Implications Of Cash Flow Forecasting On Highway Projects In Iraq

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ABSTRACT

The cash flow forecasting is beneficial for the project in both the tender stage and during the project construction progress, where the contractors want to make sure that their planned cash funds is sufficient to cover any possible financial deficit of the project. This research aims to find out minimum fund needed for highway projects in Iraq required by the contractor to maintain the progress of work under some circumstances and effects of the shortage of fund, particularly in case of payment delay, in addition to the implication of the payment delay. Data from record files of 9 highway projects in Iraq, of the unit price type contracts. It was found that the minimum fund required is 20.944 percent of the contract value of three months delay . The minimum fund required for those projects is directly proportional to the time of payment delay. The minimum fund required for projects is represented in a linear equation as a function of payment delay time, such equation would help the contractor to estimate the future amount of minimum fund required for any delay in months. Interim profit is calculated for the purpose of comparison with the expected profit for the purpose of exploring the consequences in case exceedance. Because of the use of unit price contracts in the implementation of highway projects in Iraq, it did not cause the appearance that the contractor receives large profit at early stages of the project. The delay in payment leads to negative results, including the delay in the project, reduces the level of performance of the contractor which is negatively affects project, reduce the quality of implementation and, increased cost of the project in case of the contractor to claim compensation for the damage, as well as the occurrence of a difference in currency and inflation due to the time difference between the payment date and the actual date.

Keywords*:* Cash flow, Road Construction Contract, Iraq

1. INTRODUCTION

Because the importance of Cash for day-to- day some contractors have suffered a downturn not because their work was not profitable but due to an inability of cash in the short term [1]. Because of the poor financial management, especially inadequate attention to the cash flow management, construction industry suffers of the largest number of bankruptcies of economic sectors, with many companies failing [2]. The uncertainty and ambiguity are caused not only by project-associated problems, but also by the economic and technological factors. Therefore, it has been pointed the significant importance of the cash-flow prediction for construction contractors. A reliable cash-flow prediction can help to identify the expected project financial requirement accurately [3]**.** The cash flow forecast of a construction contract or project deals more specifically with the payments due under a particular construction contract. Cash flow of the construction contract will help to inform a company's overall cash flow as they are intrinsically linked [4]. The need to forecast cash requirements is important in

order to make provision for the difficult times of unsuitable cash resources before they reach [5]. Cash flow was defined as the actual movement of money in and out of a business. Positive cash flow is termed as the money flowing into a business and is credited as cash received. Monies paid out are termed negative cash flow and are debited to the business. Net cash flow is the difference between the positive and negative cash flows [6], positive cash flow is mainly derived from monies received in the form of monthly payment certificates, stage payments, releasing of retention and final account settlement. Disbursements (negative cash flow) according to them are related to monies expended on a contract in order to pay materials,wages, plant,subcontractors' accounts submitted, preliminaries and general overheads expended during the progress of the work. According to those on a construction project, the net cash flow will require funding of the contractor when there is a cash deficit and where cash is in surplus the contract is self-financing [7] shown in **Fig 1**. The late payment problem is interrelated with the cash flow problem. Cash flow in the construction industry is critical because of the relatively long duration of projects. Any deviation due to either project delays or cash flow delays can have a major impact on the project [8].
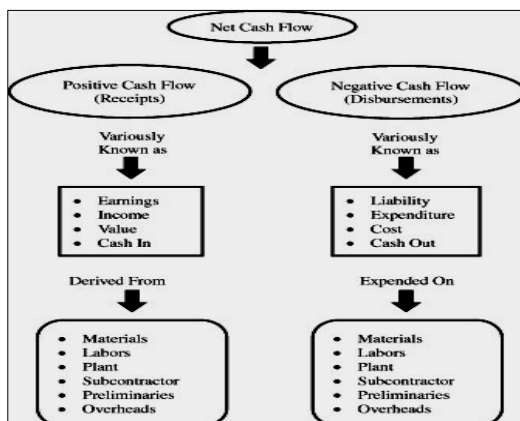

