



Utilising Best Practice in Project Planning and Scheduling for Capital Projects Success: Assessing the Importance of a Botswana Mining Company's Strategy-Sensitive Capital Projects

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Abstract

The purpose of this study was to quantitatively assess the importance of employing best practices in project planning and scheduling on capital projects' success in Botswana, using a mining company's strategy-critical projects as a case study. Seventy-two (72) respondents who are employees of the mining company completed the questionnaire. The study purposefully selected a convenient sample of individuals involved in managing capital projects. Data was collected using a closed-ended questionnaire utilizing Google forms. The same data was analysed using descriptive statistics, ANOVA statistics, collinearity statistics, multiple regression and inferential analysis formed part of the statistics used with the aid of IBM SPSS Version 25. The results of multiple linear regression revealed that out of the three factors investigated, project planning and front-end planning are significant predictors of capital project success, while project scheduling techniques are not significant predictors of project success of capital projects at the mining company. Based on the findings derived from statistical analysis, the study concluded that project planning best practices have benefited capital projects at the mining company, although with a moderately high success rate. The study recommends that the mining company's project team should be critical in selecting and applying the appropriate scheduling techniques that can enable effective monitoring and control of project tasks. In addition to this, more studies should be conducted focusing on a broader scope of the application of scheduling techniques on capital projects' success.

Subject Areas

Business Management, Engineering Management, Mineral Engineering,

Production/Operations Management, Project Management,
Project Management and Strategy

Keywords

Capital Projects, Project Planning, Scheduling, Front-End Planning,
Project Success, Strategy, Botswana

1. Introduction and Literature Review

Organisations engage in capital projects to increase productivity, efficiency, safety and, return on investment (ROI), to achieve strategic goals and objectives [1]. According to [2], capital projects involve capital investments to develop, improve or maintain capital assets. However, capital projects sometimes present unpredictable challenges that require project management knowledge, and skills, such as project planning and scheduling techniques to increase the likelihood of positive outcomes. According to [3], effective project planning and scheduling significantly increases the possibility of completing the project on time and within cost thus reducing the negative effects on the return on investment.

However, [4] argued that despite the considerable effort, capital projects fail to attain improved project performance due to poor project planning and scheduling. [5] noted that the government of Botswana remains concerned about the poor project planning in implementing capital infrastructure projects. For example, the Morupule B Power Plant project was planned to be completed in 2012, but unfortunately the project did not go according to plan causing major project delays [6].

The mining company is a joint venture between the Government of Botswana (GOB) and a leading international mining company that has over the years unlocked great shareholder value and contributed significantly to the country's GDP. According to [7], Botswana currently depends on the mining company as the mainstay of the economy because it contributes 30 percent to the GDP, over 70 percent to foreign exchange earnings and about 30 percent to government revenue. Therefore, the authors used the mining company's capital projects as a case study to assess the importance of employing best practices in project planning and scheduling for capital project success in Botswana. To achieve this, the study addressed the following objectives: 1) to assess the significance of project planning in capital projects success, 2) to determine the effect of scheduling techniques on capital projects success and lastly 3) to evaluate the influence of front-end planning on capital projects success.

The literature review was conducted through a conceptual framework developed by the authors (see **Figure 1**) to assess the importance of employing best practices in project planning and scheduling. In this study, the variables of project planning and scheduling are given, and the conceptual framework proposed shows the relationship between project planning and scheduling on capital

