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THE SCOPE OF PROJECT MATURITY ISSUES IN CAMEROON

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Abstract. Cameroon, located in Central Africa, plays a leading role in terms of trade, with about half of the GDP of the Central African Economic and Monetary Commission area. Yet, the quality of public expenditure in Cameroon is said to be one of the grievances plaguing its economic growth. This underperformance is generally linked to project management, an essential lever for the country's development. The construction of infrastructure is one of the challenges of Cameroon's development policy. This lack of stakeholders in the knowledge and practice of maturation has an enormous impact in the votes consumption and the execution of projects that inevitably leads to the abandonment of projects, the multiplication of amendments, poor workmanship and the lack of satisfaction on the part of the beneficiaries. Hence, this study, after performing a SWOT analysis on project management maturity in Cameroon public projects, explores 17 projects undertaken over the past decade, in order to probe the impact of problems caused by the immaturity of projects on schedule and costs. The results revealed that the general maturity level for this study was 68%. Out of the ten hypotheses stated, seven were accepted. It was also found that the level of maturity of a public investment project in Cameroon positively affects its delivery whereas, some of the maturity variables do not significantly explain the costs with its parameters but impact others. Recommendations for a better project management in the country are thrown.
***Keywords**:* maturation, project duration, public investment projects, vote consumption, Project costs.

EL ALCANCE DE LOS PROBLEMAS DE MADUREZ DEL PROYECTO EN CAMERUN

Resumen. Camerún, ubicado en África Central, juega un papel de liderazgo en términos de comercio, representando alrededor de la mitad del PIB del área de la Comisión Económica y Monetaria de África Central. Sin embargo, la calidad del gasto público en Camerún sería uno de los agravios que diluye su crecimiento económico. Este bajo desempeño generalmente está relacionado con la gestión de proyectos, una palanca esencial para el desarrollo del país. La construcción de infraestructura es uno de los desafíos de la política de desarrollo de Camerún. Esta falta de conocimiento y práctica de maduración por parte de los actores involucrados tiene enormes consecuencias en el consumo de créditos y la ejecución de proyectos lo que conduce inevitablemente al abandono de proyectos, la multiplicación de enmiendas, mala ejecución e insatisfacción por parte de los beneficiarios. Así, el presente estudio, después de haber realizado un análisis FODA sobre la madurez de la gestión de los proyectos de inversión pública cameruneses, explora 17 proyectos realizados durante los últimos diez años, con el fin de sondear el impacto de los problemas causados por la inmadurez de los proyectos en tiempo y costo. Los resultados

revelaron que el nivel general de madurez para este estudio fue del 68%. De las diez (10) hipótesis planteadas, siete (07) fueron aceptadas. También se encontró que el nivel de madurez de un proyecto de inversión pública en Camerún afecta positivamente su entrega mientras que algunas variables de madurez no explican significativamente los costos con sus parámetros pero afectan a otras. Se proponen recomendaciones para una mejor gestión de los proyectos en el país.
Palabras clave: Maduración, plazo del proyecto, proyecto de inversión pública, consumo de crédito, costo del proyecto.

Introduction

Following the cancellation in April 2006 of a large part of its bilateral and multilateral debt, Cameroon has set its sights on becoming an emerging country by 2035. This perspective places the country in front of the challenges of developing its infrastructure, diversifying its economy, consolidating its growth, reducing poverty and ensuring sustainable development. Public investment projects are essential to economic activity, as they help maintain or increase productive capacities and enhance the well-being of the population (MINEPAT, 2018). Development projects also appear to be the instrument for transforming a country's financial potential into infrastructure and social facilities (Messengue, 2013).

Infrastructure is an engine that facilitates trade and promotes strong and sustainable growth (DSCE, 2009), especially for developing countries. This is why the Cameroon government has invested heavily in infrastructure projects over the past decade through the Public Investment Budget (PIB). Thus, several projects have been launched in various sectors (road infrastructure with highways, engineering structures and bridges, port platforms, hydroelectric dams, water, agriculture and livestock) and since 2015, the three-year Emergency Plan that brings together several sectors of activity has been put in place to accelerate growth in Cameroon and improve the living conditions of the population (SPM, 2014).

According to PMI (2017), "a project is an effort made over a period of time with the goal of creating a unique product, service, or outcome". Furthermore, it describes it as "a set of coordinated activities, with start and end dates, undertaken by individuals or organizations to achieve specific objectives, within a defined time, cost and performance parameters." According to Aurégan and Joffre (2004), the project is present at all levels of the organization. Thus, it has particular characteristics, its uniqueness, its time horizon and its novelty. Indeed, its purpose is variable. It is also limited in time since the project has a start and end date. Finally, it is a break with the permanent management of the company.

The project planning phase is the process by which project tasks must be executed on time and within the cost. Project maturity has a positive effect on project performance, and continuous improvement in project management performance. Performance can be achieved through improving project maturity (Ko & Kim, 2019). Maturity models seek to improve the organization's ability to manage projects successfully (Kostalova & Tetrevova, 2014).

In Cameroon, multiple efforts have been made to improve project maturity and accelerate economic growth. The Finance and Budget Committee of Cameroon's National Assembly still points to the immaturity of a large proportion of projects in the PIB[1]. Despite these efforts, bad practices resulting from underspending of the Public Investment Budget (PIB) and poor management or maturity compromise the expected development process. The perfect example is the launch of several infrastructure projects for the African Cup of Nations (AfCON) recently organized in Cameroon and the Three-Year Emergency Plan. The management of

[1] The EcoMatin newspaper of October 18, 2019. Website: https://ecomatin.net/

these infrastructure related to the construction of stadiums, hotels and access roads has always been a concern for public services, as contracts were signed in haste without the projects being mature. Thus, the Public Investment Budget continues to be poorly executed, despite the existence of a mechanism that sets out the procedures for developing and validating the maturity of projects.