Figure 1. Construction cash flow concept (Odeyinka, Lowe,2001)

2. LITERATURE REVIEW

(Mei Ye, Abdul Rahman, 2010) have been identifying the underlying causes of late payment from the contractors' perspective in the Malaysian construction industry A survey was used in this study for the purpose to elicit the contractors' perception respondents with at least ten years of working experience agreed with the highest ranked solution which is to understand and research the owner's ability to pay in mitigation of late payment. They study highlighted some significant points to be aware by the contractors before embarking on any construction projects. The practitioners in the construction industry are encouraged to have an insight into these problems of late payment in searching for effective solutions. This measurement will be helpful to avoid repeating the same mistakes in future projects. (Abd EL razak, Honsy,et al,2014) presents a new methodology for net cash flow prediction; it depends on applying risk factors that affect the cash flow process. The probabilistic S-Curves are used as an alternative of the Standard S curve. Risk factors have been determined through a questionnaire survey. This survey was conducted between the main three parties in construction industry contractors, consultants and owners. They developed model can be used to produce a probabilistic data for more accurate plan and evaluation. They concluded that with the comparison between the actual and the output probabilistic data, it was noticed that with respect to the duration it a perfect fit, but in the case of the cost the difference between the actual and deterministic is a small. In some cases as the real life case study it might be used more than three single cash flow to build a probabilistic cash flow so a higher number of single cash flows will be used and Probabilistic cash flows is more accurate than deterministic one and it can be used by decision makers to evaluate the projects with a higher level of accuracy. (Enshassi, Mohamed, et al, 2009) was identified the

factors affecting the performance of local construction projects in the Gaza Strip and to elicit perceptions of their relative importance. Questionnaires were distributed to 3 key groups of project participants; namely owners, consultants and contractors. The survey findings indicate that all 3 groups agree for many factors affecting project performance. The recommends that There must be cooperation between the project owners and contractors and the payments must be regular and smooth. For the purpose of defeating any delay or disputes or claims must be participants in the project contributes effectively in decision-making and that there will be constant through the coordination of the project life cycle to solve problems and improve the performance of the project. (Odeyinka, Lowe, 2001), they estimate the risk factors responsible for the deviation between the forecast and actual cost flow.A questionnaire survey administered on contracting organizations. The analysis showed that the most important factor group it the delayed payment and variety of works. (Ojo,2012) The purpose of this paper is to investigate the relationship between project characteristics and risk associated with predicted clients' cash flow. Consultant quantity surveyors in Nigeria were surveyed using systematic and purposive sampling techniques. The result showed that there exist a significant relationship between project value and individual risk factors; and between project value and reduced risk factors (nature of the project, tendering procedure related factors). Also, project type and procurement method had significant Influence on valuation assessment as a risk factor when forecasting cash flow by the clients. The construction professionals should take cognizance of project characteristics in managing risk at the early stage of the project so as to minimize the effect on project delivery variables at all other stages of construction. (Chen, Wang, et al,2012),They looked at infrastructure

tender projects, including 20 MRT construction tender projects, 14 highway construction tender projects, and 8 public building tender projects. The Takagi-Sugeno's fuzzy theory is first applied to build an s-curve regression model for big projects. After the model is fitted, the cash-to-cash cycle concept is applied to analyze and diagram cash flow estimations for the execution stage of contracted projects. The goal is to understand a short-term financial demand that occurs during the execution stage, which leads to a better understanding of cash flow problems. They were found by practicing the contractors can use s-curve models to preview the cash distribution and amount demanded before projects are executed. Once construction is under way, data from the actual project cash flow can be used to update and revise the predictions. Preparation for dispatching of funds will be made according to cash predictions from the models. (Al Mohsin, Alnuaimi, et al,2014) they take data from record files of 25 villas, in Muscat, Oman, with different sizes was analyzed to identify the minimum fund required by the contractor to maintain the progress of work in case of delay of interim payments. The analysis also included identification of the consequences of delay of interim payments. They were found that the minimum fund required is 8.5 percent of the contract value for maximum interim payment delay of four weeks. The value of required minimum funds increases as the period of delay increases. In most cases the percentage of the required minimum fund increases with the increase of the contract value. (Mohammed,2013) aims to identify the common risks affecting time overrun in road construction projects in the west bank in Palestine from the contractor's viewpoint. There were 45 factors that might cause delays of highway construction projects. A questionnaire survey was performed to rank the considered factors in terms of severity and frequency. The analysis of the survey indicated 7 top risks. The two first factors

