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## ANALYSIS OF THE PERFORMANCE LEVEL OF MEGAPROJECTS IN CAMEROON: THE CASE OF THE SECOND WOURI BRIDGE CONSTRUCTION PROJECT

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**Abstract.** Many organizations and project management practitioners are focusing on project performance. In recent years, Cameroon has embarked on major construction projects that could potentially be considered megaprojects, such as the construction of the second bridge over the Wouri River. The general objective of this study was to analyze the level of performance of the second bridge construction project over the Wouri River. This research was developed from a qualitative and quantitative approach. This research chose the semi-structured interview through a questionnaire and the documentary research as instruments of data collection. The participants consisted of a representative of the contracting authority, a representative of the project owner, a representative of the head of the contracting department, a representative of the contracting engineer, a representative of the assistant to the project owner, and two representatives of the company carrying out the work. The data collected was analyzed using the data analysis software Statistical Package for the Social Sciences (SPSS) and EXCEL software. The results show that the deadlines and costs of execution were not respected but the level of quality initially planned was respected. The results of this research are similar to the findings of OPS (2011), Standish group (2018), and PMI (2015) regarding project performance research that has a high percentage of failure in megaprojects.

**Keywords:** Performance, megaproject, construction project.

## ANÁLISIS DEL NIVEL DE RENDIMIENTO DE MEGAPROJETOS EN CAMERÚN: CASO DEL PROYECTO DE CONSTRUCCIÓN DEL SEGUNDO PUENTE SOBRE EL WOURI

**Resumen.** Varias organizaciones y profesionales de la gestión de proyectos centran su atención en el desempeño en la realización de proyectos. Durante varios años, Camerún se ha dedicado a la realización de grandes proyectos

de construcción potencialmente comparables a megaproyectos, como el proyecto de construcción del segundo puente sobre el Wouri. El objetivo general de este estudio fue analizar el nivel de desempeño del proyecto para construir el segundo puente sobre el Wouri. Esta investigación se desarrolló a partir de un enfoque cualitativo por un lado y un enfoque cuantitativo por el otro. Esta investigación eligió la entrevista semiestructurada a través de un cuestionario y la investigación documental como instrumentos de recolección de datos. Los participantes estaban compuestos por un representante de la autoridad contratante, un representante del propietario del proyecto, un representante del jefe del servicio contratado, un representante del ingeniero contratado, un representante del asistente del propietario del proyecto y dos representantes de la empresa que realiza el trabajo. Los datos recopilados se analizaron utilizando el software de análisis de datos Statistical Package for the Social Sciences (SPSS) y el software EXCEL. Parece que no se cumplieron los plazos y costes de ejecución, pero se cumplió el nivel de calidad inicialmente previsto. Los resultados de esta investigación son similares a los hallazgos de OPS (2011), Standish group (2018) y PMI (2015) en cuanto a investigaciones sobre el desempeño de proyectos con alto porcentaje de fallas en megaproyectos.

**Palabras clave:** Rendimiento, megaproyecto, proyecto de construcción

### **Introduction**

Performance in project delivery is the focus of attention in many organizations. Research on project performance shows a high percentage of failure in mega-projects (Strategic Projects Observatory, 2011; Standish group, 2018). Project performance or success can be seen as the ability to deliver projects on time, on budget and to the required technical specifications (Atkinson, 1999; Westerveld, 2003). In recent years, we have witnessed the realization of large construction sites in Cameroon that can potentially be assimilated to mega construction projects in accordance with the definition of COST (2011), which states that a mega-project is a structuring initiative with a very high financial envelope, a significant political interest, and a considerable impact on the environment and on communities.

Questioning and studying the performance of mega-projects in Cameroon is of paramount importance. This research analyzed the level of performance of construction mega-projects in Cameroon more specifically that of the second bridge construction project over the Wouri River. Thus, it was possible to verify the validity of the findings of OPS (2011) and Standish group (2018) about the performance of mega-projects in the Cameroonian context.

The performance of projects focuses on their ability to be executed on time and within cost, while respecting technical requirements (Atkinson, 1999; Westerveld, 2003). This study highlights the gaps between the time, cost and quality objectives initially projected by project stakeholders and what was achieved. The results of this analysis are intended to draw the attention of construction actors to their performance in the realization of mega-projects and to a possible reframing of their project management.