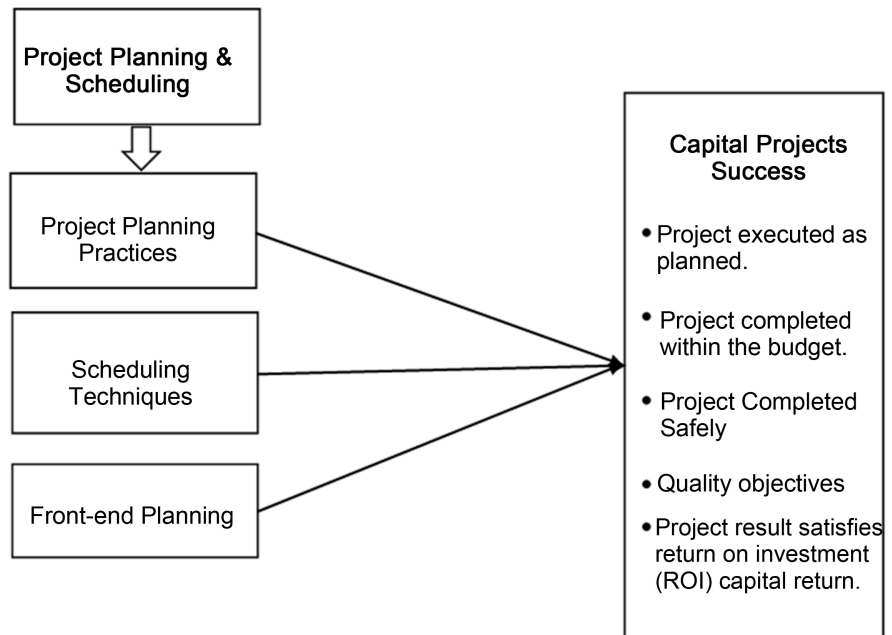


Figure 1. Conceptual framework. Source: the authors, 2023.

projects that guided literature search on models and prior research.

The literature review revealed that previous studies show that effective project planning, project scheduling and front-end planning all have a positive influence on project success. The review also indicated that project success has increased with intense project planning, and that the more time spent on planning, the more project risk reduces. Best project scheduling techniques indicate that there is a higher possibility of effectively implementing a project schedule and completing the project on time.

The research adds to previous literature on reliable project implementation concepts and knowledge-based practices that will alleviate some of the challenges that capital projects face today. From Botswana's perspective, the study will assist capital projects save costs, deliver projects on time, and contribute to the national development mandate of unlocking great shareholder value and the country's GDP.

1.1. Significance of Project Planning on Capital Project Success

In project management, once the project is envisioned in the pre-study phase, planning is the most important aspect before project execution. [8] points out that project planning provides the road map for organizations concerned with the prompt delivery of projects by extrapolating the project scope, objectives, appropriate allocation of resources and a schedule with a logical sequence of activities. According to [9], project planning involves a range of tasks including, developing the project scope, setting up the project's inputs and output, and a detailed method on how the project schedule will be implemented.

[10] researched the importance of project planning and scheduling in Indian

construction projects focusing on the contextual relationship between project planning and project success. Fifty (50) participants from the infrastructure and civil construction industry were considered for the survey. [10] concluded that project planning can reduce the cost and improve the work efficiency of the project. [11] also conducted a study in Ghana's construction industry to evaluate the relationship between project planning and project success using an explanatory design of the quantitative approach. The data was analyzed using descriptive statistics and multiple regression was part of inferential statistics used with the aid of SPSS. [11] indicated that there was a moderate positive correlation among all the dimensions of project planning effort with the lowest being $r = 0.026$ and the highest correlation $r = 0.543$ between technical and human factors.

In the Nigerian construction industry, [12] evaluated the impact of construction project planning on contractors' profit. The study shows that inadequate use of project planning by contractors was the main cause of project failure in the Nigerian construction industry. Therefore, [12] concluded that planning has a meaningful relationship to the success of the project. The findings of this study are in line with previous literature and concur that project planning is positively associated with project success. Based on that, it can be concluded that project planning effort affects project success positively.

1.2. Effects of Scheduling Techniques on Capital Project Success

Since ancient times, capital projects have been the backbone of the global economy. However, most capital projects are characterised by schedule and budget overruns and the results are not improving [13]. Schedule and budget overruns are usually caused by poor scheduling practices resulting in project delays [14]. Effective project scheduling techniques are useful in managing most of these challenges. For the successful completion of projects, adopting proper project scheduling techniques is imperative [15]. With the best project scheduling techniques, there is a high possibility of effectively implementing a project schedule and completing the project.

There are common scheduling techniques used in the construction industry. [9] found that among the various scheduling techniques, these are the most used; Gantt Chart, Critical Path Method (CPM), and Programme Evaluation and Review Technique (PERT). Different techniques and tools, e.g., GANTT chart, CPM and PERT, have been developed to support improved project planning, ([16] [17]) stated that scheduling techniques like the Gantt chart, CPM, and the PERT, are the only ones discussed in the most celebrated cross-industry project management standards. The authors showed that the commonly accepted advantages of these techniques are their simplicity, user-friendliness, and seamless interfacing with scheduling software. [17] suggested that these techniques remain the dominant scheduling norms available for implementing successful projects. Despite being the most utilised, these scheduling techniques do not consider the complexity and dynamic environment of construction projects [18].