This situation of failed public investment projects due to maturity in underdeveloped countries has attracted the interest of many researchers. Muriithi and Crawford (2003) drew conclusions regarding existing project management standards and guides to increase their relevance and applicability for projects in Africa. Christoph Albrecht and Spang (2014) identified potential influences on an organization-specific "ideal" level of project management maturity by taking a qualitative and exploratory approach. While Seelhofer and Graf (2018) developed a systematic national project management maturity framework and the national project management maturity model, defining maturity levels, identifying key perspectives and drivers of maturity, and discussing key performance indicators that can be used to assess and compare national project management maturity. In assessing the drivers of project delays in Algeria, Salhi and al. (2018) found that insufficient pre-project studies are the most important but also the most common factor for project failure.

The interest of the study is to allow the smooth running of infrastructure projects financed or co-financed by the state budget to demonstrate the extent of the problems of project maturity during their execution. As stated by Nguyen (2011) the occurrence of a hazard during project execution necessarily influences the time, cost and quality of the project. Thus, the objective of this research is to evaluate the principles of project management, from the design phase to the various potential hazards that may occur during their implementation. To do so, the study addresses the question of the cross influence of project maturation with the process of managing delay and within the limits of expected costs. To achieve this objective, a few research questions were raised: 1). What are the weaknesses of project maturity in Cameroon? 2) To what extent do maturity weaknesses affect project execution delays? 3) To what extent do maturity weaknesses affect projected project costs? Using statistical and qualitative data, a SWOT analysis was conducted and hypotheses were developed and tested to answer the questions posed. This study was conducted in Cameroon in January 2022.

Review of the literature and hypotheses

Project Management Maturity Measures

One of the key success factors of a project is project maturity. Good program and project portfolio management within the organization improves the likelihood of prioritizing projects and meeting quality expectations and project goals (V. S. Anantatmula & Rad, 2018). Organizations with a portfolio management emphasis on maturity are likely to complete projects within the planned budget (V. Anantatmula & Rad, 2013). Descriptive statistics of project maturity levels by assessment area can be identified as methods and tools (M), human resources (H), project environment (E), and knowledge management (K) (Spalek, 2015). Tiwari and al. (2020) developed a mixed maturity model framework that combines sequential and tiered models depending on the scope of the evaluation.

In Cameroon, the management of public investment project maturation occurs at three different levels. In the regions, public investment projects are initiated either by the Decentralized Local Authorities (DLAs) or by the devolved services of the State and coordinated by the Governor of the region concerned. For state corporate entities, the maturation of projects is coordinated by the general management concerned. Finally, for public administrations, the portfolio of public investment projects is made up of projects initiated

either by central services, devolved services, or projects initiated by the Decentralized Local Authorities or public institutions (PMI, 2017).

Taking into account all the previous research raised, in this study, we will consider the following elements as measures of project management maturity: 1-Scope formulation: project whose description has not clearly specified all that is necessary for its success. 2- Availability of funding: projects whose projected budget does not take into account available resources. 3- Release of rights-of-way: projects for which the project execution sites are not available. 4- Execution schedule: projects whose execution schedule is not realistic. 5- Technical studies: projects whose technical studies are insufficient and for which the tender documents are poorly prepared. The tender documents are in fact an output of the technical studies.

A concept for measuring project maturity was created by Mormul (2021) in the form of a weighted average of values (i.e., an average probability of the planned factors: 0.00-0.20, 0.21-0.40, 0.41-0.60, 0.61-0.80, and 0.81-1.00) scaled according to their importance (number of respondents choosing the correct answer). In addition, the indicator value of 1.0 implies that the surveyed companies rate their project maturity as perfect (fully mature organization), while 0.0 means that an organization is not project mature at all. In addition, there are three ranges of the indicator that classify three levels of project maturity: 0.00-0.33 is low project maturity; 0.33-0.66 medium project maturity; and 0.66-1.00 high project maturity. In addition, according to the survey, an overall project maturity score among infrastructure construction firms was calculated at 0.55 (medium). This concept will be used in the present work.

Project Maturity and Project Delay

Several studies have explored the closeness between project maturity and project schedule. Bento and al. (2019) stated that the adoption of organizational project management maturity brought about process improvements, resulting in more appropriate scoping, scheduling, and stakeholder communications. A study by Ibbs and Kwak (2000) involving 38 international companies also concluded that companies with good project management capabilities and skills achieve better project outcomes. Public sector firms in Ghana recorded low levels of maturity in most phases of the project management life cycle. This can be attributed to the low level of project management expertise in the sector, with possible disastrous consequences on project delivery time and the country's development since public sector projects account for a large percentage of projects (Ofori & Deffor, 2013).

Empirical research conducted at Addis Ababa University Institute of Technology revealed that the implementation of road construction projects suffers from poor organizational performance due to project immaturity. Poor scope management, recorded delays, higher than expected costs, and serious quality defects are among the critical effects of these underperforming organizations (Ambaw, 2017). In Nigeria, Koko and al. (2013) found that design flaws, poor contract management, and poor financing, were the most important nodes for improvement in project management. In Egypt, Abu El-Maaty and al. (2017) showed that the contractor's technical staff is insufficient and ineligible to accomplish the project, which should be considered in project maturity models, is one of the important causes of time overrun.