Research has shown that large engineering and construction projects are highly complex. These projects are characterized by large-scale construction works, many stakeholders and interfaces, complicated systems and a lack of standardization (An and Shuai, 2011; Russell, 2013). According to Atkinson (1999) and Westerveld (2003), a project is said to perform or succeed when it is delivered on time and within budget while meeting the defined quality level. Flyvbjerg (2014) presents the mega-projects with historical cost overruns around the world in Table 1.

Table 1  
*Megaprojects with historical cost overruns worldwide.*

Projects	Cost overrun (%)
Suez Canal, Egypt	1 900
Scottish Parliament Building, Scotland	1 600
Sydney Opera House, Australia	1 400
Montreal Summer Olympics, Canada	1 300
Concorde Supersonic Aeroplane, UK, France	1 100
Troy and Grenfield Railroad, USA	900
Excalibur Smart Projectile, USA, Sweden	650
Canadian Firearms Registry, Canada	590
Lake Placid Winter Olympics, USA	560
Medicare transaction system, USA	560
Bank of Norway headquarters, Norway	440
Furka Base Tunnel, Switzerland	300
Verrazano Narrow Bridge, USA	280
Bostorn's Big Dig Artery/Tunnel project, USA	220
Denver International Airport, USA	200
Panama Canal, Panama	200
Minneapolis Hiawatha light rail line, USA	190
Humber Bridge, UK	180
Dublin Port Tunnel, Ireland	160
Montreal Metro Laval extension, Canada	160
Copenhagen Metro, Denmark	150
Boston-New York-Washington Railway, USA	130
Great Belt Rail Tunnel, Denmark	120
London Limehouse Road Tunnel, UK	110
Brooklyn Bridge, USA	100
Shinkansen Joetsu high-speed rail line, Japan	100
Channel Tunnel, UK, France	80
Karlsruhe-Bretten light rail, Germany	80
London Jubilee Line extension, UK	80
Bangkok Metro, Thailand	70
Mexico City Metroline, Mexico	60
High-speed Rail Line South, The Netherlands	60
Great Belt East Bridge, Denmark	50

*Note:* Taken from Flyvbjerg (2014).

Several organizations have addressed the issue of project performance, such as the Standish Group International, the Project Management Institute (PMI) and the Strategic Projects Observatory (SPO). The work of these organizations draws attention to the high percentage of project failures in general and mega-projects. The following paragraphs present empirical data from these different organizations on project performance.

#### Data from Standish Group International

In its 2019 report, Standish Group International has published the results of a survey of over 50,000 projects. According to the organization, only 16.2% of projects were deemed successful by being completed on time and on budget, with all the qualities promised. Most projects, 52.7%, were over cost, completed late or lacked the qualities promised. These results provide ample evidence that projects are struggling to achieve the desired performance. Table

2 shows the percentages of successful, unsuccessful, and troubled projects between 1994 and 2014 (Standish group, 2015).

Table 2

*Percentage of successful, unsuccessful, and problematic projects*

Year	Success	Difficulty	Failure
1994	16%	53%	31%
1996	27%	33%	40%
1998	26%	46%	28%
2000	28%	49%	23%
2002	34%	51%	15%
2006	29%	53%	18%
2009	32%	44%	24%
2010	37%	42%	21%
2012	39%	43%	18%
2014	28%	55%	17%

*Note:* Taken from Standish group (2015).

According to Table 2, on average 30% of the projects analyzed by Standish Group were successful and about 27% were unsuccessful. There is a high percentage of projects in difficulty with an average of 46%.

#### Data from Project Management Institute

A study was carried out in 2011 by the Project Management Institute (PMI) on nearly 1000 project management actors (Mahamadou, 2016). According to the results of this work, projects that do not achieve the predefined objectives constitute about 36%. This shows that even organizations with a good command of project management find it difficult to achieve the objectives of time, quality, and cost simultaneously. PMI (2015) notes that companies lose an average of USD 109 million of every billion invested in their megaprojects as a result of managerial failures. As a result, only 52% of megaprojects stay within their initial budget.

According to the Project Management Institute's (PMI) Pulse of the profession 2018 survey of 5,402 companies, around 70% of projects tend to fail. Projects with a budget of more than \$1 million are 50% more likely to fail than projects with a budget of less than \$350,000. Only 2.5% of companies complete all their projects all the time (PMI, 2018).