It is important to note that planning such projects requires a huge amount of time, which can be reduced with the help of project planning software, [19] [20] analysed the main causes of time and cost overruns in construction projects and the results show that the use of proper scheduling tools like Microsoft Project (MSP) and Primavera (P6) can enhance the prompt completion of projects. According to [21] P6 and MSP are two of the most often used scheduling software in the construction industry. [22] is also of the view that P6 is the best tool for construction projects because it can be used to organise projects and identify potential problems. According to [23], implementation of MSP software for the construction of buildings for time and cost management provides effective monitoring and control.

1.3. Significance of Front-End Planning on Capital Project Success

Front End Planning (FEP) is a process for developing adequate scope definition, and unpacking project unknowns in a structured approach [24]. The FEP stage includes determining the business objective, and project scope, outlining project design, and execution plans, and estimating the benefits and costs, risks, and funding sources for a capital project [25]. In addition, the strategic role of FEP is to define the outcomes of the project and establish its feasibility. Hence, what happens during the FEP is essential for a project's success [26].

[27] carried out a study intending to identify the implementation status of FEP in the Singapore construction industry and its impact on project success. Data was collected from 27 different companies and the results revealed that at the company level, 17 companies (63%) out of the 27 companies surveyed practised FEP, while 234 (71%) out of a total of 329 projects were completed with the implementation of FEP. In addition, the analysis stated that FEP can reduce project duration and cost by up to 15%. [27] concluded that FEP improves project performance and significantly increases opportunities for project success.

[28] conducted an online study to describe how an organized approach to FEP analysis can result in a successful project. The results of the study indicate that the FEP can reduce project costs by 20% on average in comparison to poorly planned projects. The results also show that projects can be delivered in an optimum time with fewer delays enhancing net present value (NPV) in the early stages of the project. The author argued that FEP has great benefits because it can influence the outcome of a project during the initial stages.

1.4. Summary of Problems in Prior Research

While [10] [11] [27] carried out research outside of Africa, African research by [2] [3] [11] [12] was not based in the mining industry. Although research by [1] was in the mining industry in Africa, its focus was on readiness. This research intends to cover the range of project planning and scheduling techniques across the strategic, tactical, and operational areas of management with a focus on stay-in-business strategy critical projects. The research seeks to augment the

project planning and scheduling knowledge-based practices outlined in the review above. Additionally, it attempts to improve the implementation of capital projects by focusing on strategy-critical projects for a mining company that makes significant contribution to the economy. The study envisages triggering new strategies and concepts required to successfully manage capital projects in Botswana and beyond.

2. Methodology

The section below outlines the methodological choices and methods adopted for this research. It includes an outline of the justifications for the choices on philosophy, design, approach, population, and sampling choices. It continues with an outline of the instrument developed for the study, with pre- and post-administration tests of validity and reliability carried out on the instrument, ethical considerations taken into account as well as methods of data analysis adopted.

2.1. Philosophy

Philosophy as an academic discipline has seen paradigm shifts such as positivism, interpretivism, post-positivism, pragmatism, post-modernism, and critical realism [29]. The research is aligned with the positivist philosophy because of its scientific empirical methods that focus on discovering observable and measurable facts. This study adopted this philosophy to measure the effectiveness of project planning and scheduling on the success of strategy-sensitive capital projects.

2.2. Design

There are three types of research design namely experimental research, descriptive and causal research design [30]. The research employed descriptive research design to establish the relationship between project planning and scheduling and the success of capital projects. This research design is mostly used to measure the underlying relationships between the dependent and independent variables. In this study, the independent variables of the study are 1) project planning and scheduling, and 2) the dependent variable is capital project success.

2.3. Approach

The research adopted a quantitative approach employing a closed survey questionnaire to gather responses from the strategy-critical project team and key stakeholders. The research also adopted a cross-sectional design utilizing predefined closed questions for data collection. The researchers selected the quantitative approach because the findings from statistical analysis are less susceptible to bias as statistics are less likely to be influenced by the opinion and biased interpretation of researchers [31]. A quantitative approach was considered the most suitable for the research due to its ability to gather data in a structured, systematic, and analytical approach.

2.4. Population and Sample Size

This study was conducted at the mining company centering on its capital projects which have about 250 professionals in the department. The authors used convenience sampling [32] [33] where not every subject of the target population has an equal chance of being part of the study. The method was appropriate as the data needed was about team members who are tasked to manage and support-strategy-critical capital projects. This study purposefully selected a convenient sample of 75 project team members from the department *i.e.*, Programme Managers, Project Managers, Lead Engineers, Project Engineers, Project Controls Managers, Procurement Managers, Project Planners, Cost Analysts and Project Administrators.

