Cash-Flow Planning and Public Infrastructure Project Performance: Evidence from the Uganda National Roads Authority

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ABSTRACT

Public infrastructure projects may be technically viable, contractually approved and adequately budgeted, yet still experience implementation difficulties when financial resources are not available at the time project obligations fall due. This distinction between budgetary provision and actual liquidity is particularly important in large public infrastructure projects, where implementation depends on the continuous coordination of engineering activities, procurement processes, contractual commitments and financial releases. Against this background, this study examined the relationship between cash-flow planning and the implementation of public infrastructure projects at the Uganda National Roads Authority (UNRA).

The article was derived from a convergent mixed-methods study involving 78 questionnaire respondents, 10 key informants and documentary evidence obtained from ten substantially completed infrastructure projects. Quantitative data were analysed using descriptive statistics, Pearson's correlation coefficient and simple linear regression, while qualitative evidence was analysed thematically to explain and contextualise the observed statistical patterns.

The findings revealed an important institutional contradiction. Respondents generally acknowledged the existence of infrastructure expenditure commitments, planning policies and cash-flow regulations. However, comparatively weaker ratings were reported regarding personnel understanding of budgeting processes, preparation of annual financial plans, stakeholder involvement, open communication of cash-flow plans and dissemination of information concerning funding sources. Cash-flow planning was positively and significantly related to infrastructure-project implementation ($r = .617$, $p < .01$). Regression analysis further demonstrated that cash-flow planning significantly predicted project implementation ($\beta = .617$, $p < .001$), accounting for 38.0% of the observed variance in implementation outcomes ($R^2 = .380$).

The findings indicate that cash-flow planning should not be understood narrowly as an accounting procedure. Rather, it constitutes an integrated project-management capability through which funding requirements are aligned with construction schedules, procurement obligations, payment milestones, contractual commitments and implementation priorities. The article concludes that stronger forecasting, wider stakeholder participation, improved budgeting competence, integrated information systems, transparent communication and regular revision of cash-flow plans are necessary to reduce financial disruption, implementation delays and cost escalation in public infrastructure projects.

Keywords: cash-flow planning; public infrastructure; project implementation; financial forecasting; project performance; UNRA; Uganda

INTRODUCTION

Public infrastructure plays a central role in economic transformation, service delivery and national development. Roads, bridges, energy systems, water infrastructure and other public assets facilitate mobility, trade, access to markets, industrial development and the provision of essential services. Governments therefore invest substantial financial resources in infrastructure with the expectation that such investments will stimulate productivity, improve connectivity and contribute to long-term social and economic development.

However, the approval of an infrastructure project and allocation of financial resources do not automatically guarantee successful implementation. Infrastructure delivery depends not only on how much funding has been approved, but also on whether the required financial resources become available at the specific stages when project activities and contractual obligations require them.

This distinction between budgetary allocation and actual liquidity is fundamental in understanding infrastructure-project performance. A project may have an approved annual budget and still experience implementation delays when actual releases, payment schedules and project expenditure requirements are poorly synchronised. Infrastructure implementation is therefore influenced by both the adequacy and timing of financial resources.

Cash-flow planning provides a mechanism for addressing this challenge by forecasting the amount and timing of expected financial inflows and outflows over the project implementation period. In construction and infrastructure environments, cash-flow forecasting translates the overall project budget into a time-phased financial programme that can be compared with planned physical progress and actual expenditure (RICS, 2014).

Effective cash-flow planning enables project managers to estimate when contractors, suppliers, consultants and other stakeholders are likely to require payment. It also allows managers to anticipate financing shortfalls before they become operational crises. Forecasting therefore supports decisions concerning project sequencing, procurement, contract administration, resource allocation and expenditure prioritisation.

Makridakis (1996) argues that forecasting plays a critical role in management because it enables decision-makers to anticipate likely future conditions and prepare appropriate responses. Forecasting does not eliminate uncertainty; rather, it provides a structured basis for managing uncertainty.

This principle is particularly relevant to public infrastructure because public-sector financing operates through multiple institutional processes. Government revenue projections, parliamentary appropriations, expenditure warrants, quarterly cash limits, procurement commitments, payment certificates and contractor obligations must interact before resources ultimately support project implementation.

Any weakness in this chain can have significant consequences. Delayed financing can slow construction activities, affect procurement, generate outstanding contractor obligations, produce claims for interest or extensions of time and ultimately increase project costs.

Uganda has consistently prioritised transport infrastructure as part of its broader national-development agenda. Road infrastructure supports agricultural production, trade, investment, regional integration and access to public services. UNRA historically carried responsibility for managing a significant portfolio of national road-development and maintenance projects.

The successful implementation of these projects required sustained financing across several stages, including planning, design, procurement, construction, supervision, compensation and project close-out.