In Cameroon, Kala Kamdjoug and Motcheka (2015) used a mixed-method approach to show that both determinants (maturity and planning) have a positive relationship with delays in the implementation of Information Systems projects. However, none have ever worked on finding the relationship between maturity and delays in public investment projects, so the following hypothesis can be made. Ha: The level of maturity of a public investment project in Cameroon positively affects its delivery delay.

Project Maturity and Project Cost

Research on the benefits of project management maturity has so far focused on studying the relationship between maturity and the certain beneficial effect (Christoph & Konrad, 2014). Later, thousands of articles in the literature proved the proximity of project management maturity and are cost. The research results of Ambaw (2017) indicate that project cost management is considered the most important aspect compared to the management of other knowledge areas. Spalek (2013) proved that an increasing level of maturity in project management can have an influence on reducing the costs of projects managed by the organization. On the other hand, Heravi and Gholami (2018) proved using the project success criteria (cost and quality) that the influence of organizational learning on improving project performance is greater than the influence of the project risk management maturity level.

An Ethiopian study conducted on project management maturity in the construction industry by Yimam (2011) found that 22% of the maturity of the contractors cost management process is incomplete, resulting in projected cost overruns. Tebeje (2015) using interviews with contractors, pointed out that the main factor causing cost overruns in construction projects is poor planning. In Nigeria, Abdulrahman and al. (2019) used a five-scale maturity level in their study, to define the level of maturity achieved by organizations and showed that it is simply the average maturity level, which is not satisfactory, leading to cost overruns. On the other hand, Olanisimi and Amusan (2011) studies found that the main factors observed through factor analyses causing cost overruns were, contractor inexperience, inadequate planning, inflation, continuous variations and changes in project design. In addition, project complexity, shortening or increasing project duration, and fraudulent practices were also responsible.

In Cameroon, Nyuonguo and Sundjo (2018) found that improved planning and risk mitigation at the construction site increased the likelihood that the project would not meet its projected costs. This probability was not significant, however, for failure to meet the planned schedule. However, the current literature lacks models that allow experts to correlate measured maturity with the expected probability of success related to cost overruns (Sanchez et al., 2020). The following hypothesis can be initiated. Hb: The level of maturity of a public investment project in Cameroon positively affects its costs.

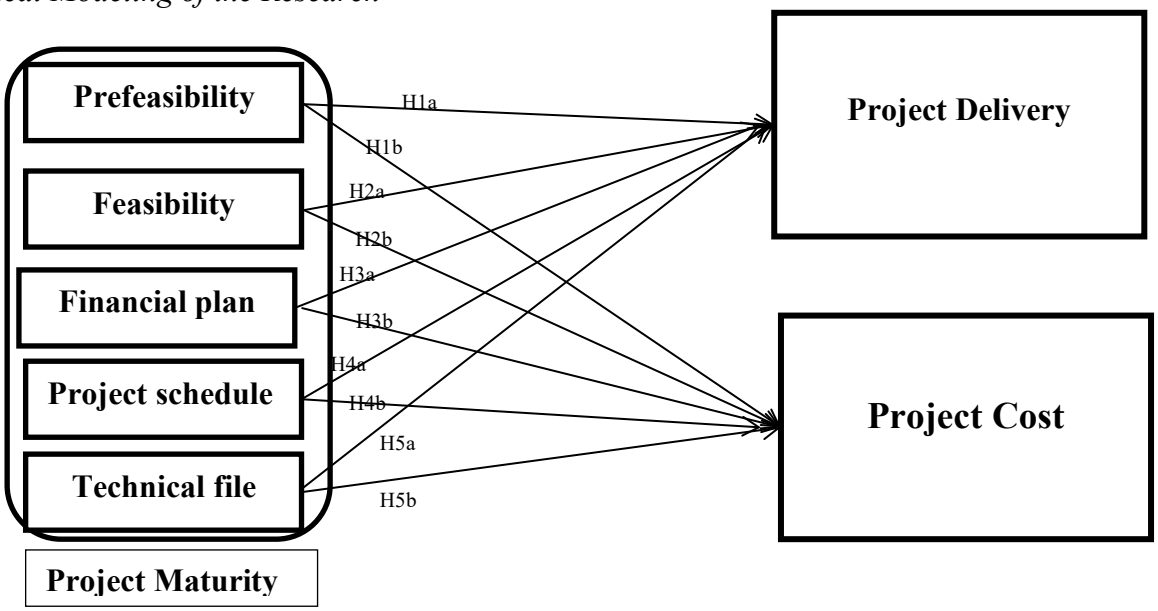
The project management maturity baseline provides the information needed to determine the levels of project management maturity in Cameroon's public sectors at a given time. This baseline provides the basis for developing a project management maturity improvement plan. Using the five maturity measures described earlier, the two hypotheses can be divided into five NULL hypotheses, to test the dependence of cost and delivery on each of the maturity variables. The overall structure of the research hypotheses is shown in Figure 1. The "a" hypothesis are cost-related, while all hypotheses noted as "b" are time-related. The appropriate methods for collecting data and testing the hypotheses are presented in the following sections.