From the purposive alternatives identified by [33], being 1) stakeholder sampling, 2) extreme or deviant case sampling, 3) typical case sampling, 4) paradigmatic case sampling, 5) maximum variation sampling, 6) criterion sampling, 7) theory-guided sampling, 8) critical case sampling and 9) disconfirming or negative case sampling, the authors employed a combination of stakeholder, paradigmatic and criterion sampling because the titles of the team members in the departments above are involved in the designing, receiving, giving or administration of a project planning and scheduling information and data as critical stakeholders. In addition, these professionals were considered by the authors as knowledgeable and information-rich exemplars typical of professionals that are involved in project planning and scheduling. Lastly, they all met the authors search for individuals meeting the criteria outlined in the application of these three selected purposive sampling alternatives by [33] applied and adopted in **Table 1**.

Since convenience sampling is subject to multiple forms of bias and allows for statistical assessment of sampling error as highlighted by [34], the above procedures highlight its advantages as less costly, quicker, efficient [34] [35] and simpler than other forms of sampling that could have been applied in the circumstances. Additionally, these were considered knowledgeable experts [36] with access to email who could be emailed the data-gathering instrument through Google forms.

2.5. Instrument

The authors collected data using a closed-ended questionnaire utilizing Google forms. A questionnaire is an instrument used to collect data and provides researchers information required for the research [35]. The questionnaire was designed with a Likert scale to quantitatively measure the application of recommended project planning practices, the techniques used in project scheduling and front-end planning and the capital project success rate for the team. The questionnaire consisted of two sections; the first section required respondents to fill in their demographic data while the second section has items intended to measure the other variables.

Table 1. Application of selected purposive sampling alternatives.

Job title	Stakeholder in	Exemplars of	Selection criteria	Estimated population	Number sampled
Programme Managers	Project Planning	Information-rich source as Strategic Planners	Knowledgeable experts with access to email	10	4
Project Managers	Project planning and project scheduling	Planners and Managers	Knowledgeable experts with access to email	20	5
Lead Engineers	Project planning and project scheduling	Specific strategy-sensitive projects expertise	Knowledgeable experts with access to email	50	23
Project Engineers	Project planning and project scheduling	Planners and schedulers	Knowledgeable experts with access to email	53	12
Project Controls Managers	Project scheduling	Tactical planners	Access to email	63	12
Procurement Managers	Sourcing materials and services required for projects	Inter-project planners	Knowledgeable experts with access to email	16	7
Project Planners	Project scheduling	Operational Planners	Knowledgeable experts with access to email	21	3
Cost Analysts	Project scheduling, costing project activities and cost variance analysis	Sponsor-facing project professionals	Knowledgeable experts with access to email	6	3
Project Administrators	Reporting on projects against schedules	Sponsor-facing project professionals	Knowledgeable experts with access to email	11	5
Total estimated/sampled				250	75

Source: the authors, 2023.

2.6. Validity and Reliability of Instrument

To produce a stable and consistent result, the reliability of the questionnaire was measured from the pilot data by computing the Cronbach's alpha reliability coefficient (Table 2). The acceptable alpha is 0.7 and above [37].

To ensure that the instrument is valid, a pilot study was conducted using a random sample of a few selected respondents. Cronbach's alpha reliability coefficients were computed using SPSS for each variable to determine the reliability of the questionnaire. The results of the reliability analysis (Table 3) show that the alpha for all sections of the data-gathering instrument were above 0.7 implying that the questionnaire was reliable for data collection.

2.7. Ethical Considerations

The researchers adhered to the core ethics of conducting research which include informed consent, confidentiality, and anonymity. Permission was sought from the company's Head of Projects and Senior Services Manager to conduct the study and written consent was obtained from the selected respondents. This was done to ensure that participants are fully informed about the purpose of the research and exercise their personal and individual choice to either participate in the study or not. Anonymity of individuals during data collection was assured.

3. Data Analysis

The data was analysed using SPSS version 25 to test the hypotheses by conducting multiple linear regression to determine the strength and direction of the linear relationship between the independent variables (project planning, scheduling techniques and front-end planning) and the dependent variable (success of capital

Table 2. The classification of Cronbach's alpha coefficient.