Nevertheless, Uganda's roads sector has experienced challenges associated with delayed payments, financing constraints, expenditure inefficiencies, procurement delays and weaknesses in the alignment of budgets and implementation requirements (Ggoobi et al., 2020; Muzaale & Auriacombe, 2018; Ochary, 2016).

These challenges suggest that infrastructure performance is not exclusively an engineering problem. It is also a financial-management problem.

A project may possess high-quality designs and competent contractors but still perform poorly when cash is unavailable at critical stages. Financial planning therefore constitutes an important component of implementation capacity.

The Public Finance Management Act, 2015 provides the broader legal framework within which public-sector financial resources are planned, appropriated, released and controlled in Uganda. The framework recognises the importance of aligning expenditure commitments with anticipated resource availability.

However, compliance with financial regulations alone does not guarantee effective project implementation.

The existence of policies and guidelines must be accompanied by personnel competence, realistic forecasting, stakeholder involvement, effective communication and reliable information systems.

Cash-flow planning should therefore be understood as a managerial capability rather than simply a statutory or accounting requirement.

Previous studies have examined challenges affecting infrastructure implementation in Uganda, including delayed procurement, poor contract management, cost overruns, weak institutional coordination and delayed project completion (Ggoobi et al., 2020; Muzaale & Auriacombe, 2018; Ochary, 2016).

However, relatively limited attention has been given to cash-flow planning as a multidimensional project-management capability involving budgeting knowledge, policy guidance, stakeholder participation, communication, financial forecasting and information technology.

This creates an important analytical gap.

The key question is not simply whether public institutions prepare cash-flow plans, but whether those plans are sufficiently realistic, understood, communicated, regularly updated and integrated with implementation schedules.

This study therefore examined the relationship between cash-flow planning and the implementation of public infrastructure projects at UNRA.

Specifically, the study sought to analyse existing cash-flow planning practices, determine the relationship between cash-flow planning and project implementation and identify the managerial and policy implications arising from the findings.

The article contributes to project-management literature by demonstrating that cash-flow planning is an important implementation capability and not merely a financial-control procedure.

LITERATURE REVIEW AND CONCEPTUAL ORIENTATION

Conceptualising Cash-Flow Planning

Cash-flow planning refers to the process of estimating the timing and amount of expected financial receipts and expenditures over a specified period.

In project environments, the central purpose of cash-flow planning is to ensure that anticipated expenditure obligations are matched with realistic expectations concerning the availability of financial resources.

This distinguishes cash-flow planning from aggregate budgeting.

A budget establishes the total amount of financial resources allocated to a project, whereas a cash-flow plan determines when those resources will be required and when they are expected to become available.

This temporal distinction is particularly important in infrastructure projects because expenditure does not occur evenly throughout the implementation period.

Construction activities frequently involve phases of relatively low expenditure followed by periods of intensive financial requirements associated with mobilisation, procurement, major works, certification and payments.

RICS (2014) emphasises that cash-flow forecasting is essential in construction because it enables managers to estimate the pattern of expenditure throughout a project and compare expected expenditure with actual progress.

A cash-flow forecast therefore functions as both a financial-planning and monitoring instrument.

It allows managers to identify potential funding gaps and determine whether actual implementation remains consistent with planned expenditure.

Cash-flow planning should consequently be treated as a dynamic process.

A forecast prepared at the beginning of a financial year or project cannot remain accurate indefinitely.

Changes in physical progress, procurement schedules, scope, contract variations, inflation, delayed approvals and funding conditions may alter expected expenditure patterns.

Effective cash-flow planning therefore requires continuous revision.

Makridakis (1996) observes that forecasting should support managerial decision-making rather than be viewed as an attempt to predict the future with complete certainty.

In infrastructure projects, this means that forecasts should provide managers with sufficient information to prepare for alternative financing conditions and adjust implementation decisions accordingly.

Cash-Flow Planning and Infrastructure Implementation

Infrastructure projects involve a sequence of interconnected activities, each of which generates financial obligations.

The relationship between cash-flow planning and project implementation therefore arises from the interaction between technical progress and financial capacity.

Where financing is adequately forecast and available when needed, implementation activities can proceed according to plan.

Where financing is delayed or poorly anticipated, implementation may slow, stop or require rescheduling.

Majumder et al. (2022) demonstrate that effective construction planning contributes to improved project performance by strengthening coordination and resource allocation.

Financial planning complements construction planning by ensuring that the resources required to support the technical programme are available at the appropriate stages.

For example, a work programme may indicate that major construction activities will intensify during a specific quarter.

A corresponding financial forecast should reflect the increased expenditure that will result from those activities.

If the physical schedule and cash-flow forecast are not aligned, the project may encounter liquidity problems despite having an approved budget.