were the financial status of the contractors and payment delays by the owner. (Lip,2003) concluded that during the years, with the diminished volume of construction work, contractors are reeling under relentless pressure to tender with little or non-existent margins or as most aptly called 'suicide' bids just to sustain the flow of work orders. Payment to contractors or lack of it is a common cause of disputes in the construction industry. Timeliness of payments affect many contractors, for whom receiving delayed payments from their employers is a cause of friction between the two parties.(Meng,2005) in his works stated that all problems in construction begin when payment is not received at the exact amount or date. Disagreements then lead to arguments as relationships sour, and the stage becomes a setting for conflict, blame, finger pointing, buck-passing and lawyers. Projects exceed initial time and cost estimates and experience extensive delays. But contractors are the ones who suffer the most when things like this occur. This is the case, especially when Design and Built construction contracts are practiced more and more nowadays.

3. PROBLEM STATEMENT

Iraq is suffering many unusual circumstances surrounding the implementation of the construction industry. One of these is late payment or not paid in the amount certified which means big problems to the contractors because that will cause a failure to meet cash flow requirements or minimum fund needed for construction projects. Highway construction involves huge amount of money and most of the contractors find it very difficult to bear the heavy daily construction expenses when the payments are delayed. Work in progress can be delayed due to the late payments from the owner because there is inadequate cash flow to support construction expenses, especially for those contractors who are not financially sound and that's what we

are suffering from in Iraq. This research aims to find out the minimum fund required for cash outflow in case of delay in payments in highway projects. Due to lack of highway projects which Implemented in Iraq, the data collected was only for 9 projects.

4. METHODOLOGY

Data was collected for nine highway projects, which include the contract documents
(Which helps to know the value of the contract and the value of the ratio of profit), time schedule for the implementation distributor by value of every project activity.
A spreadsheet model was used for the calculation of cash flow forecasting for every project to find the minimum fund at every period of delay in payment from the owner, in this case three delay periods (1,2,3 month) have been taken. Table 1 in the appendix shows the process of cash flow calculation and the minimum fund required. The three main ingredients in this model are:
- Expenses (cash out) which represents the aggregate of the payments which the contractor will make over a period of time for all resources used in the project.
- Income (cash in) that represents the receipts a contractor will receive over a period of time for the work has completed.
- Timing of payments: in cash flow analysis, we are interested in the timing of payments related to the work which must be done by the contractor.
 In Iraq, according to the Iraqi Contracting Condition, the contractor receives the amount of the advance month after the due date to be deducted (10%) of the value of payments until up to 5% of the total contract value. Launches half of these deductions when the work is done and received by the owner and the remaining launched after the end of the maintenance period, amounting to one year. Al the project, which has been taken in this

research takes 20% profit That has been identified by the contractors.

5. RESULTS AND DISCUSSION

The studied 9 highway projects were subjected to cash flow analysis using three different payment''s delay periods (1, 2, 3 - week). **Table 1** shows the results of the cash flow analysis and required minimum fund to keep the execution continues.