Cronbach's alpha Coefficient	Interpretation of Cronbach's alpha Coefficient
≥ 0.9	The internal consistency of the scale is high,
$0.7 \leq \alpha < 0.9$	The scale has internal consistency,
$0.6 \leq \alpha < 0.7$	The internal consistency of the scale is acceptable,
$0.5 \leq \alpha < 0.6$	The internal consistency of the scale is weak,
$\alpha < 0.5$	The scale has no internal consistency.

Source: ([37]: p. 2714).

Table 3. Cronbach's alpha reliability test results from the pilot study.

Variable	N	Cronbach's alpha
Project planning	9	0.819
Project-scheduling	5	0.850
Front-end planning	5	0.913
Project success	4	0.850

projects). The suitability of the model was also checked using analysis of variables (ANOVA).

Multiple regression analysis was conducted to establish the relationship between the dependent variable (project success) and the independent variables/predictors (project planning, project scheduling techniques and front-end loading). The suitability of the model was also checked using ANOVA statistics. The R-square value of 0.478 was obtained, which is slightly lower at 0.455 when adjusted (see **Table 4**). This value indicates that 47.8% of the variations in the dependent variable can be attributed to the variations in the independent variables.

An assumption was that the values of residuals are independent. This assumption was tested using the Durbin-Watson statistic. The analysis of Durbin-Watson statistics showed that the values of residuals are independent since the Durbin-Watson coefficient is not extremely far from 2 (Durbin-Watson = 2.330, see **Table 4**). This implies that therefore the data is not auto-correlated since the Durbin-Watson statistic is between 1.5 and 2.5.

The ANOVA statistics (see **Table 5**) show that there are statistically significant correlations between the dependent variable and the three independent variables ($F = 20.731, p < 0.001$).

Table 6 shows that project planning has a statistically significant influence on success of capital projects ($B = 0.114, p = 0.037$), because the p-value is lower than 0.05, at the critical p-value at 95% confidence interval.

Table 7 shows that the mean score for project planning is 34.53, which is 76.7% of the maximum possible score and a mean score for project success of 13.22

Table 4. Model summary statistics.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.691	0.478	0.455	3.365	2.330

Predictors: (Constant), Project planning, Project scheduling techniques, Front-end planning
Dependent Variable: Project success

Table 5. ANOVA statistics.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	704.341	3	234.780	20.731	0.000
1 Residual	770.103	68	11.325		
Total	1474.444	71			

a. Dependent Variable: Project Success

b. Predictors: (Constant), Project planning, Project scheduling techniques, Front-end planning

Table 6. Multiple linear regression coefficients.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.423	2.422		0.588	0.559
1 Project planning	0.114	0.054	0.206	2.130	0.037
Project scheduling	-0.193	0.132	-0.149	-1.463	0.148
Front-end loading	0.581	0.087	0.660	6.648	0.000

Table 7. Descriptive statistics for the variables.

	N	Min	Max	Mean	Std
Project planning	72	9	45	34.53	8.209
Project scheduling techniques	72	10	25	18.94	3.520
Front-end loading	72	5	25	19.81	5.178
Project success	72	4	20	13.22	4.557
Valid N (listwise)	72				

which is 66.1% of the highest possible score based on the seventy-two ($n = 72$) from those sampled that responded to the Google forms email requests to participate in the research.

3.1. Significance of Project Planning on Capital Project Success

Project planning was measured using nine items with a Likert scale rated 1 - 5. The scores from all the nine items were automatically added together to produce overall score for project planning rating per respondent. The minimum possible score for project planning is 9 (9×1) while the highest score possible is 45 (9×5). The descriptive statistics for project planning (Table 7) show that the mean score for project planning is 34.53, which is 76.7% of the maximum possible score. This shows that project planning is highly considered at the mining company. [38] conducted a similar study in Pakistan assessing the importance of project planning and the author's hypothesis supports that project planning has a significant positive influence on project success.

Project success was also measured using four items in the questionnaire on a Likert scale rated 1 - 5. The scores from each of the four items were added together to produce the total score for project success. The minimum possible score for project success is 4 (4×1) while the maximum possible score is 20 (4×5). The descriptive statistics (Table 7) show that the mean score for project success 13.22 which is 66.1% of the highest possible score. This shows that respondents gave a moderately high rating for project success at the mining company.