#### Data from the Strategic Projects Observatory

Mahamadou (2016) points out that the Strategic Projects Observatory (SPO) studies on the level of performance of strategic projects in Europe showed that almost 47% of the managers interviewed stated that about 26% of their projects failed in terms of time, cost and quality. The study revealed that most managers surveyed felt that in more than 15% of cases projects were abandoned.

In view of the percentages of failure reported by organizations such as the PMI, the Standish Group and the Strategic Projects Observatory, it can be noted that in several countries around the world, mega-projects are struggling to achieve the performance targets set by the construction industry. This observation leads us to question the contextualization of this observation, particularly the case of Cameroon. For some years now, we have been witnessing the implementation of major construction projects in Cameroon that can potentially be assimilated to mega construction projects in accordance with the definition of COST (2011), following the example of the project to build the second bridge over the Wouri. The question then arises whether construction megaprojects in Cameroon achieve the desired levels of

performance from project inception. In other words, are mega construction projects successful in Cameroon?

To answer this question, a review was made of a particular case that refers to the Wouri bridge construction project. In this regard, what is the performance level of the second Wouri bridge construction project? It is very likely that the level of performance of the construction project of the second bridge over the river is low. To conduct this research, three specific hypotheses were stated. The first hypothesis stated that the execution deadlines were not respected in the construction of the second bridge over the Wouri. The second hypothesis supported the idea that the execution costs were not respected in the construction of the second bridge over the Wouri. The third hypothesis claimed that the quality level initially planned was not respected in the execution of the project to build the second bridge over the Wouri.

The general objective of this study was to analyze the performance level of the second bridge construction project over the Wouri River. This research had three specific objectives. Firstly, it was necessary to analyze the level of performance of the Wouri second bridge construction project from the point of view of respect of deadlines, secondly to evaluate the level of performance of the Wouri second bridge construction project from the point of view of respect of costs and finally to study the level of performance of the Wouri second bridge construction project from the point of view of respect of quality.

In view of the above objectives, and after having presented the method used to conduct this study, this research was first applied to carry out an evaluation of the level of performance of the construction project of the second bridge over the Wouri from the point of view of respect of deadlines. Secondly, it analyzed the level of performance of the construction project of the second bridge over the Wouri from the point of view of the respect of costs. Finally, it analyzed the level of performance of the construction project of the second bridge over the Wouri from the point of view of respect for quality.

## **Method**

### ***Design***

This research was developed from a qualitative and quantitative approach. A review of the literature on the performance of megaprojects was conducted in order to connect to previous research on the subject. The use of a data collection device allowed for efficient data collection in the field. Analysis of the data using data analysis software allowed for scientific interpretation of the results.

### ***Participants***

This study concerned mega construction projects in Cameroon, particularly the project for the construction of the second bridge over the Wouri River, and the population was made up of the actors of this project. The participants in this study included a representative of the contracting authority, a representative of the project owner, a representative of the head of the contracting department, a representative of the contracting engineer, a representative of the assistant to the project owner, and two representatives of the company carrying out the work (a member of the project management and a person in charge of the project quality department). Table 3 specifies the roles of each actor in the project.

Table 3  
*Roles of actors in the construction project of second bridge over the Wouri River*

Actors	Role in the project
Contracting authority	He is the signatory of the contract and ensures its proper functioning. He also ensures the control of the effectiveness of the services during the execution through the General Directorate of Controls of Public Contracts.
Project owner	He represents the beneficiary administration of the services
Head of Contract Department	He ensures compliance with the administrative, technical and financial clauses at the stage of definition, preparation, execution and acceptance of the services covered by the contract. He represents the project owner in the relevant bodies and reports to them.
Contract Engineer	He is responsible for the technical and financial monitoring of the contract. He reports to the Contract Manager.
Assistant to the Contracting Authority	He is responsible for defending the project owner's interests at the stage of the definition, preparation, execution and acceptance of the services covered by the contract.
<i>Contractor performing the services</i>	<i>He is responsible for the design and implementation of the project.</i>

*Note:* Taken from this research.

### **Data collection instrument**

This research chose the semi-structured interview as the data collection instrument. The interview evoked a structured research technique such as questionnaires. It should be noted that literature research also provided a solid basis for the collection of information in this study. Indeed, studies by Myers (1997) suggest that interviews and literature should be used primarily as a source of data.

