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# Improving Pre-Construction Planning on Public Construction Projects: An Analysis of the Time Allocated to the First Three Project Work Stages of the Construction Process

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**ABSTRACT**

**Purpose:** Time allocated to the initial three work stages of the construction process in South Africa is crucial for the success and completion of public construction projects. The paper evaluates the factors influencing the time allocated in the initial stages. Identifying challenges, best practices, and optimization opportunities in pre-construction planning procedures in public construction projects to identify areas of improvement.
**Design:** Use of a questionnaire allowed data to be collected from the built environment professionals involved in the pre-construction planning stages of public construction projects.
**Findings:** The study finds that the factors influencing time allocation in pre-construction work stages are closely linked to respondents' perceived knowledge. These factors have a significant effect on the time allocated in the pre-construction planning stage and they are not fully optimized to improve project outcomes of the time allocated in the pre-construction work stages.
**Value and contribution:** Sufficient pre-construction analysis is important in establishing a project's scope, giving stakeholders insightful information, and guaranteeing the project's successful completion.
**Research Assumptions:** Sufficient time allocation in pre-construction planning is linked to successful project delivery and the three pre-construction planning work stages are inception, concept and viability and design development.
**Conclusion:** This study emphasizes the importance of adequate preparation time in the first three work stages to define a project's scope, provide stakeholders with useful information, and ensure the project's successful completion. It highlights the need for public construction project stakeholders to prioritize sufficient time allocation in the pre- construction planning stages for project efficiency.

**Keywords**: Public construction projects, Pre-construction planning, Project work stages, Time allocation

## 1. INTRODUCTION

Public construction projects are essential to a nation's economic development[1]. These projects' success or failure is mostly determined by a few important factors (the knowledge of the project stakeholders and the type of project being developed) that significantly impact their performance[2]. Pre-construction planning guarantees that project needs are satisfied, and any design difficulties are addressed early on by developing thorough designs and engineering plans. During pre-construction planning, creating an organized construction schedule facilitates the proper sequencing of tasks, resource allocation, and management of project schedules[3]. Pre-construction planning determines the project's goals and parameters by determining the requirements and expectations of stakeholders to guarantee alignment with project objectives[4].

There is occasionally pressure on construction projects to mobilize as soon as possible, which results in erroneous plans and unrealistic schedules[5]. This reckless assumption strains all parties involved and leads to expensive pauses, conflicts, and lawsuits[5]. A project needs thorough pre-construction planning to be successful, it requires managing cash flow, setting aside ample time, and giving the design careful attention[6]. Early design defect resolution allows for identifying and resolving many issues, improving project performance, and facilitating a more effective construction process[6]. A well-developed preconstruction strategy can ensure successful construction projects[7].

The pre-project analysis is a crucial component of the project design; in addition to helping project managers, it offers a great deal of assistance to significant stakeholders, by giving them information that clarifies the project's scope[8]. The successful completion of constructing and commissioning facilities relies on a seamless progression through the following stages: inception, concept and viability, and design development. The duration of each stage is determined by the competency and collaborative interaction among participants involved in an investment and construction project[9].

The necessity of pre-construction planning for public construction projects, their difficulties, and the inefficiencies that arise from insufficient time allocation in the first three work stages (project initiation, project planning, and design development) are the driving forces behind this research. The 2022/2023 Annual report from the Department of Public Works - KwaZulu-Natal highlighted that failure to offer appropriate project scopes and adequate budgets for projects previously committed to is one of the pressures Public Works faces. [10] on their National Planning Commission Economy Series - Background Paper listed the following major contributors to the unsatisfactory outcomes from infrastructure projects; defects in the identification, appraisal, and preparation of the project; failures in decision-making and management, identifying stakeholders, internal and external communications, and making sure the project aligns with the government's strategic objectives or any changes to those objectives; political meddling and impractical deadlines; the absence of suitable ability, expertise, and experience among people in charge of organizing, directing, and supervising the construction of infrastructure. The above reports on what is viewed as challenges to meet the desired project outcomes in the public construction projects clearly shows there is a problem in achieving a successful pre-construction planning stage and hence there is a need for this study to be carried out.

Infrastructure projects and public facilities are important for boosting the country's economy; therefore, it is imperative for the planning of these projects to be done properly. This study is intended on addressing the issues highlighted by the 2022/2023 Annual report from the [23] and the study by [10] for the purpose of improving the outcomes of the public construction projects through allocating sufficient time in the first three project work stages and addressing the challenges faced in these stages.