The results from multiple linear regression (Table 6) show that project planning has a statistically significant influence on success of capital projects ($B = 0.114$, $p = 0.037$). This is because the p-value is lower than 0.05, the critical

p-value at 95% confidence interval. This implies that the project planning can significantly predict project success as emphasized by several previous researchers and authors. [39] argued that project planning is the most crucial element of project management, and it has a considerable influence on the project's success. [8] also pointed out project planning provides the road map for the timely delivery of projects.

3.2. Effect of Scheduling Techniques on Capital Project Success

Project scheduling techniques implemented at the mining company were evaluated using measured using 5 items with a Likert scale rated 1 - 5. The scores from all the five items were automatically added together to produce overall score for project scheduling rating per respondent. The minimum possible score for all project scheduling is 5 (5×1) while the highest score possible is 25 (5×5). The descriptive statistics for project scheduling (Table 7) show that the mean score for project scheduling is 18.94, which is 75.76% of the maximum possible score. This shows that project scheduling is highly considered at the mining company. The results relate to [15] observations that applying robust scheduling techniques is important for the successful completion of projects.

The results from multiple linear regression (Table 6) show that project scheduling has no statistically significant influence on success of capital projects ($B = -0.193$, $p = 0.148$). This is because the p-value is higher than 0.05, the critical p-value at 95% confidence interval. This implies that the project scheduling does not significantly predict project success. Although the results show that all four project scheduling techniques are adequately adopted at the mining company, the application of these techniques does not significantly contribute to project success. These outcomes contradict the findings of several previous researchers such as [14] [15] [36] [40] who stated that project scheduling techniques significantly influence project success. These arguments seem to imply that proper scheduling techniques should positively contribute to project success. This may not be ruled out until other studies are conducted to produce more findings in support of the findings in this study.

3.3. Influence of Front-End Planning on Capital Project Success

Front-end loading was measured using five items with a Likert scale rated 1 - 5. The scores from all the five items were automatically added together to come up with overall score for front-end loading rating per respondent. The minimum possible score for project planning is 5 (5×1) while the highest score possible is 25 (5×5). The descriptive statistics for front-end loading (Table 7) show that the mean score is 19.81, which is 79.24% of the maximum possible score. This shows that front-end loading is often considered at the mining company. [41] also conducted a similar study and reported that successful execution of FEP results in better project performance and greatly contributes to project success. [41] conducted a similar study and reported that successful execution of FEP

results in better project performance and greatly contributes to project success.

The results from multiple linear regression (**Table 7**) show that front-end planning has statistically significant positive influence on success of capital projects ($B = 0.581, p < 0.001$). This is because the p-value is lower than 0.05, the critical p-value at 95% confidence interval. This implies that the use of front-end planning significantly predicts project success. [25] argued that front-end loading contributes to project success because it provides information required for senior management to determine whether to approve, terminate, or modify the project at any stage of the project. The third null hypothesis, that front-end planning has no statistically significant influence on success of capital projects is therefore rejected. Consequently, the alternative hypothesis that front-end planning has a statistically significant influence on success of capital projects is accepted.

4. Conclusions

The results from data analysis show that the mining company's capital projects have a moderately high success rate. Based on the findings of the study, the authors conclude that there is a moderate project success rate for capital projects at the mining company. This is because project planning and front-end planning have a significant influence on project success as evidenced by the results of this study as well as the literature reviewed.

The authors also concluded that project scheduling in general does not significantly influence project success. Although the results of this study show that project scheduling techniques have no significant influence on project success, the literature shows the opposite.

5. Further Research Recommendations

The contradiction between the literature and the results of this study shows a weak influence of project scheduling on project success. It is recommended that further studies should be conducted focusing on a broader scope of the application of scheduling techniques on capital projects' success. This suggested further research might confirm the findings from this study since there is no alignment with most of the previous research on the topic. The hypotheses upon which this research was based have been validated. It can be concluded that project planning best practices have benefited capital projects, although with a moderately high success rate.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Kagogo, T.S. and Steyn, H. (2019) Effect of Scope Readiness on Capital Projects in Mining. *South African Journal of Industrial Engineering*, **30**, 257-269.