Tripathi and Gardner (2016) similarly emphasise that credible cash forecasting is fundamental to effective government cash management.

Accurate forecasting helps governments manage liquidity and ensure that financial commitments can be met without unnecessary disruption.

Cash-flow planning can therefore influence infrastructure performance through several mechanisms.

First, it improves financial predictability.

Second, it allows project managers to identify likely funding gaps before they disrupt implementation.

Third, it supports realistic sequencing of procurement and construction activities.

Fourth, it strengthens communication between technical and financial personnel.

Fifth, it provides a benchmark against which actual expenditure can be monitored.

Public-Sector Financial Planning

Public-sector cash-flow management differs significantly from private-sector financial management because government agencies operate within legislatively approved budgets and administrative expenditure controls.

The Public Finance Management Act, 2015 establishes Uganda's legal framework for planning, appropriating, controlling and accounting for public expenditure.

Public institutions therefore cannot simply treat an approved budget as immediately available cash.

Actual expenditure depends upon resource availability, cash limits, warrants and other government financial-management processes.

This creates particular challenges for public infrastructure.

Infrastructure contracts may create contractual payment obligations that follow technical milestones, while government financing may follow annual, quarterly or other administrative cycles.

Effective cash-flow planning helps reconcile these potentially competing timelines.

Failure to achieve this alignment may lead to delayed payments, outstanding obligations and implementation interruptions.

Budgeting Knowledge and Planning Competence

The effectiveness of cash-flow planning depends significantly on the knowledge and competence of personnel involved in project implementation.

Infrastructure projects involve multidisciplinary teams including engineers, project managers, accountants, procurement specialists, contract managers and administrators.

Each professional group possesses different forms of knowledge.

Engineers may understand construction schedules and physical requirements.

Financial personnel may understand budgeting and cash-release procedures.

Procurement personnel understand procurement timelines and contractual commitments.

Effective cash-flow planning requires these forms of knowledge to be brought together.

Where project personnel have limited understanding of budgeting processes, expenditure requirements may not be realistically translated into financial forecasts.

Similarly, where financial personnel lack sufficient information concerning implementation progress, forecasts may become disconnected from actual project requirements.

Budgeting knowledge should therefore be understood as a shared managerial competence rather than the exclusive responsibility of finance personnel.

Stakeholder Participation in Cash-Flow Planning

Infrastructure implementation involves numerous stakeholders whose decisions influence expenditure requirements and project progress.

Relevant stakeholders may include funders, implementing agencies, contractors, consultants, local governments, communities and government financial-management institutions.

Stakeholder involvement strengthens cash-flow planning because different participants possess information necessary for realistic forecasting.

Contractors understand expected work sequencing and payment requirements.

Engineers understand likely implementation progress.

Procurement units understand procurement lead times.

Finance departments understand anticipated cash availability.

Communities may affect compensation, access and implementation timelines.

When these stakeholders are excluded from planning, forecasts may be developed using incomplete assumptions.

Stakeholder participation therefore improves the comprehensiveness and realism of financial planning.

Communication and Financial Transparency

Communication is another critical component of cash-flow planning.

Financial information has limited managerial value when it is concentrated among a small number of officials.

Project managers, technical teams, procurement personnel and contractors require information concerning available financing, expected releases, expenditure priorities and likely constraints.

Open communication reduces uncertainty and enables stakeholders to make informed implementation decisions.

Poor communication, by contrast, may result in activities being undertaken on the assumption that financing will be available when this may not be the case.

Transparent communication of cash-flow arrangements therefore strengthens coordination and reduces the risk of unrealistic implementation expectations.

Information Technology and Cash-Flow Management

Modern infrastructure projects generate large volumes of information relating to budgets, procurement, contracts, commitments, physical progress, certificates and payments.

Effective cash-flow planning increasingly depends on information systems capable of integrating these different forms of data.

Where financial and technical information is fragmented across departments, management may struggle to obtain an accurate picture of the project's current financial position.

Information technology can improve forecasting by enabling real-time or timely comparison between planned expenditure and actual project progress.

However, the availability of technology alone is insufficient.

Information systems must be integrated, regularly updated and used by competent personnel.

Poor-quality data entered into an advanced system will still produce unreliable forecasts.

Technology should therefore complement, rather than substitute, sound managerial processes.

Understanding Project Performance

Project performance has traditionally been evaluated using time, cost and quality.

These dimensions remain important because infrastructure projects are expected to achieve planned outputs within approved schedules and financial resources.

However, modern project-management literature increasingly recognises that project success is multidimensional.

Ika and Pinto (2022) argue that project success should be interpreted beyond the traditional iron triangle to include broader stakeholder and organisational outcomes.

For the purposes of this study, infrastructure implementation was assessed through dimensions including time, cost, quality, safety and overall execution.