A construction project's successful execution and completion depends on the efficient planning and execution of its pre-construction processes [7]. There is constant pressure on construction projects to meet unrealistic deadlines, which results in costly delays and inaccurate planning that puts strain on all stakeholders[5]. Sufficient time allocation in pre-construction planning is important in establishing a project's scope, giving stakeholders insightful information, and guaranteeing the project is successful completion [8]. The study investigates the factors influencing the time allocation to the first three project work stages of the construction process in South Africa, and how these allocations impact project outcomes. This study focused on the Gauteng and KwaZulu-Natal regions. Participants consisted of stakeholders/ professionals involved in the first three project work stages. The study was limited to the pre-construction stages namely inception stage, concept and viability stage and design and development stage.

Finally the study aims to investigate the factors influencing the time allocation to the first three project work stages of the construction process in South Africa, and how these allocations impact project outcomes. This will be achieved by: analyzing factors affecting the allocation of time in the preconstruction planning stage, evaluating the impact of time allocated in the pre-construction planning stage, analyze how technological techniques can be leveraged in the pre-construction planning stage to achieve project efficiency, and lastly determining best practices and strategies that can be implemented to effectively manage time allocation in the first three project work stages to improve construction project outcomes in South Africa.

## 2. LITERATURE REVIEW

### 2.1 Public Construction Projects

According to [11] infrastructure projects (such as roads, bridges, and transportation systems) and public facilities (such as schools, hospitals, and libraries) are examples of public-sector building projects that are financed, owned, and run by a government for the benefit of the general public. One important area boosting the country's economy is the construction industry. It offers a wealth of infrastructure for other sectors, including health, education, and transportation, which increases employment and revenue for the entire society [12].

### 2.2 Pre-construction Planning

Pre-construction planning is critical to the successful execution of any construction project. It encompasses a variety of early-stage activities such as securing permits, assessing the construction site, preparing technical documents, managing project cash flow, and resolving design issues early to avoid delays and cost overruns [6;9]. According to [6], pre-construction planning enables proactive identification of potential project challenges and supports better risk mitigation. [9] emphasize that tasks such as site approval, title acquisition, and engineering studies lay the foundation for a smooth project execution. The design development phase is particularly critical as it involves producing and approving comprehensive engineering documentation.

### 2.3 Time Allocation in the Pre-construction Planning Stages

Time allocation in the pre-construction planning stages is a crucial step in ensuring the smooth and efficient execution of a construction project [13]. This involves determining how much time should be allocated

for each phase of the project, including design, procurement, permitting, scheduling, and construction [14]. By properly allocating time for each stage, project managers can effectively plan and coordinate resources, identify potential risks and challenges, and ensure that the project stays on track and is completed within the designated time frame [15].

### 2.4 Factors Affecting the Allocation of Time in the Pre-construction Stage

Recognizing and comprehending pre-project elements, such as the necessary actions and sequences to minimize the chance of project failure, should be adhered to from project inception through design completion [8]. Entrepreneurial factors involve the generation of ideas oriented towards the pursuit of a project, including several alternatives to financing schemes and appropriate project design. Time allocation during pre-construction is influenced by several key factors. Resource and knowledge accessibility, including the availability of materials, equipment, skilled labor, and centralized knowledge systems, enhances decision-making and collaboration [16]. Timely access to accurate information prevents scheduling delays and improves coordination [17], while streamlined regulatory procedures reduce red tape and accelerate project timelines [18;19]. Project complexity also plays a role, as larger, more technically demanding projects require additional planning time [8; 13]. Effective stakeholder participation is crucial, as poor management—such as mishandled payments and non-compliant tenders—can cause costly delays [20; 21; 22; 23]. Thorough site assessments, including soil analysis and environmental studies, ensure accurate planning [13]. Collaboration between architects, engineers, and consultants during design development shapes pre-construction timelines [13], while accurate budgeting and cost estimation help prevent overruns [13; 8; 24]. Early risk assessment, addressing factors like weather disruptions and labor shortages, supports contingency planning [13]. Incorporating value engineering balances cost, quality, and time, ultimately improving project outcomes [13]. Lastly, a comprehensive project schedule, outlining tasks, milestones, and deadlines, ensures proper time distribution for each activity [13].