- [2] Asare, K.A.B., Liu, R. and Anumba, C.J. (2022) Building Information Modeling to Support Facilities Management of Large Capital Projects: A Critical Review. *Facilities*, **40**, 176-197. <https://doi.org/10.1108/F-11-2020-0124>
- [3] Ogbeifun, E. and Pretorius, J.H.C. (2022) Ameliorating the Effects of Time Overrun in the Execution of Capital Infrastructure Projects. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, Nsukka, 5-7 April 2022, 303-314.
- [4] Choi, J.O., Shrestha, B.K., Kwak, Y.H. and Shane, J. (2022) Exploring the Benefits and Trade-Offs of Design Standardization in Capital Projects. *Engineering, Construction and Architectural Management*, **29**, 1169-1193. <https://doi.org/10.1108/ECAM-08-2020-0661>
- [5] Kaboyakgosi, G. and Marata, K.P. (2013) An Analysis of Botswana's Implementation Challenges. *PULA: Botswana Journal of African Studies*, **27**, 309-324.
- [6] Mutoko, W.R. and Mutoko, P. (2019) Literature Review on the Solar Energy Potential for Botswana. *European Scientific Journal*, **15**, 27-43. <https://doi.org/10.19044/esj.2019.v15n34p27>
- [7] Masokola, A. (2022) Is Botswana—De Beers Partnership Too Big to Fail? Weekend Post, Gaborone.
- [8] AlNasseri, H.A. (2015) Understanding Applications of Project Planning and Scheduling in Construction Projects. Division of Construction Management, Department of Construction Sciences, Faculty of Engineering, Lund University, Riyadh.
- [9] Kafile, M. (2021) Project Planning and Scheduling in the Face of the Fourth Industrial and Scheduling in the Face of the Fourth Industrial. *Journal of Business Administration Research*, **4**, 51-61. <https://doi.org/10.30564/jbar.v4i3.3398>
- [10] Gaur, S. (2022) Understanding the Importance of Project Planning and Scheduling in Indian Construction Projects. *Journal of Positive School Psychology*, **6**, 3535-3544.
- [11] Agyemang, O.O. (2021) Assessing the Relationship between Project Planning Effort and Project Success in the Construction Industry of Ghana. *International Journal of Research Publication and Reviews*, **2**, 373-386.
- [12] Akinradewo, O., Aigbavboa, C. and Akinradewo, O. (2019) Impact of Construction Project Planning on Contractor's Profit. *IOP Conference Series: Earth and Environmental Science*, **385**, Article ID: 012009. <https://doi.org/10.1088/1755-1315/385/1/012009>
- [13] Al-Hazim, N., Salem, Z.A. and Ahmad, H. (2017) Delay and Cost Overrun in Infrastructure Projects in Jordan. *Procedia Engineering*, **182**, 18-24. <https://doi.org/10.1016/j.proeng.2017.03.105>
- [14] Segelod, E. (2017) Project Cost Overrun: Decision-Making, Overruns, and Their Consequences. Cambridge University Press, Cambridge. <https://doi.org/10.1017/9781316779675>
- [15] Deshmukh, P. and Rajhans, N.R. (2018) Comparison of Project Scheduling Techniques: PERT versus Monte Carlo Simulation. *Industrial Engineering Journal*, **11**, 1-13.
- [16] Zareei, S. (2018) Project Scheduling for Constructing Biogas Plant Using Critical Path Method. *Renewable and Sustainable Energy Reviews*, **81**, 756-759. <https://doi.org/10.1016/j.rser.2017.08.025>
- [17] Ballesteros-Perez, P., Larsen, G.D. and Gonzealez-Cruz, M.C. (2018) Do Projects Really End Late? On the Shortcomings of the Classical Scheduling Techniques. *Journal of Technology and Science Education*, **8**, 17-33.