#### *Semi-structured interviews*

The objective of these semi-structured interviews was to collect data about the performance of the second Wouri bridge construction project. The interview can be seen as an exchange with the purpose of the study (Gavard-Perret, Gotteland, Haon and Jolibert, 2012). According to these authors, the data collected during an interview is a production of both the interviewee and the interviewer. Thus, to produce the information necessary to achieve the study objectives, this research collected data through interactions with the construction actors involved in the project. The information was collected by answering the questionnaire proposed and validated by Ika (2011) about the key success factors of development aid projects. The participant had to provide information about the delay, cost and quality of the project. Each participant had to choose the means of data collection with which he or she felt comfortable to provide the maximum amount of information,

The various actors in the mega-projects selected for this study were contacted by e-mail, by phone call or in person. The location of the interview was agreed with the participant and was adapted to their schedule. The interviews were conducted in a relaxed and unpressured manner to allow the participants to open and offer objective data that is important for the research.

### *Literature review*

The literature review was a very important and crucial step in carrying out this research. Thus, a first literature review was related to general readings about the research. This literature review targeted scientific and professional writings related to the problematic of the study. This literature review was open throughout the research.

As the research progressed, the readings became more and more focused. Contracts and meeting reports were of paramount importance. These documents provided an insight into the megaproject, tracking its progress from inception to assess its performance. Reading about megaprojects around the world and the performance of construction projects in general has been a focus of this research. The various research studies on the performance of mega-projects have identified the views of different researchers and practitioners in project management.

With the advent of new information and communication technologies, the Internet has proven to be a very useful tool in the data collection process. However, the use of webography has been done with great caution and common sense. Although not a traditional method of documentary analysis, this technique of information gathering had an important place in the conduct of this study.

### *Data analysis*

This study used content analysis. The processing consisted in extracting useful and usable elements from the collected data, capable of defining the level of performance of the second bridge construction project on the Wouri. Data analysis recommends proper processing and interpretation of the data collected. The data was therefore analyzed and interpreted to bring out all its subtleties to draw reliable conclusions.

During this phase, the data collected during the data collection phase was coded manually to make it processable by data analysis software. In this work, data analysis was carried out using data analysis software. Microsoft Excel was also used to tabulate the numerical data.

The information was collected with the consent of the participants. The data collected was coded to be treated confidentially. The data was only used for the purpose of this research and the anonymity of the participant was respected.

## **Results**

This section analyses the performance level of the second Wouri bridge construction project in terms of timeliness, cost, and quality.

### *Presentation of the data*

The questionnaire proposed by Ika (2011) with questions on project success criteria was submitted to the various project stakeholders. Each stakeholder interviewed gave their views on a scale of 1 to 7. Table 4 shows what the different values on this scale represent.

Table 4  
*Value of the measurement range*

Value of the sample	Correspondence
1	Disagree completely
2	Somewhat disagree
4	Neither agree nor disagree
7	Agree completely

*Note:* Taken from Ika (2011).

The data collected was analyzed using Statistical Package for the Social Sciences (SPSS) and EXCEL data analysis software. Table 5 presents the minimum, maximum and average values as well as the standard deviation of the scores attributed to each success criterion by the stakeholders of the second Wouri bridge construction project.

Table 5  
*Value of the measurement range*

Code	Project Success Criteria	Min	Max	Avg	Standard deviation
CPT	Completion Of The Project Within The Timeframe	1	6	3,43	1,90
AIOO	Achievement Of The Initially Identified Objectives	5	7	5,71	0,76
DPROQS	Delivery Of The Project To The Required Quality And Standards	4	7	5,29	0,95
<i>GBM</i>	<i>Good Budget Management</i>	5	7	<i>6,14</i>	<i>0,69</i>

*Note:* Taken from this research.

#### ***Analysis of the level of performance of the second Wouri bridge construction project in terms of meeting deadlines***

The main contract N°306/M/MINTP/CCPM-AI/2013 relating to the construction works of the second bridge over the Wouri was notified on 04 March 2013. This contract had a global execution period of forty-four (44) months for all the services (design and execution). This period was divided into two parts, the design part being eight (08) months and the execution part being thirty-six (36) months. By Service Order N°0306/OS/MINMAP/SG/DGMI/DMTR/CE2/2013 notified on 15 March 2013, the project owner prescribed the start of the services. Thus, the project end date initially planned was 15 November 2016 (AMO Final Report, February 2019).