### 2.5 Impact of Time Allocation on Project Effectiveness

One of the most crucial elements that might influence whether the project's goals are achieved is the efficient and effective use of time [24]. The distribution of time among various tasks and phases significantly affects the outcome of a project [25]. Effective time management is essential to the success of any project because it can significantly affect the following; reaching project completion benchmarks, and efficient time allocation is critical to attaining project completion milestones [25]. By allocating time properly to tasks and activities, projects are more likely to move smoothly and meet their intended goals within the timeframe [5].

#### Reducing the Number Of Delays and Interruptions

Proper time allocation helps to reduce delays and disruptions during project execution. When time is allocated properly, it allows for better planning, coordination, and execution of tasks, lowering the possibility of setbacks and interruptions that might slow project development [25]. The impact of time allocation on reducing interruptions during the pre-planning stage of projects was studied by [26]. To minimize delays and interruptions [26] investigated the efficacy of different time allocation strategies used during pre-planning. According to their findings, it is crucial to provide enough time during the pre-planning stage for thorough risk assessment, stakeholder participation, and precise scope definition. Project teams may prevent delays and disruptions, create strong backup plans and lay the groundwork for a successful project’s completion by allocating enough time to these tasks. The importance of time is emphasized in this study.

### Team Productivity and Morale

Well-structured time allocation fosters a productive working environment, allowing team members to focus on their responsibilities without burnout. [9] suggest that this structured approach improves individual performance and strengthens overall team dynamics. [25] also emphasizes that fair workload distribution enhances morale and reduces fatigue.

### Stakeholder Satisfaction and Risk Mitigation

Timely project delivery increases stakeholder confidence and fosters long-term partnerships. Accurate time estimation also plays a critical role in mitigating risks related to resources, scheduling, and communication breakdowns [9].

### Quality control and Flexibility

Allocating enough time for each phase of the project allows teams to concentrate on quality control procedures. Short deadlines frequently result in deteriorated quality since there is insufficient time for rigorous testing and refinement [25]. Effective time management provides built-in flexibility to accommodate unforeseen changes or setbacks. Projects with strict deadlines may struggle to adapt to changing circumstances, but those that have sufficient buffers can alter without compromising overall effectiveness [27].

### Learning and Improvement

Reflective time allocation strategies enable teams to analyze and learn from previous experiences. This iterative method promotes continual improvement, resulting in more successful project management procedures in the future [27].

## 3. RESEARCH METHODOLOGY

This study focused on built environment professionals — including Architects, Quantity Surveyors, Engineers, and Project Managers — involved in public construction projects during the first three work stages. The population was drawn from Gauteng and KwaZulu-Natal provinces, using a non-random sampling method. The sample size consisted of 70 participants, with 50 completed questionnaires, achieving a 71% response rate. Data collection involved questionnaires distributed via Google Forms which were divided into three sections: participant qualifications, project information, and factors influencing time allocation and its impact on project outcomes.

The study acquired Ethics clearance in accordance with the requirements of the institution and department. Confidentiality and anonymity wasensured with all participants, ensuring fair treatment of all participants, with care for participants, accurate reporting and avoiding any conflict of interest throughout the study.

## 4. FINDINGS AND DISCUSSIONS

### 4.1 Demographic Characteristics of Respondents

The professional qualification respondents' reveals that 22% of the respondents were Project Managers, 2% of the respondents were Risk Managers, 4% of the respondents were Contractors, 2% were Architects,

46% of the respondents were Quantity Surveyors, 4% of the respondents were Engineers, 6% of the respondents were Construction Managers, 8% were Town /Urban Planners and 6% of the respondents were Building Inspectors.

### 4.2 Challenges/ Factors Hindering The Successful Implementation Of Pre-Construction Planning For Construction Projects

Table 1 shows the ranking of the Challenges/ Factors hindering the successful implementation of pre-construction planning for construction projects. According to the rankings the first factor/ challenge is insufficient collaboration among stakeholders with a mean item score of 4.41 and the second factor/challenge is lack of understanding of pre-construction planning with a mean item score of 3.86, the third factor/ challenge insufficient funding allocated for pre-construction planning implementation with a mean item score of 3.82, the fourth factor/ challenge is lack of structured frameworks and guidelines for pre-construction planning with a mean item score of 3.76, the fifth factor/ challenge is time constraints due to the dynamic nature of construction projects with a mean item score of 3.64, the sixth factor/ challenge is resistance to change within the organizational culture and the two 7th factor/ challenge are unclear roles and responsibilities in pre-construction planning and Lack of technological support for implementing pre-construction planning with a mean item score of 3.54.