These indicators provide an operational basis for evaluating whether project implementation proceeded as expected.

Conceptual Relationship

The conceptual logic of the study is that stronger cash-flow planning improves infrastructure implementation by strengthening financial predictability, coordination and managerial responsiveness.

The relationship can be understood as follows:

Cash-flow planning → increased financing predictability → improved coordination of project obligations → improved infrastructure implementation.

However, cash-flow planning is not the sole determinant of project performance.

Implementation is also influenced by procurement performance, contractor capability, land acquisition, institutional capacity, technical complexity, policy conditions and external financing constraints.

The empirical analysis therefore examined the extent to which variation in cash-flow planning was associated with variation in infrastructure implementation.

METHODOLOGY

Research Design

The study was derived from a parent investigation examining cash-flow management and the implementation of public infrastructure projects at the Uganda National Roads Authority.

A convergent mixed-methods research design was adopted.

The design allowed quantitative and qualitative data to be collected within the same broad phase of the study and integrated during interpretation.

Creswell and Creswell (2018) explain that mixed-methods research provides a more comprehensive understanding of complex research problems by combining numerical evidence with qualitative explanations.

This approach was appropriate because cash-flow planning involves both measurable organisational practices and stakeholder experiences.

Quantitative analysis enabled the researchers to determine relationships between variables, while qualitative evidence provided explanations concerning why particular financial-management practices were perceived as strong or weak.

Study Population

The study population consisted of stakeholders involved in cash-flow management and infrastructure implementation across ten substantially completed UNRA projects.

Participants included project engineers, station engineers, section managers, procurement personnel, accountants, project managers, supervisors, technical staff, directors and community representatives.

This diversity was important because cash-flow planning involves different organisational functions.

The inclusion of both technical and financial stakeholders provided a broader understanding of how financing and implementation processes interact.

Sample and Response Rate

The quantitative component targeted 92 respondents.

A total of 78 usable questionnaires were returned, representing an 85% response rate.

Ten key informants were also interviewed.

The overall participation level was approximately 86.3%.

The relatively high response rate strengthened the credibility of the dataset within the context of the studied projects.

Nevertheless, the sample remained specific to UNRA and should not be interpreted as automatically representing every public infrastructure organisation in Uganda.

Data Collection Methods

Four methods were employed: questionnaires, semi-structured interviews, observation and document review.

The questionnaire generated quantitative evidence concerning respondents' perceptions of cash-flow planning and infrastructure implementation.

Semi-structured interviews allowed key informants to provide deeper explanations concerning planning practices, challenges and possible improvements.

Observation provided contextual evidence concerning implementation practices, while document review enabled the researchers to examine relevant organisational and project records.

The use of multiple methods strengthened the study by enabling findings from one source to be compared with evidence obtained from other sources.

Measurement of Variables

Cash-flow planning was treated as the independent variable.

It was measured through indicators relating to expenditure commitments, planning policies, cash-flow regulations, budgeting knowledge, annual financial planning, use of funds according to plans, communication, stakeholder involvement, technology, information concerning funding sources and alignment of forecasts with budgets and timelines.

Infrastructure-project implementation was treated as the dependent variable.

It was interpreted through project time, cost, quality, safety and overall execution.

A six-point agreement scale was used for quantitative responses.

The six-point scale avoided a neutral midpoint and encouraged respondents to indicate whether their assessment tended towards agreement or disagreement.

Data Analysis

Quantitative data were analysed using descriptive and inferential statistics.

Means and standard deviations were used to summarise respondents' assessments of individual cash-flow planning indicators.

Pearson's correlation coefficient was used to determine the strength and direction of the relationship between cash-flow planning and infrastructure-project implementation.

Simple linear regression was used to determine the predictive contribution of cash-flow planning to project implementation.

Qualitative evidence was organised thematically.

Recurring issues relating to planning flexibility, decision criteria, stakeholder participation, long-term planning and policy improvement were identified and used to interpret the quantitative findings.

Ethical Considerations

Ethical safeguards included voluntary participation, informed consent, confidentiality and restricted use of research data for academic purposes.

Participants were informed about the purpose of the study and were allowed to participate voluntarily.

Confidentiality was particularly important because the study involved perceptions regarding financial management and public infrastructure implementation.

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RESULTS

Descriptive Findings

Table 1 Respondents' Assessment of Cash-Flow Planning

Planning indicator	Mean	Standard deviation
Funders plan and commit infrastructure expenditure	3.576	0.878
Policies guide infrastructure planning	3.469	0.963
Cash-flow regulations guide planning	3.265	1.069
Budgeting process is understood by personnel	2.327	1.340
Annual financial plans are prepared	2.857	1.579
Funds are used in line with annual plans	3.245	1.211
Open communication of the cash-flow plan	2.918	1.561
Stakeholders are involved during planning	2.837	1.251
Technology for processing cash-flow information is efficient	3.235	1.196
Stakeholders are informed about funding sources	2.816	1.348
Forecasts align with budgets and timelines	3.044	1.252
Grand mean	**3.053**	**1.240**

The descriptive findings portray a cash-flow planning environment characterised by relatively strong formal structures but weaker operational practices.