On 06 February 2015, the project owner notified a Service Order N°0272/OS/MINTP/SG/DGTI/DOA/DOA20 extending by three (03) months the execution period of the design phase. This was followed by Amendment 1 notified on 13 January 2016 bringing the design phase deadline to eleven (11) months, but the duration of the execution phase was maintained at thirty-six (36) months. It should be noted that this extension of the design phase did not impact the overall duration of the project (AMO Final Report, February 2019).

On 20 January 2015, a dredging boat hit the deck of the jetty, causing severe damage to the structure, and preventing work from continuing for three (03) weeks (AMO Final Report, February 2019). After the restarting of the works of the implementation phase, the appearance of new constraints related to the management of traffic in the port area following the commissioning of a new cement plant located in the right-of-way of the project led the project owner to take several decisions relating to the scope of the project. These decisions were regularized by Amendment 2 and thus brought the end of the works to 19 September 2018.

Following the commissioning of this new cement plant within the project's right-of-way, the project owner decided to undertake several actions. This led to the signing of contract N°426/M/MINMAP/CCPM-TR/2015, notified on 14 December 2015. This contract concerned the realization of the additional installations of the project of Design / Realization of the second bridge on the Wouri for a global execution time of the whole of the services studies and works



of twenty-eight (28) months. This period comprised two parts, namely one (1) month for the design phase and twenty-seven (27) months for the execution phase. The timetable and phasing of the works was compromised due to certain constraints on the release of rights of way. This led to the signing of amendment 1 to the supplementary contract bringing the end of the work to 19 September 2018.

New constraints relating to the disturbances recorded in the exploitation of the quarry, whose aggregates were used to make the foundation and asphalt layers, led to another change in the schedule. This change was confirmed by the project owner through Service Order N°1421/OS/MINTP/SG/DGTI/DOA/DOA20/DOA22 notified on 28 September 2018. Thus, the end of the works for the execution of the two contracts (main contract and supplementary contract) was set at 15 December 2018. Table 6 shows the time consumption and progress of the works for the period January 2018 to February 2019. In this table, the consumption of time has been calculated from the notification of the service order prescribing the start of the services.

Table 6

*Consumption of time versus progress of the construction of the second bridge over the Wouri from January 2018 to February 2019*

PERIOD	MAIN CONTRACTS		COMPLEMENTARY CONTRACTS	
	Time consumption	Progress of work	Time consumption	Progress of work
Jan-18	131,8%	96,24%	89,29%	75,11%
Mar-18	136,36%	97,36%	96,43%	80,20%
Apr-18	138,64%	97,36%	100%	82,18%
Jul-18	145,45%	97,57%	110,71%	87,13%
Sep-18	150,00%	98,80%	117,86%	90,10%
Oct-18	152,27%	98,90%	121,43%	95,00%
Dec-18	156,82%	99,98%	128,57%	99,90%
Jan -19	159,09%	99,99%	132,14%	99,99%
Feb -19	161,36%	100%	135,71%	100%

*Note:* taken from PW2 project activity report summaries (January 2018 to February 2019).

Figures 1 and 2 show the work progress and time consumption curves for the period January 2018 to February 2019 for the execution of the main contract and the supplementary contract respectively.