When the relationship the percentage of the minimum fund (percentage of the deficit) and the amount of the delay has been plotted as shown in **Fig (2)** a linear equation has been extracted as shown:

$$Y=8.537X-4.569 \qquad (1)$$

Where:

Y= % Percentage of minimum fund required

X= Payment delay time (month)

Table 1: Minimum fund vs. payment delay time

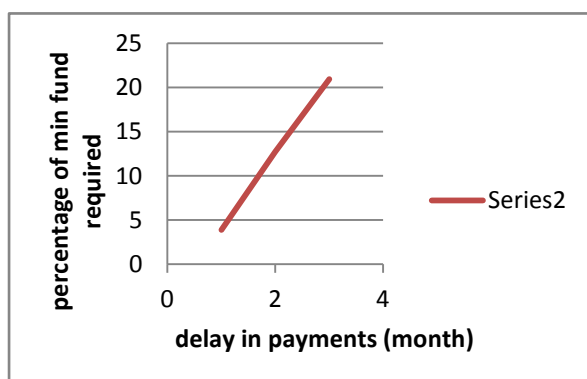| Highway Project No.	Name of project	Contract Value × 10⁶ ID	% Percentage of minimum fund required based on the delay in payments		
			1	2	3
1	Nasiriyah road 2	1638	3.638	17.843	31.015
2	The second lane of Hashemite-Midhtah-Shomali road	1725.90	8.146	20.301	29.482
3	The second lane of Diwaniya -Afak Al-Badir road	7173.65	8.584	19.426	29.527
4	Nasiriyah road 1	20896.525	5.639	14.091	23.011
5	AL Rehab- AIN SAIDI ROAD	23189.25	3.814	9.323	14.745
6	Karbala-Arzazh-Ackhedhar	26060.428	0.890	8.077	13.991
7	alsheeb road executer	38667.103	3.888	9.871	15.750
8	BAGHDAD-HILLA ROAD	47502.510	0.140	7.395	14.888
9	BAGHDAD-HILLA ROAD	112824.623	0.089	7.978	16.085
		Average	3.870	12.701	20.944
		Std Deviation	3.178	5.275	7.300

Figure 2. delay in payments vs. percentage of min fund

Due to the predicted situation in Iraq, the contractor suffers from a delay in the payment of up to more than three months ,due to the absence of government control and take the fiscal deficit to the state treasury as an excuse, this equation will help the Iraqi contractors highways to conclude the value of of the minimum found required to take into considerations extended delay in order to allow him to be provided by working capital or banks and financial institutions.

2- **Table 2** shows the maximum profit earned during the process of construction to be compared with respect to the expected profit for the research sample in different payment delays, Interim profit, the profit which results from the monthly payments, is calculated for the purpose of comparison with the expected profit . This comparison would not point out cases where the interim profit value exceeds the maximum expected profit which leads to getting rid of fears that the receipt of the contractor for large profits in the initial stages of the project, which is motivated to leave the project before completing it.

4- **Figure 3** shows there is indirectly proportional between the minimum fund and the contract value of the project for the first 6 projects, This is due to the payments received by the contractor be high so the percentage of the deficit decrease.

Table 2: Interim maximum profit vs. payment delay

| Highway Project No.	Contract Value × 10⁶ ID	Advance payment 10%	Total expected profit	% Interim maximum profit earned		
				1	2	3
1	1638	163.8	273	232.05	232.05	232.05
2	1725.90	172.59	287.65	244.50	244.50	244.50
3	7173.65	717.365	1195.61	1016.27	1016.27	1016.27
4	20896.525	2089.6525	3482.754	2960.341	2960.341	2960.341
5	23189.25	2318.925	3864.87	2357.57	2357.57	2357.57
6	26060.428	2606.0428	4343.404	3691.89	3691.89	3691.89
7	38667.103	3866.7103	6444.517	5477.84	5477.84	5477.84
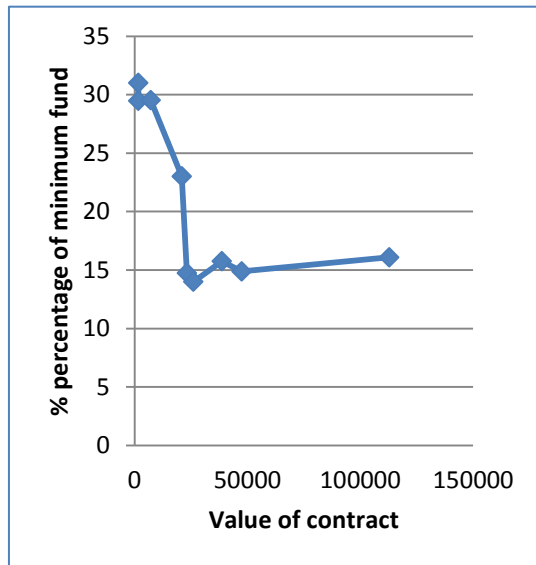
Figure 3. value of contract vs. percentage of min fund