The highest-rated indicator concerned the extent to which funders planned and committed expenditure for infrastructure projects (M = 3.576, SD = 0.878).

This suggests that respondents generally recognised that financial commitments were made for infrastructure implementation.

The comparatively low standard deviation indicates that respondents were relatively consistent in this assessment.

Policies guiding infrastructure planning also received a comparatively favourable assessment (M = 3.469, SD = 0.963).

Similarly, respondents acknowledged that cash-flow regulations influenced planning (M = 3.265, SD = 1.069).

These findings suggest that UNRA operated within an established institutional and regulatory planning framework.

However, the existence of formal policies did not necessarily translate into equally strong operational understanding.

The lowest-rated indicator was personnel understanding of the budgeting process (M = 2.327, SD = 1.340).

This result is particularly important because budgeting knowledge enables project personnel to understand the relationship between approved financial resources, expected cash availability and actual implementation requirements.

The finding suggests that financial-planning knowledge may not have been adequately distributed across all personnel involved in infrastructure implementation.

This creates a possible gap between technical project management and financial management.

Annual financial planning also received a relatively weak rating (M = 2.857, SD = 1.579).

The comparatively large standard deviation indicates substantial differences in respondents' experiences.

Some projects or departments may have had stronger annual planning practices than others.

This inconsistency is important because infrastructure projects require predictable financial arrangements across the implementation period.

Open communication of cash-flow plans recorded a mean of 2.918 and a standard deviation of 1.561.

The large variation suggests uneven access to information among respondents.

Cash-flow information may therefore have been available within particular departments without being consistently communicated throughout the wider project-management structure.

Stakeholder involvement during planning also recorded a relatively low mean of 2.837.

This suggests that key stakeholders may not have been sufficiently involved in developing financial forecasts.

Limited participation can reduce forecast accuracy because different stakeholders possess different information concerning implementation requirements.

Similarly, respondents reported comparatively weak performance regarding the extent to which stakeholders were informed about funding sources (M = 2.816, SD = 1.348).

This finding indicates limitations in financial transparency.

Stakeholders who lack information concerning funding sources and release conditions may develop unrealistic expectations about project schedules and payment timing.

Technology for processing cash-flow information recorded a mean of 3.235.

This indicates moderate rather than strong confidence in the efficiency of financial-information systems.

The result suggests that technological systems were available but may not have been fully integrated or sufficiently effective in supporting real-time financial decision-making.

Forecast alignment with budgets and implementation timelines recorded a mean of 3.044.

This result is particularly important because alignment between expenditure forecasts and implementation schedules lies at the centre of effective cash-flow planning.

The overall grand mean of 3.053 suggests that respondents perceived cash-flow planning as moderately established but not consistently effective.

Taken together, the findings indicate an **institutionalisation gap**.

Formal policies and regulations were present, but their practical translation into staff competence, communication, participation and adaptive planning was comparatively weaker.

Qualitative Findings

Qualitative evidence reinforced the patterns identified through the quantitative analysis.

Participants emphasised the need for greater flexibility in cash-flow planning.

This did not imply abandoning financial discipline.

Rather, respondents recognised that infrastructure implementation occurs within changing conditions.

Project schedules, prices, procurement timelines and financing availability may change during implementation.

Cash-flow plans therefore need to be revised when circumstances change.

Participants also emphasised the need for clearer criteria for making financial decisions.

When available funding is insufficient to meet all project obligations simultaneously, project managers require transparent criteria for prioritising expenditure.

Long-term financial planning was also identified as important.

Infrastructure projects frequently extend beyond a single financial year.

Annual budgeting alone may therefore be insufficient unless it is linked with a broader multi-year financing framework.

Stakeholder participation emerged as another important theme.

Respondents considered wider involvement necessary because different stakeholders contribute information required for realistic forecasting.

Some participants proposed needs-based budgeting and the establishment of a dedicated infrastructure fund.

These proposals reflected concerns about financing uncertainty and the difficulty of sustaining long-term infrastructure obligations through conventional annual financing arrangements.

Such proposals represent stakeholder perspectives and should not be interpreted as empirically tested solutions.

Nevertheless, they provide useful insights into the institutional challenges surrounding cash-flow management.