Table 1
Hypothesis of the study

No	Hypothesis and null hypothesis
H1	H1a : An appropriate opportunity study influences reducing the costs of a project;

No	Hypothesis and null hypothesis
	H1a0 : The absence of an appropriate opportunity study influences increasing the costs of a project ; H1b : An appropriate opportunity study influences the reduction of project lead times of a project ; H1b0 : The absence of an appropriate opportunity study influences the overrun of the deadlines of a project.
H2	H2a : An appropriate feasibility study influences reducing the costs of a project; H2a0 : The absence of a feasibility study influences increasing the costs of a project; H2b : An appropriate feasibility study influences the reduction of project lead times; H2b0 : The absence of a feasibility study influences the overrun of the deadlines of a project;
H3	H3a : An adequate method and financing influences reducing the costs of a project ; H3a0 : The absence of an adequate method and financing plan influences increasing the costs of a project ; H3b : An adequate method and financing plan influences the reduction of project lead times ; H2c0: The absence of an inadequate method and financing plan influences the overrun of the deadlines of a project.
H4	H4a : An adequate project implementation schedule influences reducing the costs of a project ; H4a0 : The absence of a project implementation schedule increasing the costs of a project ; H4b: An adequate project implementation schedule influences the reduction of project lead times; H4b0: The absence of a project implementation schedule influences the overrun of the deadlines of a project.
H5	H5a : An complete technical study influences reducing the costs of a project ; H5a0 : The absence of a technical study influences increasing the costs of a project ; H5b : An complete technical study influences the reduction of project lead times; H5b: The absence of a technical study influences the overrun of the deadlines of a project.

Figure 1
Theoretical Modeling of the Research

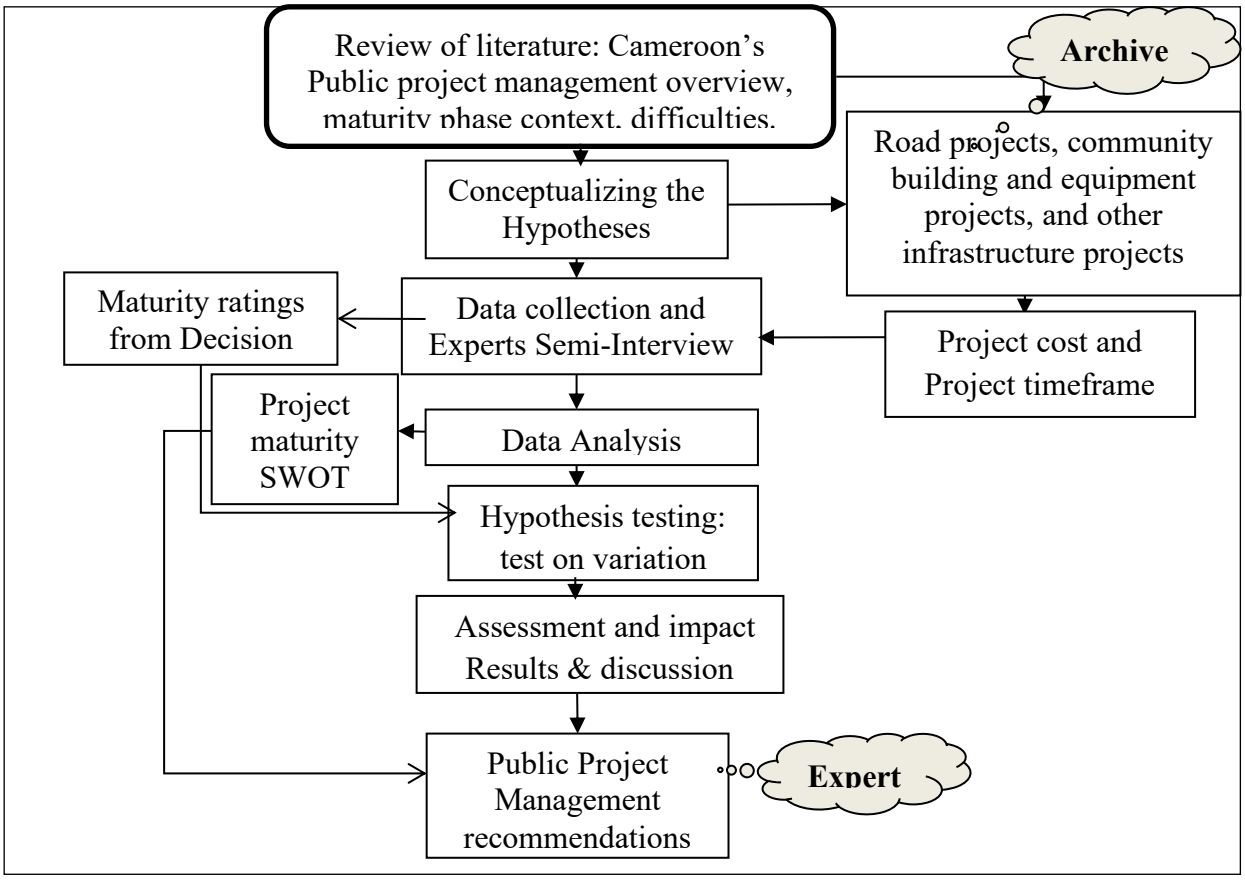


Note. Source : Author, based on data from the preliminary research and the literature review.

Methodology

The overall research methodology used is presented in Figure 2 below

Figure 2
Overall Research Methodology



Note. Source : Author, based on data from the preliminary research and the literature review.