<https://doi.org/10.3926/jotse.303>

- [18] Shikhrobat, M.B., Kabiri, S. and Flanagan, R. (2019) Project Planning and Scheduling using System Dynamics for Dealing with Complexity on Construction Projects., *Proceedings of the 35th Annual ARCOM Conference*, Leeds, 2-4 September 2019, 689-698.
- [19] Varsani, A.D., Bhavsar, P.A.N. and Pitroda, D.J.R. (2020) Effective Scheduling and Control of Construction Project Using Primavera P6: A Review. *Studies in Indian Place Names (UGC Care Journal)*, **40**, 5050-5064.
- [20] Gautam, G.P.S. and Paliwal, P.M.C. (2019) A Literature Review: Analysis of Different Projects for Timely Completion of Construction Projects. *Research Journal of Science Engineering and Technology*, **9**, 38-41.
- [21] Franco-Duran, D.M. and de la Garza, J.M. (2019) Phantom Float in Commercial Scheduling Software. *Automation in Construction*, **103**, 291-299.
<https://doi.org/10.1016/j.autcon.2019.03.014>
- [22] Bagade, P.P. and Bhirud, A. (2018) Review on Construction Project Management Software Primavera P6. *International Journal of Engineering Sciences and Research Technology*, **7**, 110-114.
- [23] Sharma, C.K., Gohel, R.V., Chauhan, V.B. and Bhavsar, A.N. (2016) Study of MS Project Software and Its Application in Construction Project and Case Study at Anand. *International Journal of Advanced Research and Innovative Ideas in Education (IJARIE)*, **2**, 2862-2870.
- [24] Gibson, E.G.J. and Stogner, E.B.R. (2010) Front End Planning for Infrastructure Projects. American Society of Civil Engineers, Alberta, 1125-1135.
[https://doi.org/10.1061/41109\(373\)113](https://doi.org/10.1061/41109(373)113)
- [25] Williams, T.M., Samset, K. and Volden, G.H. (2022). The Front-End of Large Public Projects: Paradoxes and Ways Ahead. Taylor and Francis, London.
<https://doi.org/10.4324/9781003257172>
- [26] Samset, K. and Volden, G.H. (2016) Front-End Definition of Projects: Ten Paradoxes and Some Reflections Regarding Project Management and Project Governance. *International Journal of Project Management*, **34**, 297-313.
<https://doi.org/10.1016/j.ijproman.2015.01.014>
- [27] Hwang, B.G. (2016) Does “Front-End Planning” Work for the Singapore Construction Industry? *World Construction Conference 2012—Global Challenges in Construction Industry*, 28-30 June 2012, Colombo, 162-170.
- [28] Batavia, R. (2001) Front-End Loading for Life Cycle Success. *International Journal of Project Management*, **8**, 23-35. <https://doi.org/10.4043/12980-MS>
- [29] Turyahikayo, E. (2021) Philosophical Paradigms as the Bases for Knowledge Management Research and Practice. *Knowledge Management and E-Learning*, **13**, 209-224. <https://doi.org/10.34105/j.kmel.2021.13.012>
- [30] Kothari, C.R. (2004) Research Methodology Methods and Techniques. Second Edition, New Age International Publishers, New Delhi.
- [31] Shareria, F.B. (2016) Quantitative and Qualitative Case Study Research Methods on Social Science: Accounting Perspective. *International Journal of Economics and Management Engineering*, **10**, 3839-3844.
- [32] Pandey, P. and Pandey, M.M. (2015) Research Methodology: Tools and Techniques. Bridge Publisher, Los Angeles.
- [33] Palys, T. (2008) Purposive Sampling. In: Given, L.M., Ed., *The Sage Encyclopedia of Qualitative Research Methods*, Sage, Los Angeles, 697-698.

-
- [34] Stratton, S.J. (2021) Population Research: Convenience Sampling Strategies. Cambridge University Press, Cambridge. <https://doi.org/10.1017/S1049023X21000649>
- [35] Thomas, B. (2022) The Role of Purposive Sampling Technique as a Tool for Informal Choices in a Social Sciences in Research Methods. *Just Agriculture Multidisciplinary E-Newsletter*, **2**, Article ID: 047.
- [36] Tongco, D.C. (2007) Purposive Sampling as a Tool for Information Selection. *Ethnobotany Research and Applications*, **5**, 146-158. <https://doi.org/10.17348/era.5.0.147-158>
- [37] Surucu, L. and Maslakci, A. (2020) Validity and Reliability in Quantitative Research. *Business and Management Studies: An International Journal*, **8**, 2694-2726. <https://doi.org/10.15295/bmij.v8i3.1540>
- [38] Naeem, S., Khanzada, B., Mubashir, T. and Sohail, H. (2018) Impact of Project Planning on Project Success with Mediating Role of Risk Management and Moderating Role of Organizational Culture. *International Journal of Business and Social Science*, **9**, 88-98.
- [39] Woldie, D.S. (2016) The Role of Project Planning on Project Performance in Ethiopia. Master's Thesis, Addis Ababa University, Addis Ababa.
- [40] Kartikeyan, G., Gholap, R., Katkar, R., Khune, P. and Bhosale, P. (2021) To Study Advanced Project Planning and Scheduling-Case Study. *International Journal of Advance Scientific Research and Engineering Trends*, **12**, 286-297.
- [41] Hansen, S., Too, E. and Le, T. (2018) Retrospective Look on Front-End Planning in the Construction Industry: A Literature Review of 30 Years of Research. *International Journal of Construction Supply Chain Management*, **8**, 19-42.