Inferential Findings

Table 2 Relationship Between Cash-Flow Planning and Project Implementation

Statistic	Value
Pearson correlation (r)	.617
Significance	$p < .001$
Standardised beta (β)	.617
R^2	.380
Adjusted R^2	.368
F	30.696

Pearson's correlation analysis established a moderately strong positive relationship between cash-flow planning and infrastructure-project implementation ($r = .617$).

The relationship was statistically significant.

This indicates that stronger cash-flow planning was associated with stronger implementation performance within the study sample.

Regression analysis further demonstrated that cash-flow planning significantly predicted infrastructure-project implementation.

The standardised beta coefficient was $\beta = .617$, while the model explained 38.0% of the observed variation in project implementation ($R^2 = .380$).

The adjusted R^2 of .368 indicates that the explanatory capacity remained substantial even after statistical adjustment.

The F statistic of 30.696 further confirmed the statistical significance of the regression model.

The finding that cash-flow planning explains 38.0% of variation in implementation is managerially important.

It demonstrates that financial planning is not merely an administrative requirement.

Instead, it represents an important determinant of infrastructure performance.

However, the remaining 62.0% of variation was associated with factors outside the simple regression model.

These may include procurement performance, contractor capability, land acquisition, technical complexity, monitoring, institutional capacity and external funding conditions.

The result should therefore not be interpreted to mean that cash-flow planning is the sole determinant of project implementation.

Furthermore, because the study was cross-sectional, the regression analysis establishes statistical prediction rather than definitive causation.

DISCUSSION

The findings demonstrate that cash-flow planning constitutes a significant component of public infrastructure-project implementation.

The positive and significant relationship between cash-flow planning and implementation supports the argument that financial planning should be integrated into the broader project-management process.

The finding that cash-flow planning explained 38.0% of observed implementation variation is particularly significant.

A single managerial variable accounting for more than one-third of variation in project implementation demonstrates that financial planning has substantial practical importance.

The result can be understood through the operational realities of infrastructure projects.

Construction activities continuously generate expenditure commitments.

When financial requirements are accurately forecast and aligned with expected funding availability, project managers can plan activities and contractual obligations more effectively.

When cash-flow forecasting is weak, implementation may advance faster than financing capacity, resulting in delayed payments and disruptions.

This interpretation is consistent with Majumder et al. (2022), who demonstrate that effective construction planning improves coordination and performance.

Financial forecasting complements construction planning by ensuring that the physical programme is supported by realistic financing arrangements.

An important insight from this study is the distinction between **the existence of policies and the effectiveness of planning**.

Respondents acknowledged planning policies and cash-flow regulations but expressed weaker confidence regarding budgeting knowledge and financial communication.

This indicates that institutional rules do not automatically translate into effective implementation.

Policies provide the framework within which planning should occur.

Their actual performance effect depends on personnel competence, organisational communication and the extent to which planning information influences managerial decisions.

The particularly low rating for personnel understanding of budgeting processes is therefore significant.

Infrastructure-project teams consist of professionals from several disciplines.

Engineers may understand physical implementation requirements but may have limited knowledge of government cash-management processes.

Finance personnel may understand budget execution but may not have complete information concerning emerging technical requirements.

If these professional perspectives remain separated, cash-flow planning becomes fragmented.

The study therefore suggests that effective financial planning requires **cross-functional financial literacy**.

Technical personnel do not need to become accountants, but they need sufficient understanding of budgeting processes to appreciate how implementation decisions affect financial commitments.

Similarly, finance personnel require timely information concerning physical progress and procurement requirements.

The relatively weak performance in annual financial planning also deserves attention.

Infrastructure projects are frequently multi-year investments.

Government budgeting, however, is primarily organised around annual financial cycles.

This creates a structural tension between multi-year project obligations and annual financing arrangements.

Annual cash-flow plans should therefore be connected to longer-term project-financing forecasts.

Failure to maintain such continuity may contribute to repeated financing gaps at the beginning or end of financial periods.

The communication findings also have important implications.

Financial information is valuable only when it reaches decision-makers capable of acting upon it.

A technically accurate cash-flow forecast that remains confined to the finance department has limited impact on project implementation.

Engineers, procurement officers, contract managers, project managers and contractors all require relevant financial information.

For example, a contractor unaware of emerging funding constraints may continue mobilising resources on the assumption that payments will be made according to the original schedule.

Similarly, procurement officials may initiate commitments without fully understanding revised financing conditions.

Open communication enables project teams to adjust before financing difficulties become implementation crises.

Stakeholder involvement also emerged as a significant weakness.

Infrastructure implementation depends on several actors.

Each stakeholder contributes information that can improve financial forecasting.

Technical teams understand work programmes.

Procurement personnel understand procurement lead times.

Contractors understand construction sequencing and anticipated payment requirements.

Finance personnel understand government funding procedures.

Integrating these perspectives is therefore essential for realistic forecasting.