A literature review was conducted using open data and data from the Ministries in charge of the Economy, Public Works and Public Contracts. This review led to an inventory of project management in Cameroon and the identification of issues in the maturity phase. The literature review led to the formulation of different hypotheses that will answer the different research questions. A mixed method approach was used in this research. The maturity variables were qualitative, while the success variables were purely quantitative. After a workshop and a semi-interview with seven (7) skilled actors (Decision Makers), the success factors of the project maturity variables were defined and estimated. After collecting archival data, a SWOT analysis of the maturity phase was performed and using IBM SPSS, the hypotheses were tested using correlation analysis. The cost variances (difference between the estimated cost at planning and the cost after execution) were calculated and tested. This led to a first conclusion on maturity weaknesses and opportunities and the involvement of Covid19 was also assessed. Finally, the results were presented, a discussion compared the current work to previous studies, and recommendations were made with the help of experts. The variation that highlights the rate of cost and schedule execution versus the physical execution rate of the services is presented by the following equation:

$$Variation = \left(\frac{Actual\ Consumption\%}{Physiscal\ Execution\%} \times 100\right) - 100\% \qquad \text{(Eq1)}$$

Variation=((Actual Consumption%)/(Physical Execution%)×100)-100% (Eq1)

Variables: the independent variables are maturity measures (M1=pre-feasibility/opportunity study; M2=feasibility study; M3=financial plan; M4=project schedule; M5=technical file) that will be evaluated after the Experts have given their maturity scores for each of the selected projects while the dependent variables are the percentage of cost and time overruns in relation to the provisional values, calculated from the data in the archives of MINEPAT and MINMAP.

Sampling and Data Collection: The population was organized at the structural level by project type. The study population is covered by road construction projects, building and public facilities projects, and other infrastructure projects. A simple random sampling (SRS) of seventeen (17) projects was used by selecting the projects and programs directly related to the sample, launched in the last ten years. In the selected sample, road projects were explored. Delays in project execution and financial overruns in the construction of some public buildings and facilities that have been under construction for several years were investigated. The work on other infrastructures was not omitted. Data were collected using two different techniques. Maturity data were collected through interviews with the heads of the government teams responsible for the projects, while cost and schedule data were collected through the archives of the selected project files.

Data Analysis: An average probability of the planned factors: 0.00-0.20, 0.21-0.40, 0.41-0.60, 0.61-0.80, and 0.81-1.00 was used for each of the measures, as mentioned previously, to acquire maturity weights. Project duration and cost overrun was calculated using the equation (1). Spearman's rho correlation analysis in IBM-SPSS statistical tools was used as it helps better to obtain information regarding certain variables that are the main determinants of both noncompliance of delays and forecasted cost. With the SPSS correlation model, we were interested in the impact of certain variables on the non-compliance of both the forecasted cost and the project execution delay.

The projects selected for the study with schedule (over several months) and estimated costs (in billions of CFAF) as of December 31, 2021 are presented in Table 2. These projects have a major development action or a set of integrated major actions of national economic and/or social interest, the result of which is a large-scale physical object or complex infrastructure.

Table 2
Projects selected for the study

No	Projects
1	Yaoundé-Douala Highway Construction Project (Phase I)
2	Complementary rehabilitation works on the eastern entrance road section of the city of Douala, from PK10+400 to PK19+300 (bridge over the Dibamba).
3	Construction of the Sangmelima – Ouesso road, lot 1 (Sangmelima – Djoum), Section 1 (Sangmelima – Mekok – Bikoula: 65 km
4	Construction of the Sangmelima – Ouesso road, lot 1 (Sangmelima – Djoum) Section 2 (Bikoula – Djoum : 38 km
5	Construction of the Kribi-Lolabe highway
6	RN17A construction works: lot 1 Mengong-Sangmélima
7	Olama-Kribi road construction works, Lot 1: Olama-Bingambo
8	Construction works of the MBAMA-MESSAMENA road section
9	Construction of the Yaoundé-Nsimalen highway, open countryside section
10	Drinking Water Supply Project for the City of Yaoundé and its Surroundings from the Sanaga River (PAEPYS).
11	Project for the Upgrading of Electricity Transmission Networks and Reform of the Sector (PRRTERS)
12	Energy evacuation line from the MEMVE'ELE hydroelectric dam
13	BINI WARAK hydroelectric development (75 MW)
14	Lom Pangar hydroelectric development (foot plant with a capacity of 30 MW and energy evacuation lines)
15	Construction of the second phase of the Kribi Deep Water Port
16	Construction of the drinking water supply system for the Port of Kribi and its outbuildings
17	Construction of 1,675 social housing units in Yaoundé/Olembé and Douala/Mbanga-Bakoko

These major projects (roads, highways, ports, hydroelectric dams, drinking water supply, social housing, etc.) are those whose implementation cost represents at least 1% of the State's budgetary expenditure according to MINEPAT Document of Projects in Need of Funding IN 2021. In Cameroon, (MINEPAT, Public Financial Management Assessment Framework (PEFA), February 2016) specifies nine (09) main characteristics that distinguish a major project from a conventional project. These are: cost of preparation and implementation, the multiplier effect and structuring function, the function of training and strengthening the operationality of other projects, the great potential for job creation (direct and induced), the strength and sustainability of the economic and / or social impact, the specific institutional and partnership set-up, technological innovation and connectedness.

Results

Table 3 shows the project management maturity factors found in the successful implementation of public investment projects in the form of a SWOT matrix. This table was developed using related literature, project reports, and with the contribution of experts. This

has helped to identify difficulties encountered by project stakeholders in terms of maturity, and provides a basis for recommendations to be made.