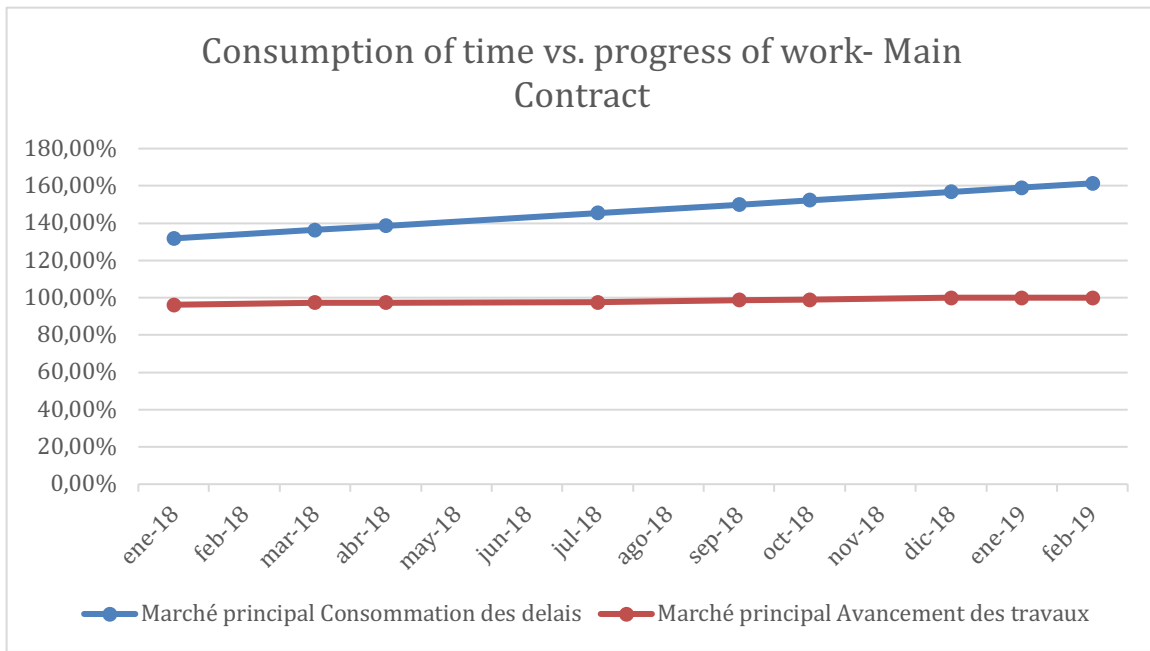


Figure 1. Time consumption vs. work progress - Main Contract. Note: taken from PW2 project activity reports (January 2018 to February 2019).

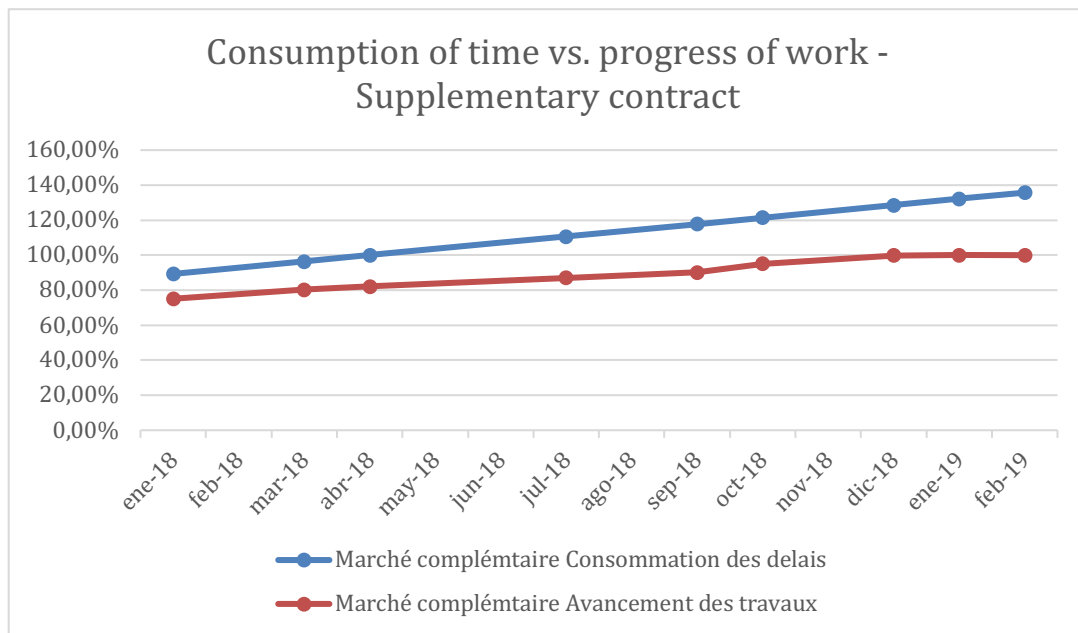


Figure 2. Time consumption vs. work progress - Supplementary contract. Note: taken from PW2 project activity reports (January 2018 to February 2019).

Figures 1 and 2 show that over the period from January 2018 to February 2019, the work progress curves have been below the time consumption curves. This means that the project has been behind schedule. The provisional general acceptance without reservation of the two contracts (base contract and supplementary contract) was pronounced on 15 February 2019. Table 7 shows the differences between the planned and the actual deadlines.

