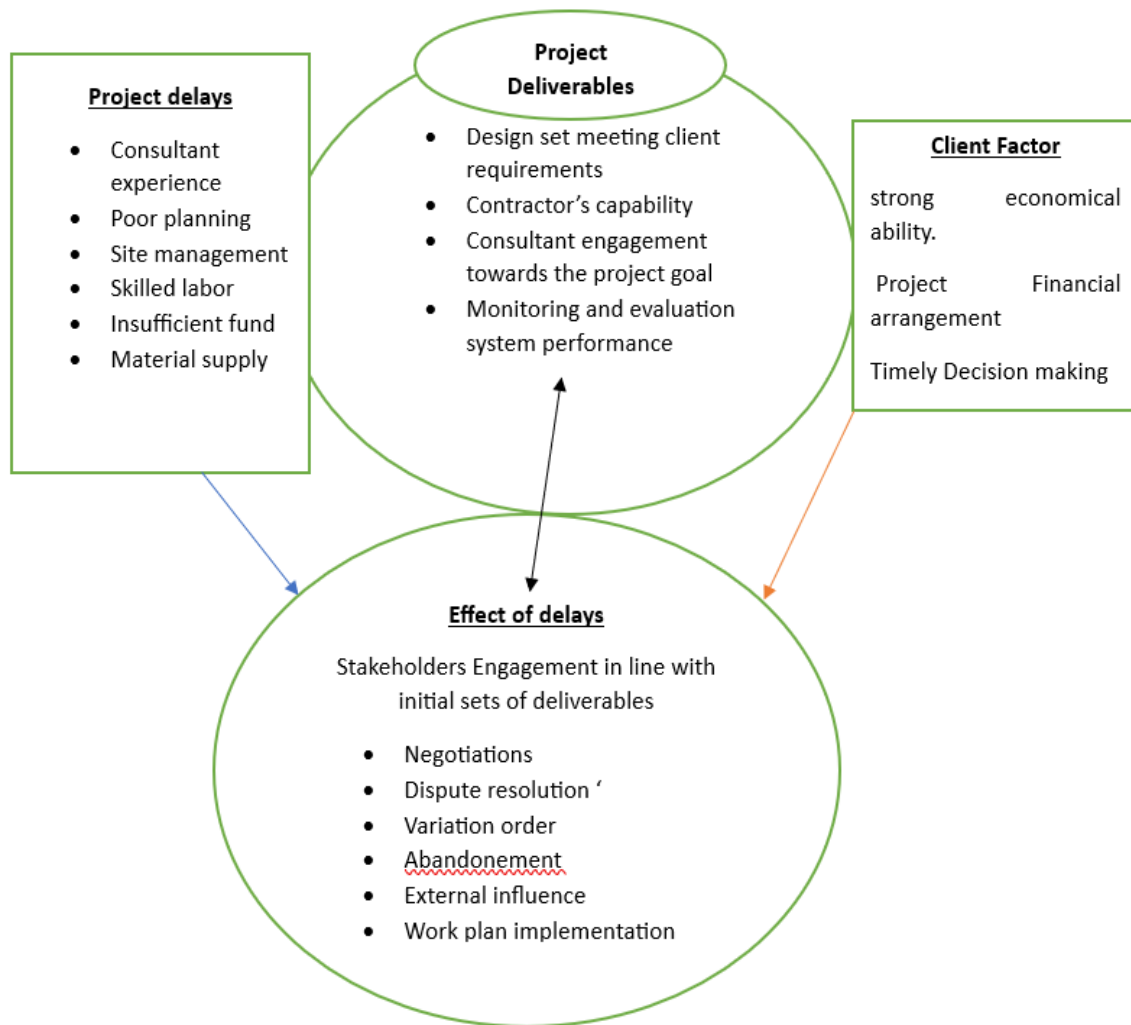


Fig. 1: Proposed Model to ease the construction delays in Rwanda.

E. Establishing a system thinking approach

In this research, the delay factors are namely three-fold: the client, contractor, and consultants without forgetting other linked causes such as supply chain issue, payment and inadequate expertise. Therefore, an established model has to take into consideration all the important factors hindering the project implementation from the initiation stage up to the project close out and tackle efficiently the construction effects caused by bad scheduling, poor site management, inadequate designs, lack of skilled people, supply chain, cost underestimate, understaffing, procurement process and delayed decision.

V. CONCLUSION AND RECOMMENDATIONS

A. Conclusion

To ultimately ease the delays, the owner should take the lead in monitoring and properly following up the plan put in place ahead of undertaking the project. A rational methodology for deciding on project parties has to rely on the funds availability in order to avoid late payments that largely affect the contractor's cash flow and the delivery of materials on site. Additionally, contract documents should be well prepared to the fact that any delay or potential risks can be dealt without any hiccup to the planned project milestones.

B. Recommendations

During the project initiation, the client intent has to consider the modern tools because a project with new equipment cut down the workforce and the time required to have the project completed. This action will alleviate the issue of losses in human resources, inadequate expertise and not meeting the timeline set. Therefore, project planning with clear milestones has to be aligned with the traceable progress status and the situation at hand so that stakeholders are not dragged into legal battles resulting from the bad planning. Otherwise, quarrel will be inevitable and will lead to project drawbacks.

C. Recommendations for future considerations

- The client's task is to identify any potential risk linked to the funds' availability and draw a way forward against that in case it happens.
- To factor in the project external influence and their effects on the planned budget and timeline.
- To benchmark the impacts of project delays on the construction sector vis-à-vis the sector readiness to handle their disruption on the industry development.

#### D. Limitations and Practical Implications

- The construction sector in Rwanda presents a considerable limitation as it is a sector without records of what happened in the past and what is bridging the past and the present. Due to the fact that the practitioners in the sector do not keep their records for future consideration, losses incurred in the industry continue to be similar for a while.
- Supply chain is also considered as a key player in the project implementation, however, the construction sector in Rwanda does not have record of supplier's capability; qualifications and required performance to be considered during supplier's selection. That is why material delivery is still a challenge as they simply rely on contractor's payment and client cash flow, yet the disbursement has a set time during the supplier has to continue delivery until the payment is effected.

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