6- Conclusions

1- Payment is considered as the lifeblood for any construction projects, so the need to forecast cash is an important tool in order to make provision for the difficult times of inadequate cash resources and provides a good warning system to predict possible insolvency. When the cash forecasting wrong is all too clear. The project can lose money when project borrows more than what is actually needed or invest money project managers thought they had but don't, due to poor forecasting.

2- The payment term is something considered very important because it has an effect on the price and also on the efficiency of the contractor. Risk of delayed payment from the owner will cause the project's cost to increase abnormally and subsequently delay the progress of the project. It is also important for the contractor in predicting cash flows in the stage tender when preparing the project schedule the abnormal Circumstances of Iraq in addition to the known circumstances, by Using the equation derived, the contractor can guess the future amount of minimum fund required for any delay in months.

3- The minimum fund required for highway construction is directly proportional to the time of payment delay, as to be expected.

4- Because of the use of unit price contracts in the implementation of highway projects in Iraq, it did not cause the appearance that the contractor receives high percentage profit at early stages of the project as compared with lump sum contract type.

5- One solution will be to reduce the delay in pay to the Contractor is to take Strict procedures and raise the level of culture of the parties to the contract and project managers in particular the financial management of projects both in terms of estimating costs or cash flow or how the financial control compatible with the schedules.

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تاثيرات حسابات التدفقات النقدية على مشاريع الطرق في العراق

المدرس: بيفيان اسماعيل الحديثي

الخلاصة:

يعد التنبؤ بالتدفق النقدي مفيدا في كل من مرحلة العطاء واثناء تقدم المشروع ، حيث يحتاج المقاولون الى التاكد من ان التمويل المخطط كافي لتغطية أي عجز مالي محتمل للمشروع.يهدف هذا البحث الى معرفة الحد الادنى من المبالغ اللازمة المطلوبة من قبل المقاول لمشاريع الطرق في العراق للحفاظ على سير العمل في بعض الظروف واثار النقص الحاصل في التمويل ولا سيما في حالة تاخير الدفع بالاضافة الى الاثار المترتبة عن تاخير السداد.

تم جمع البيانات من السجلات الخاصة بتسعة مشاريع للطرق في العراق لنوع عقود مقاولات سعر الوحدة. تبين ان الحد الادنى من التمويل اللازم هو 20.944 من قيمة العقد في لحالة تاخير تبلغ ثلاثة اشهر في دفع السلف الشهرية. وجد ان الحد الادنى من التمويل اللازم لهذه المشاريع يتناسب طرديا مع مقدار التاخير في السداد وتم ايجاد معادلة خطية تربط بين الحد الادنى من التمويل اللازم لهذه المشاريع ومدة التاخير بالاشهر مما سوف يساعد مقاولي الطرق في العراق في تقدير القيمة المستقبلية من التمويل.تم احتساب الربح المترتب على اساس الدفعات الشهرية لغرض معرفة فيما لو تم تجاوزه للربح المتوقع لغرض احتساب العواقب في حال حصوله ونظرا لاستخدام مقاولات عقد سعر الوحدة في هذا النوع من المشاريع فلم يتسبب في حصول هذا التجاوز .ان التأخير في دفع السلف الشهرية يؤدي الى نتائج سلبية بما في ذلك التاخير في المشروع ويقلل مستوى اداء المقاولين مما يؤثر سلبا على المشروع ويقلل من جودة تنفيذه وزيادة تكلفته في حال مطالبة المقاول بالتعويض عن الضرر الحاصل.