**Table 7**

*Differences between the planned and actual timeframes for the construction of the second bridge over the Wouri River*

Contracts	Start date	Expected end date	Actual end date	Expected completion time	Actual implementation time	Gap	
Main contract	15 March 2013	15 November 2013	15 February 2019	44 months	71 months	27 months	61,36 %
Supplementary contract	14 December 2015	14 April 2018	15 February 2019	28 months	38 months	10 months	35,71 %

*Note:* taken from inspired by the final AMO report of the PW2 project (February 2019)

Table 7 shows a 27-month and 10-month difference between the initially planned end date and the actual completion date for the main and supplementary contracts respectively. Thus, there was a 61.36% delay in delivery for the main contract and a 35.71% delay in delivery for the supplementary contract.

***Analysis of the performance level of the second Wouri bridge construction project in terms of cost compliance***

The main contract N°306/M/MINTP/CCPM-AI/2013 relating to the construction works of the second bridge over the Wouri and notified on 04 March 2013 was for a total amount of 180.31 million dollars (100.87 billion CFA francs). On January 13, 2016, Amendment 1 N°000298/AV/MINTP/CCPM-AI/2015 was signed by the project owner, the purpose of which was to extend the execution time and modify some provisions of the contract. But this Amendment 1 had no impact on the amount.

On October 3, 2017, Amendment 2 N°000242/AV/MINMAP/CCPM-AI/2017 was notified. This Amendment concerned the modification of certain provisions of the main contract, the early commissioning of certain parts of the work, the modification of the execution period and the modification of the amount of the provision for the relocation of the networks. The amount of this amendment was USD 3.84 million (CFA 2.15 billion).

Following the commissioning of this new cement plant in the project area, the project owner decided to undertake several actions. This led to the signature of contract N°426/M/MINMAP/CCPM-TR/2015, notified on 14 December 2015. This contract concerned the realization of the additional installations of the project of Design / Realization of the second bridge on the Wouri for a global amount of execution of the whole of the services studies and works of 60,57 million dollars (33,88 billion CFA francs).

An amendment to the contract for the additional works was notified on 03 October 2017. This Amendment 1 N°000241/AV/MINMAP/CCPM-AI/2017 concerned the modification of certain provisions of the complementary contract, the validation of certain new prices, the modification of certain quantities and the modification of the amount of the provision for the relocation of networks. The amount of this amendment was USD 7.75 million (CFA 4.33 billion). Table 8 shows the differences between the amounts initially planned and the amounts consumed in the execution of the contracts for the construction of the second bridge over the Wouri.

Table 8

*Differences between the amounts planned and the amounts consumed in the execution of the project for the construction of the second bridge over the Wouri*

Contracts	Amount originally planned (in dollars)	Amount consumed (in dollars)	Differences	
			In dollars	As a % of
Main contract	180 313 659	184 150 600	3 836 941	2,13%
Supplementary contract	60 566 052	68 313 399	7 747 346	12,79%

*Note:* taken from inspired by the final AMO report of the PW2 project (February 2019).

Table 8 shows differences of USD 3.84 million and USD 7.75 million respectively between the amount initially planned and the amount actually used in the execution of the main contract and the supplementary contract. Thus, there was a budget overrun of 2.13% in the execution of the main contract and a budget overrun of 12.79% in the execution of the additional contract.

### ***Analysis of the performance level of the second Wouri bridge construction project in terms of compliance with quality requirements***

Within the framework of the execution of the project for the construction of the second bridge over the Wouri, quality control was carried out at several levels.

Internal quality control, based on the principle of double control, consisted of internal and external control. The internal control was a quality control Organization attached to the Works Directorate. This control was therefore carried out by the workers and was exercised at all levels of the production department hierarchy. The external control had the task of ensuring the effectiveness of the internal control. This control was attached to the person in charge of the external quality of the site, who sometimes relied on design offices or external organizations.

External quality control was carried out by the Project Owner. In carrying out this control, the latter was assisted by two entities. The Technical Assistance to the project owner and the Geotechnical Assistance to the project owner.

According to the final report of the Assistant to the Contracting Authority, only materials approved by the internal and external inspection were used for the construction of the works (Final report AMO, February 2019). For the Assistant to the Project Owner, the implementation was generally done in compliance with the specifications. Thus, he considers that the supplies and execution procedures adopted for the implementation of the Work are compliant.

On the environmental and social level, according to the final environmental and social activity report, the level of compliance by the builders with the requirements of the Environmental and Social Management Plan (ESMP) resulting from the Environmental and Social Impact Assessment is 95.83%. For the Assistant to the Project Owner, most of the environmental and safety measures provided for in the various project documents have been satisfactorily implemented by the contractors.