**Table 1**: Challenges/ Factors hindering the successful implementation of pre-construction planning for construction projects

| CHALLENGES | SD | D | N | A | SA | Total | MIS | R |
|---|---|---|---|---|---|---|---|---|
| Insufficient collaboration among stakeholders | 1 | 4 | 7 | 13 | 25 | 50 | 4.14 | 1 |
| Lack of understanding of pre-construction planning | 1 | 2 | 10 | 22 | 15 | 50 | 3.96 | 2 |
| Insufficient funding allocated for pre-construction planning implementation | 1 | 6 | 9 | 17 | 17 | 50 | 3.86 | 3 |
| Lack of structured frameworks and guidelines for pre-construction planning | 0 | 5 | 11 | 22 | 12 | 50 | 3.82 | 4 |
| Time constraints due to the dynamic nature of construction projects | 1 | 6 | 12 | 16 | 15 | 50 | 3.76 | 5 |
| Resistance to change within the organizational culture | 2 | 6 | 10 | 18 | 11 | 47 | 3.64 | 6 |
| Unclear roles and responsibilities in pre-construction planning | 2 | 7 | 15 | 14 | 12 | 50 | 3.54 | 7 |
| Lack of technological support for implementing pre-construction planning | 0 | 8 | 17 | 15 | 10 | 50 | 3.54 | 7 |

*Note: MIS=Mean Item Score; R= Rank*

According to the rankings (R), together with the calculated mean item score (MIS), it was found out that the challenges/ Factors hindering the successful implementation of pre-construction planning for construction projects sector are as follows: insufficient collaboration among stakeholders (MIS=4.41; R=1), lack of understanding of pre-construction planning (MIS=3.96; R=2); insufficient funding allocated

for pre-construction planning implementation(MIS=3.86; R=3) lack of structured frameworks and guidelines for pre-construction planning (MIS=3.82; R=4); time constraints due to the dynamic nature of construction projects (MIS=3.76;R=5), resistance to change within the organizational culture(MIS=3.64; R=6); unclear roles and responsibilities in pre-construction planning and Lack of technological support for implementing pre-construction planning (MIS=3.54; R=7). According to [28], many variables and feedback from many stakeholders impact the project at this early stage of development and that is in agreement with the findings. Understanding and satisfying client expectations is an important part of preconstruction planning [29] According to [29], accurate scheduling during pre-construction planning is critical for developing realistic project timeframes and milestones. The following practice implications have been discovered as a result of the factors affecting the allocation of time in the pre-construction planning stage. According to [22] effective stakeholder management is essential to the success of building projects. Allocating adequate time for each activity and allowing for contingencies helps guarantee that the project remains on track [30].

### 4.3 Adequacy Of Time Allocated To Each Of The First Three Work Stages (Inception, Concept And Viability, And Design Development) In Public Construction Project

The study's findings on time allocation for the first three work stages in public construction projects revealed that 42.6% (20) of respondents found the time allocated to be inadequate, while 40.4% (19) considered it adequate. Additionally, 10.6% (5) rated it as very inadequate, with the remaining respondents indicating that the time was either more than adequate or excessive. [17] emphasized that projects with adequate pre-construction planning time have better efficiency, less rework, and shorter schedule delays. The insufficient amount of time allocated during the preliminary phases of pre-construction planning has been repeatedly associated with projects that fail to be successful, according to numerous publications and studies [31]. Allocating adequate time for each activity and allowing for contingencies helps guarantee that the project remains on track [30]. Adequate time allocation in pre-construction planning is critical for ensuring quality control in construction projects [19].

The findings from the interviews revealed several factors influencing time allocation across the first three work stages of public construction projects. In the Inception Stage, key factors included the identification of stakeholders, failure to clearly define project objectives, client expectations, financial objectives—often influenced by funding availability—and external constraints such as planning permissions and legal requirements from consultants or authorities. During the Concept and Viability Stage, time allocation was affected by the nature of the project, the type of contract used, funding allocation, project complexity—especially for projects initiated due to non-compliance—limited involvement from end-user clients, delays in appointing required consultants, payment for succeeding stages, and scope changes or scope creep. In the Design Development Stage, the primary factor was the client's capacity to review documentation and provide timely approvals.

These findings align with both the survey results and the literature review. According to [28], multiple variables and feedback from various stakeholders influence projects during the early stages of development, supporting the interview responses. Understanding and meeting client expectations are vital components of pre-construction planning, as highlighted by [29]. Accurate scheduling during this phase is crucial for establishing realistic project timeframes and milestones. Furthermore, [24] emphasizes that the efficient and effective use of time is a key factor in determining whether a project's goals are successfully achieved.