Table 3
SWOT analysis matrix for projects in Cameroon

Criteria	Project management maturity factors
Strengths	1 Donors are still open to investing in Cameroon. 3 Flexibility in project cost estimates. 4 The use of specialists for project implementation. 5 Local project managers (professional and skilled) work in the central administration, devolved services, and Local Decentralized Authorities.
Weaknesses	1-Project management units usually stick to estimates until project completion, with no further effort to refine the costs determined by the studies. Whereas projects should continue to mature during physical and financial execution. 2-The absence of a Technical Consulting Firm in some cases to accompany the project manager in the control and monitoring of the execution of the works. 3-The detailed fore-project studies and technical choices are made during the execution of the project and there is no optimization. 4-The profile of some projects changes after the contract is signed. 5-Some projects start without any study. 6-many contracts are signed on the basis of preliminary designs (APS) contrary to the provision of the Cameroon Public Contract Code which requires that the technical studies be at least at the phase of detailed draft (APD). 7-after signing contracts for major projects, project teams often take one to two years to complete the execution studies. 8-the technical risks of the project are not calculated and measured in the estimates. 9-Lack of qualification criteria to identify the best contractors.
Opportunities	1-the country has qualified engineers in various fields, trained locally or outside the country. 2-the strong production of construction materials at the local level. 3-Information and Communication Technologies offer Cameroonians the possibility of self-training to international standards. 4- Access to contracts deserved for local Small and Medium Enterprises (SMEs) allowing them to participate in the country's economic activities, create jobs, realize their turnover and increase their profits.
Threats	1- Lack of information on facilities and equipment, especially on the plans of projects. 2- Many social and cultural factors surrounding the projects need to be taken into account before their execution. 3- Lack of variety in the projects which is materialized by the standard plans. 4- Corruption in the award and execution of public contracts. 5- Centralization of decision-making, including for smaller projects 6- Insecurity in certain localities. 7- Pandemic and epidemic diseases in some regions of the country. 8- Recurrent difficulties in obtaining compensation and freeing up the right of way for certain projects.

Seven experts were interviewed to collect project maturity measures, and their profiles are recorded in Table 4. This table shows a cumulative experience of over 100 years, with Experts coming from different parts of the country and having at least a university degree. It is reported that all Experts have a Master's degree or higher and 100% have at least 10 years of experience.

Table 4
Profile of Experts

Gender	Frequency	Percentage (%)
Male	5	71
Female	2	29
	Skilled	
Less than 10 years	0	0
Between 10 and 15 years	3	43
More than 15 years	4	57
	Level of education	
Bachelor's degree	0	0
Master's degree	6	86
PhD	1	17
PostDoc	0	0
	Field	
Administration	0	0
Engineering	3	43
Management	3	43
Finance	1	16

Each of the project maturity level weights given by the Experts for each project was recorded and averaged in Table 5. This matrix was used to assess the correlation between maturity and project success factors. Analyzing the comparison of time and cost overruns recorded in Figure 3, it is particularly noticeable for projects N9, N11, and N13 that both delays and cost overrun percentages were positive, suggesting a greater influence on project performance. In particular, project 13 (BINI WARAK hydroelectric scheme, 75 MW) shows the largest cost and schedule overrun, which means that the project has the largest problems among the set studied.

Table 5
Project maturity levels according to the experts

Measure	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
M1	90 %	60 %	50 %	70 %	50 %	50 %	70 %	65 %	70 %	60 %
M2	80 %	70 %	70 %	70 %	60 %	70 %	70 %	70 %	60 %	50 %
M3	40 %	50 %	60 %	50 %	50 %	50 %	55 %	85 %	45 %	70 %
M4	60 %	80 %	85 %	80 %	80 %	85 %	60 %	80 %	85 %	80 %
M5	90 %	80 %	95 %	85 %	90 %	85 %	80 %	90 %	80 %	60 %

Table 5

Project maturity level according to experts (continued)

Measure	P11	P12	P13	P14	P15	P16	P17
M1	55 %	45 %	55 %	60 %	75 %	80 %	60 %
M2	60 %	50 %	50 %	70 %	80 %	85 %	60 %
M3	60 %	45 %	40 %	60 %	40 %	85 %	50 %
M4	85 %	75 %	60 %	80 %	80 %	80 %	70 %
M5	85 %	80 %	80 %	80 %	70 %	85 %	75 %

Table 6

Variation in project implementation costs

Measure	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Consumption %	117	13.42	87	93	96.28	83.62	87	65	100	78.5
Execution%	97.7	9.1	87	96.6	96.02	86.33	96	73.68	25	81.5
%Cost(variation)	19.75	47.4	0	-3.7	0.27	-3.13	-9.3	-11.7	300	-3.68

Measure	P11	P12	P13	P14	P15	P16	P17
Consumption %	9	92	0.5	37	8	34	52
Execution%	6.52	94	9	40	32.5	44	78
%Cost(variation)	38.03	-2.12	-94.4	-7.5	-75.38	-22.72	-33.33

Table 7

Variation in Project delays

Measure	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Consumption %	96.62	0.5	95.6	98.5	105	94.1	94	92	98	83.2
Execution%	97.7	9.1	87	96.6	96.02	86.3	96	73.68	25	81.5
% Time(variation)	-1.1	-94.5	9.96	1.96	9.352	9.1	-2.08	24.86	292	2.08