## **Discussion and conclusions**

The general objective of this study was to analyze the performance level of the second bridge construction project over the Wouri River. This research had three specific objectives. Firstly, it was necessary to analyze the level of performance of the Wouri second bridge construction project from the point of view of respect of deadlines, secondly to evaluate the

level of performance of the Wouri second bridge construction project from the point of view of respect of costs and finally to study the level of performance of the Wouri second bridge construction project from the point of view of respect of quality.

In relation to these study objectives, three hypotheses were stated. The first hypothesis stated that the execution deadlines were not respected in the construction of the second bridge over the Wouri. The second hypothesis supported the idea that the execution costs were not respected in the construction of the second bridge over the Wouri. The third hypothesis claimed that the quality level initially planned was not respected in the execution of the project to build the second bridge over the Wouri.

The data collected from the stakeholders of the second bridge construction project over the Wouri River indicate an average of 3.43 out of 7, or 49%, for the criterion "timely completion of the project". Analysis of the project documents shows a gap of 27 months and 10 months respectively between the initially planned end date and the date on which the project was completed for the main contract and the supplementary contract. Thus, there was a 61.36% delay in delivery for the main contract and a 35.71% delay in delivery for the supplementary contract. These results show that the execution deadlines were not respected in the construction of the second bridge over the Wouri. These results are in line with the findings of Standish Group (2019), PMI (2018) and OPS (2011), which state that most mega-projects have difficulty meeting deadlines. From the above, it can be said that the first hypothesis which stated that the execution deadlines were not respected in the construction of the second bridge over the Wouri was validated.

The stakeholders of the second Wouri bridge construction project awarded an average of 6.14 out of 7, i.e., 87.71%, for the criterion "good budget management". Analysis of the project documents shows discrepancies of USD 3.84 million and USD 7.75 million respectively between the amount initially planned and the amount used in the execution of the main contract and the supplementary contract. Thus, there was a budget overrun of 2.13% in the execution of the main contract and a budget overrun of 12.79% in the execution of the additional contract. This result shows that the execution costs were not respected in the framework of the construction of the second bridge over the Wouri. Compared to the findings of PMI studies (2015) which reveal that companies lose an average of USD 109 million out of every billion invested in their mega-projects as a result of managerial failures, i.e. about 10.90%, by assigning an average of 6.14 out of 7, the stakeholders of this project find the results obtained from the point of view of respecting costs (2.13% of cost overruns) satisfactory as regards the execution of the main contract, representing about 74.85% of the overall services. Although the actors were satisfied with the management of the project costs, the results of this study show that the second hypothesis which supported the idea that the execution costs were not respected in the framework of the construction of the second bridge over the Wouri was validated.

The data collected from the actors in the Wouri secondary construction project indicate an average of 5.71 out of 7, i.e., 81.57%, and 5.29 out of 7, i.e., 75.57%, respectively, for the criteria "achievement of the initially identified objectives" and "completion of the project in accordance with the required quality and standards". These results are in line with the analysis of the project documents, which indicate that only materials approved by the internal and external auditors were used for the construction of the works (Final AMO Report, February 2019). For the Assistant to the Contracting Authority, the implementation was generally done in compliance with the specifications. Thus, he considers that the supplies and execution procedures adopted for the implementation of the Work are compliant. Also, on the environmental and social level, according to the final environmental and social activity report, the level of compliance by the builders with the requirements of the Environmental and Social

Management Plan (ESMP) resulting from the Environmental and Social Impact Assessment is 95.83%. For the Assistant to the Project Owner, most of the environmental and safety measures provided for in the various project documents were implemented satisfactorily by the contractors. These results show that the level of quality initially planned was respected in the execution of the construction project of the second bridge over the Wouri River. From the above, it can be said that the third hypothesis which claimed that the quality level initially planned was not respected in the framework of the execution of the project for the construction of the second bridge over the Wouri River was not validated.

In short, this study analyzed the level of performance of the second bridge construction project over the Wouri River. The results show that the deadlines and costs of execution were not met, but the quality level initially planned was respected. The results of this research are similar to the findings of OPS (2011), Standish group (2018) and PMI (2015) on project performance research with a high percentage of failure in mega projects.

Although this study was conducted on a single project, it presents interesting results. However, the question arises as to what the performance of other mega-projects in Cameroon is like? The analysis of the performance of other mega-projects in Cameroon and Africa could thus be the subject of further research and contribute to the generalization of the findings of this study.

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