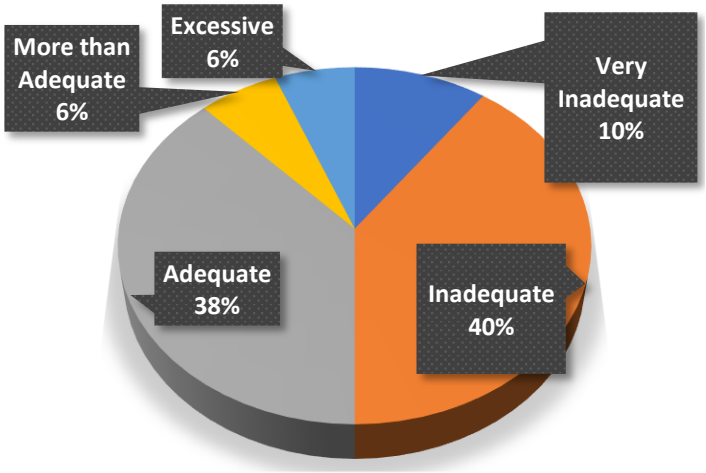



Figure 4.1: Adequacy of time allocated to each of the first three work stages in public construction projects

## 4.4 Challenges/ Factors Hindering The Successful Implementation Of Pre-Construction Planning For Construction Projects

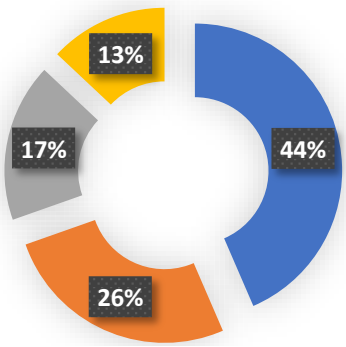



Figure 4.2: Strategies or best practices recommended for improving time allocation

When asked about strategies to improve time allocation in the pre-construction planning stages of public construction projects, 43.5% of respondents recommended improved project scoping and definition, 26.1% suggested better stakeholder engagement, 17.4% advocated for streamlining regulatory approvals, and 13% highlighted the use of digital tools for project management. Previous literature generally agrees that reducing the risk of project failure involves identifying and comprehending pre-project elements, which encompasses all procedures and steps to be followed from project commencement to design completion [8]. Reflective time allocation strategies enable teams to analyze and learn from previous experiences [27].

## 4.5 Summary Of Findings

Collaboration amongst stakeholders must be enforced and prioritized as it has a great impact on the duration of the first three work stages of the project. Detailed scope and programming of what is required in the first three project work stage must be implemented with realistic time frames

## 5. CONTRIBUTION

The findings of this study will help the Built Environment professionals involved in the pre-construction stages to be aware and better plan for the factors influencing time allocation in the first three project work stages of the construction process in South Africa.

## 6. CONCLUSION

The study analyzed data collected through a questionnaire survey and semi-structured interviews with built environment professionals — including Architects, Project Managers, Town and Regional Planners, Engineers, and Quantity Surveyors — from Gauteng and KwaZulu-Natal provinces in South Africa. The findings were presented using tables and graphs for clarity. Both the data collection from the questionnaires and interview reflects that there should be a joint approach in standardizing the expectations with the outputs. The findings also highlight that there are many factors affecting the time allocated in the pre planning stages and that they should be best mitigated to achieve better outcomes of the project.

## 7. RECOMMENDAIONS

To improve the effectiveness of pre-construction planning in public construction projects, it is essential to establish a standardized framework that guides the entire process. A national guideline or toolkit should be developed and implemented, outlining expected timelines, core activities, and clearly defined stakeholder responsibilities for each of the three key work stages: inception, concept and viability, and design development. This would reduce inconsistencies across projects and offer professionals a structured roadmap to follow, ultimately improving project outcomes. In addition, early-phase collaboration must be prioritized through mandatory stakeholder workshops. These workshops should involve all key parties—clients, consultants, contractors, and end-users—and be held during the inception stage to ensure that the project scope, objectives, and expectations are aligned from the outset. Documenting the outcomes of these workshops as part of planning approvals will help reduce miscommunication and scope creep during later stages. Furthermore, a dedicated and protected budget for pre-construction activities should be ring-fenced within the overall project funding framework.

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