The moderate assessment of technology for processing cash-flow information further reinforces the need for integrated management systems.

Effective cash-flow planning requires current information concerning approved budgets, commitments, procurement progress, certified works, outstanding payments and physical implementation.

Where these datasets remain separate, project managers may struggle to determine the true financial position of a project.

Information systems should therefore enable management to compare forecast expenditure against actual expenditure and physical progress.

This would allow emerging variances to be identified early.

The findings are broadly consistent with Tripathi and Gardner (2016), who emphasise that credible cash forecasting is essential to government cash management.

The findings also correspond with Uganda-specific evidence concerning challenges in aligning public expenditure with roads-sector implementation (Ggoobi et al., 2020).

The present study extends this literature by demonstrating empirically that cash-flow planning itself is significantly associated with implementation performance.

The implications can also be understood within the broader literature on project success.

Ika and Pinto (2022) emphasise that project success extends beyond narrow cost and schedule measures.

Nevertheless, financial disruption has the potential to affect several dimensions of project performance simultaneously.

Delayed financing can increase project duration.

Extended duration can increase costs.

Financial pressure may constrain resources required to maintain quality.

Repeated disruptions may also affect contractual relationships and stakeholder confidence.

Cash-flow planning should therefore be viewed as a cross-cutting managerial function.

The most important practical lesson is the need to shift from **compliance-oriented planning to decision-oriented planning**.

Compliance-oriented planning asks whether a cash-flow plan has been prepared.

Decision-oriented planning asks whether the plan is realistic, whether it reflects current implementation, whether deviations are analysed and whether management decisions are adjusted accordingly.

Public infrastructure agencies should therefore judge cash-flow planning by its contribution to implementation decisions rather than simply by the existence of planning documents.

CONCLUSION

This study examined the relationship between cash-flow planning and the implementation of public infrastructure projects at UNRA.

The findings demonstrate that cash-flow planning has a significant positive relationship with project implementation.

Pearson's correlation coefficient of r = .617 established a moderately strong positive association between the variables.

Regression analysis further showed that cash-flow planning accounted for approximately 38.0% of the observed variation in infrastructure-project implementation.

The findings therefore establish cash-flow planning as an important project-management capability.

However, the descriptive findings revealed a significant contradiction.

Formal planning policies, regulations and infrastructure expenditure commitments were recognised by respondents, yet operational weaknesses remained in budgeting knowledge, annual financial planning, stakeholder participation and communication.

The primary challenge therefore does not appear to be the complete absence of financial planning structures.

Rather, it concerns the extent to which existing structures are translated into practical managerial capability.

Effective infrastructure financing requires more than an approved budget.

It requires a realistic, time-phased and continuously reviewed cash-flow plan that connects expected funding availability with construction schedules, procurement commitments and contractual obligations.

The study further concludes that cash-flow planning creates the greatest managerial value when forecasts are regularly compared with actual expenditure and physical progress.

Significant deviations should trigger analysis and corrective action.

The findings therefore demonstrate that financial planning and technical implementation should not be managed as separate systems.

Their integration is essential for improving the implementation of public infrastructure projects.

RECOMMENDATIONS

Strengthen Budgeting and Cash-Flow Competence

UNRA and other infrastructure institutions should strengthen the budgeting and cash-flow forecasting competence of personnel involved in project implementation.

Training should include project managers, engineers, procurement personnel, contract managers and finance staff.

The objective should be to promote a shared understanding of the relationship between technical implementation and financial obligations.

Introduce Project-Level Time-Phased Cash-Flow Forecasts

Every major infrastructure project should maintain a detailed time-phased cash-flow forecast.

The forecast should be directly linked to the project work programme, procurement plan and anticipated payment schedule.

This would improve the ability of project teams to identify future financial requirements before they become urgent.

Institutionalise Regular Forecast Revision

Cash-flow forecasts should be reviewed and revised periodically.

Forecast revision should occur whenever there are significant changes in physical progress, project scope, procurement timelines, contractual obligations or funding availability.

Variances between planned and actual expenditure should be analysed and explained.

Improve Communication of Cash-Flow Information

Relevant stakeholders should receive timely information concerning funding sources, expected releases, cash limitations and significant revisions to financing arrangements.

Clear communication would reduce unrealistic expectations and enable project teams to adjust implementation activities when necessary.

Strengthen Stakeholder Participation

Technical, procurement, finance and contract-management teams should participate jointly in cash-flow planning.

Other stakeholders should be involved where their information materially affects financial forecasting.

Stakeholder participation should be structured around the information each participant contributes to the planning process.

Integrate Financial and Physical-Progress Systems

Information systems should integrate project budgets, procurement commitments, physical progress, certifications and actual payments.

Managers should be able to compare forecast expenditure with actual expenditure and construction progress.

Integrated systems would improve forecasting and strengthen early identification of financial risk.