Measure	P11	P12	P13	P14	P15	P16	P17
Consumption %	33	115	300	87	45	60	215
Execution%	6.52	94	9	40	32.5	44	78
% Time(variation)	406.1	22.3	3233	117.5	38.46	36.36	175.64

Figure 3
Comparison of project costs and delays

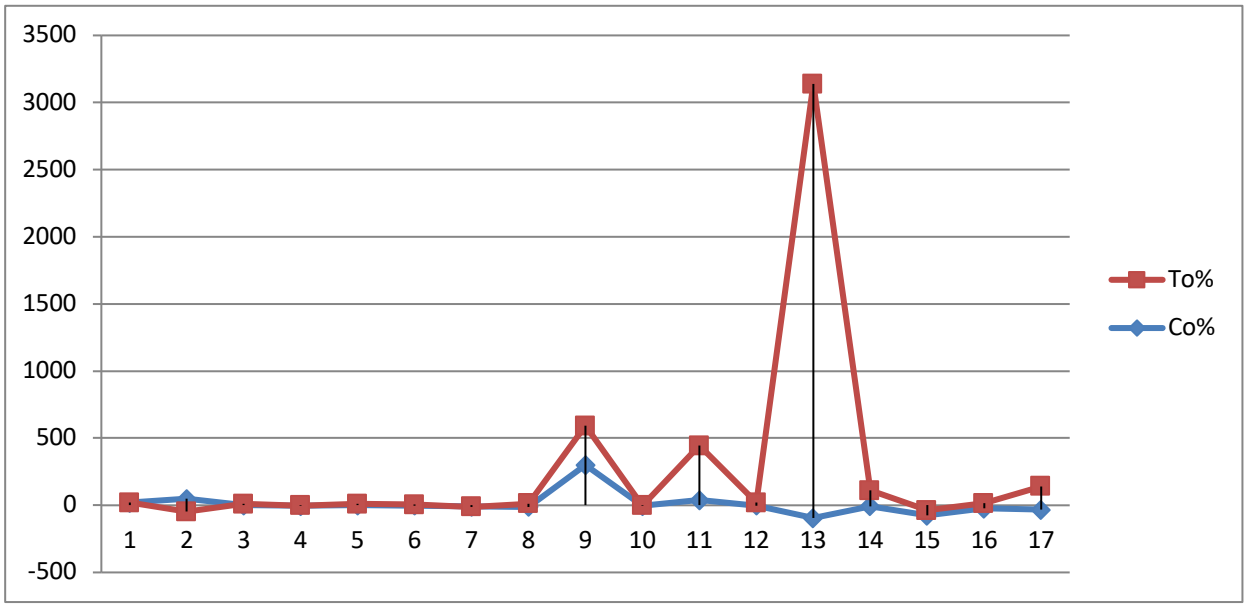


Table 8
Correlation test between project maturity variables, delays and costs

Spearman's rho Correlations

			Co	To	M1	M2	M3	M4	M5
Spearman's rho	M1	Correlation Coefficient	.212	.531**	1.000	.638**	-.035	-.249	-.061
		Sig. (2-tailed)	.041	.061	.	.006	.893	.336	.817
	M2	Correlation Coefficient	.131	.622**	.638**	1.000	.118	.059	.338
		Sig. (2-tailed)	.617	.208	.006	.	.651	.823	.184
	M3	Correlation Coefficient	.564**	.561**	-.035	.118	1.000	.348	.194
		Sig. (2-tailed)	.808	.816	.893	.651	.	.171	.456
	M4	Correlation Coefficient	-.167	.662**	-.249	.059	.348	1.000	.264
		Sig. (2-tailed)	.062	.521	.336	.823	.171	.	.306
	M5	Correlation Coefficient	-.300**	.738**	-.061	.338	.194	.264	1.000
		Sig. (2-tailed)	.242	.357	.817	.184	.456	.306	.

Note. **. Correlation is significant at the 0.01 level (2-tailed).

In Table 5, the results revealed that the overall maturity level of the selected projects according to the Experts was 68%. The results in Table 6 represent a calculation of the percentage of project cost overrun relative to the physical implementation level, using equation

(1). A positive cost overrun percentage means that the budget has exceeded or may exceed the required forecast, while a negative or zero value means that there would be no cost overrun in a given project. Similarly, using equation (1) and the same hypotheses used for costs, Table 6 represents a calculation of the time overrun percentages (delays) for each of the seventeen selected projects. Looking at the results in Table 8 above, it can be noted that the correlation coefficients show the scope and direction of the linear relationship between the project maturity variables and the sampled projects' success measures (cost and delay).

The P-value is shown along with the correlation coefficient for the matrix studied. The significance level shown is for the 1% level, which indicates a very high significance of the research. The results in Table 8 also show a significant correlation between the Maturity variables.

A Spearman correlation analysis reveals a positive correlation (r=.531**) between an appropriate opportunity/prefeasibility study (M1) and the time overrun (delay) of public investment projects, hence the acceptance of H1b (An appropriate opportunity study influences project delay). However, a weak positive correlation (r=.212) is found between M1 (appropriate opportunity study/prefeasibility) and project cost overrun, which means that even if the measure affects costs, other factors may have more influence, thus, H1a: appropriate opportunity study influences reducing the costs of a project are accepted. It can also be seen that the correlations between an appropriate feasibility study (M2) and time/delay overrun (r=.622**) or cost overrun (r=.131**) are both significantly positive, with a higher influence on project time overrun, thus accepting the two hypotheses. H2a: An appropriate feasibility study influences reducing the costs of a project and H2b: An appropriate feasibility study influences the reduction of project lead times.