Strengthen Multi-Year Financial Planning

Annual financial planning should be linked with medium- and long-term project-financing requirements.

Infrastructure projects extending across several financial years require continuous financing projections rather than isolated annual plans.

Incorporate Cash-Flow Risk into Project Reviews

Cash-flow risk should be included in regular project-performance reviews.

Project teams should identify potential financing gaps, assess their implications and assign responsibility for mitigation measures.

IMPLICATIONS OF THE STUDY

Managerial Implications

The findings demonstrate that cash-flow planning should be treated as an operational management responsibility rather than solely a finance function.

Project managers should regularly compare planned financial requirements with actual expenditure and physical progress.

Significant variances should prompt corrective decisions.

Management should also strengthen cooperation between technical and financial teams.

The low level of budgeting understanding indicates that project personnel require greater shared financial awareness.

Policy Implications

The study has implications for public-sector financing policy.

Public financial-management frameworks should recognise that infrastructure projects generate contractual obligations that may not always correspond neatly with periodic government cash-release arrangements.

Policy frameworks should therefore promote realistic forecasting and early identification of potential mismatches between project obligations and anticipated liquidity.

Infrastructure-project approval should also be accompanied by credible medium-term financing strategies.

Institutional Implications

The findings reveal that formal regulations alone are insufficient.

Effective institutional performance requires capable personnel, reliable information systems and clear communication channels.

Infrastructure institutions should therefore strengthen internal accountability for cash-flow forecasting and variance management.

Responsibilities for preparing, updating and communicating project cash-flow forecasts should be clearly assigned.

Practice Implications

Project teams should treat cash-flow forecasts as continuously evolving management tools.

When project implementation changes, the financial forecast should also change.

Forecast revision should subsequently influence decisions regarding procurement, sequencing and risk management.

Project teams should move away from treating annual cash-flow plans as static compliance documents.

Implications for Contractors and Consultants

Improved communication concerning financing conditions would enable contractors and consultants to plan implementation resources more realistically.

Reliable cash-flow information can reduce uncertainty surrounding payment expectations and improve coordination between the implementing agency and contractual partners.

However, shared forecasts should be sufficiently credible to avoid creating unrealistic expectations.

Theoretical Implications

The study reinforces the planning-performance perspective by demonstrating that cash-flow planning is significantly associated with infrastructure implementation.

The findings further suggest that cash-flow planning is multidimensional.

It incorporates forecasting, budgeting knowledge, stakeholder participation, communication and information technology.

Future theoretical models should therefore avoid reducing cash-flow planning to a purely technical accounting process.

Research Implications

Future studies should use longitudinal project data to compare forecast and actual expenditure over time. Such studies could examine whether forecast accuracy predicts contractor payment delays, cost escalation and project completion time.

Comparative studies across roads, health, water, energy and local-government infrastructure could also determine whether the relationship differs according to sector.

Future research could additionally examine variables such as procurement performance, contractor capacity and institutional capability as mediating or moderating influences.

Study Limitations

The study has several limitations.

First, the cross-sectional design limits causal interpretation.

Although cash-flow planning significantly predicted project implementation, the findings do not establish definitive causality.

Second, a substantial part of the study relied on respondents' perceptions.

Perception-based evidence provides valuable organisational insight but may differ from conclusions based solely on audited financial and physical-performance records.

Future studies should therefore combine perception data with longitudinal project records.

Third, the study focused on UNRA and ten substantially completed projects.

The findings should therefore be generalised cautiously beyond the road-infrastructure context.

Fourth, cash-flow planning explained 38.0% of the observed variation in implementation.

This confirms its importance but also demonstrates that other variables collectively explain a larger proportion of infrastructure performance.

Future research should therefore develop multivariate models incorporating procurement, contractor capability, institutional capacity and other implementation factors.

Finally, project-level cash-flow planning operates within wider fiscal and institutional conditions that project managers may not directly control.

Improved forecasting can therefore strengthen project management without completely eliminating uncertainty arising from broader government financing conditions.

Contribution of the Study

This study makes an important empirical, managerial and conceptual contribution to the understanding of public infrastructure-project performance.

First, it provides empirical evidence that cash-flow planning is significantly associated with infrastructure-project implementation within Uganda's roads sector.

Second, it demonstrates an important distinction between formal financial-planning structures and effective operational planning.

Policies and regulations may exist while weaknesses persist in budgeting knowledge, communication, stakeholder participation and information management.

Third, the study reconceptualises cash-flow planning as a multidisciplinary project-management capability connecting finance, engineering, procurement and contract administration.

The study therefore shifts attention from the narrow question of whether infrastructure projects have approved budgets to the more important question of whether financial resources are realistically forecast, sequenced, communicated and monitored throughout implementation.

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