By investigating the relationship between adequate project financing method and plan (M3) and duration/delay overrun (r=.561**) or cost overrun (r=. 564**), the Spearman correlation coefficients were both weakly positive, but there was sufficient evidence to accept both hypotheses H3a : An adequate method and financing influences reducing the costs of a project and H3b : An adequate method and financing plan influences the reduction of project lead times.

We also note that the correlation between an adequate project implementation schedule (M4) is strongly related to time overrun and delays (r=.662**) but negatively related to cost overrun (r=-.167 **), therefore, there is sufficient evidence to reject H4a: An adequate project implementation schedule influences reducing the costs of a project but not enough to reject H4b: An adequate project implementation schedule influences the reduction of project lead times. Similarly, when testing the influence of having an incomplete technical file (M5) on project execution time and cost overrun, a weak negative correlation (r=-.300**) was revealed with cost overrun and a weak positive correlation was found with time overrun, suggesting that there is a weak influence of complete technical files on time overrun but a negative correlation with cost overrun, thus H5a : An complete technical study influences reducing the costs of a project is rejected while H5b : An complete technical study influences the reduction of project times is accepted, with a strong positive r=.738**.

Table 9 below summarizes all hypotheses and their status. It can be seen that seven of the ten stated hypotheses were accepted, thus, the main hypotheses that: The level of maturity of a public investment project in Cameroon positively affects its delivery is accepted, while, the maturity variables do not significantly explain the costs, therefore, there is sufficient evidence to reject the hypotheses on the influence of costs. This means that costs are not only influenced by maturity, but by other factors that should be induced in future studies.

Table 9
Hypothesis Testing Using Correlation Analysis

No	*Hypothesis*	*Status*
1	H1a : An appropriate opportunity study influences reducing the costs of a project;	Accepted
2	H1b : An appropriate opportunity study influences the reduction of project lead times of a project;	Accepted
3	H2a : An appropriate feasibility study influences reducing the costs of a project;	Accepted
4	H2b : An appropriate feasibility study influences the reduction of project lead times;	Accepted
5	H3a : An adequate method and financing influences reducing the costs of a project;	Accepted
6	H3b : An adequate method and financing plan influences the reduction of project lead times ;	Accepted
7	H4a : An adequate project implementation schedule influences reducing the costs of a project ;	Rejected
8	H4b: An adequate project implementation schedule influences the reduction of project lead times;	Accepted
9	H5a : An complete technical study influences reducing the costs of a project ;	Rejected
10	H5b : An complete technical study influences the reduction of project lead times;	Accepted

Discussion and conclusion

The overall maturity level for this study was 68%. In investigating project management maturity and project management success in the engineering and construction industries in Southern Africa, , Pretorius et al., (2012) found that the average perceived project management maturity level was 2.88 (57.6%), which is lower than the results found in these studies. One of the objectives of this study was to assess how the maturity level of a public investment project in Cameroon affects its delivery time and costs. The results revealed that the maturity level of a public investment project in Cameroon positively affects its delivery while the maturity variables do not significantly explain the costs with its parameters M1 and M5, but affect with others, therefore, the costs may not be simply influenced by maturity alone, but other factors should be induced.

Similarly, , Spalek (2013) found that an increasing level of project management maturity can influence the cost reduction of projects managed by the company, and Yazici (2009) proved that an increasing project management maturity as well as improved results. The oriented organizational culture improves the competitiveness of an organization, which translates into cost savings and increased sales. However, the strength of this influence depends on various factors. In addition, many other researchers have found a strong relationship between maturity and project completion duration. In Nigeria, Salawu and Abdullah, (2015) suggested that the overall risk management maturity level of contractors is "novice," which can still lead to project time overrun or even cancellations. These findings significantly support the results found in Cameroon.

This study shows that the hypothesis that the level of maturity of a public investment project in Cameroon positively affects its delivery time is accepted, while costs are not only

influenced by maturity, but by other factors that should be induced in future studies. Several recommendations would help Cameroonian utilities manage the current scenario. Certain measures need to be adopted to overcome the impacts of unpredictable scenarios in the future and thus continue to support sustainable growth. Guides and standards will help improve project performance and more efficient use of project resources.

There is a need in Cameroon to improve the level of maturity of public investment projects. It is necessary to establish consultancy and project management assistance firms in the structures in charge of public investment projects and to develop a project management maturity model that is inclusive of local realities. Benchmarking and lessons learned from previous projects are essential.

Operation and maintenance costs of completed projects must be integrated during the project maturation phase. Responsibilities must be clarified. The ministry in charge of Public Contracts should assume responsibility for each project, and the parliament should have a committee on major infrastructure projects. Training in public finance should be provided for project managers.

For project time management, Cameroon should adopt different methodologies such as the critical chain methodology and results-based methodologies when designing project delay management strategies. There is also a need to improve project integration. General reporting, statistics, monitoring and feedback need to be implemented in the most important projects.

Project quality and risk management must be implemented at every stage of the project. To this end, it is recommended that change control process for each project is established and followed to minimize the "erosion" of project quality. Quality and risk management of Public Investment projects are areas for future research. These two aspects will be addressed in a future scientific article.

This study tried to show the scope of project maturity problems on execution delays and cost overruns of public investment projects in Cameroon. The results revealed that the level of maturity of a public investment project in Cameroon positively affects its delivery delay, which is not the case with the project cost.

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