

CHAPTER 6

PROJECT CASH FLOW

In the previous chapters, techniques for project planning, scheduling, resources management, and time-cost trade off have been introduced. This chapter deals with project cash flow to predict the actual flow of money during the contract duration. A project's cash flow is basically the difference between the project's income and its expense. The difference between a company's total income and its total expense over a period of time is the company cash flow.

6.1 Contract Cash Flow

At the project level, a project's cash flow is the difference between the project's expense and income. At the construction company level, the difference between company's total expense and its total income over a period of time is the company's cash flow.

$$\text{Cash flow} = \text{Cash in} - \text{Cash out} = \text{Income} - \text{Expense}$$

Forecasting cash flow is necessary for a construction company for the following reasons:

- To ensure that sufficient cash is available to meet the demands.
- It shows the contractor the maximum amount of cash required and when it will be required. Thus, the contractor can make arrangements to secure the required cash.
- It provides a reliable indicator to lending institutions that loans made can be repaid according to an agreed program.
- It ensures that cash resources are fully utilized to the benefit of the owner and investors in the company.

The three main ingredients in determination of cash flow 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 such as labor, equipment, material, and subcontractors.
- Income (cash in) that represents the receipts a contractor will receive over a period of time for the work he/she has completed.
- Timing of payments: in cash flow analysis, we are interested in the timing of payments related to the work done by the contractor.

6.1.1 Construction Project Costs

In preparing the cash flow for a project, it is necessary to compute the costs that must be expended in executing the works using activities durations and their direct and indirect costs. The principal components of a contractor's costs and expenses result from the use of labors, materials, equipment, and subcontractors. Additional general overhead cost components include taxes, premiums on bonds and insurance, and interest on loans. The sum of a project's direct costs and its allocated indirect costs is termed the project cost.

The costs that spent on a specific activity or project can be classified as;

- *Fixed cost*: costs that spent once at specific point of time (e.g., the cost of purchasing equipment, etc.)
- *Time-related cost*: costs spent along the activity duration (e.g., labor wages, equipment rental costs, etc.)
- *Quantity-proportional cost*: costs changes with the quantities (e.g., material cost)

Project direct costs

The costs and expenses that are incurred for a specific activity are termed direct costs. These costs are estimates based on detailed analysis of contract activities, the site conditions, resources productivity data, and the method of construction being used for each activity. A breakdown of direct costs includes labor costs, material costs, equipment costs, and subcontractor costs. Activities' direct costs are estimated as presented previously in chapter 3.

Project indirect costs

Other costs such as the overhead costs are termed indirect costs. Part of the company's indirect costs is allocated to each of the company's projects. The indirect costs always classified to: project (site) overhead; and General (head-office) overhead.

Project overhead

Project overhead are site-related costs and includes the cost of items that can not be directly charged to a specific work element and it can be a fixed or time-related costs. These include the costs of site utilities, supervisors, housing and feeding of project staff, parking facilities, offices, workshops, stores, and first aid facility. Also, it includes plants required to support working crews in different activities.

A detailed analysis of the particular elements of site-related costs is required to arrive at an accurate estimate of these costs. However, companies used to develop their own forms and checklists for estimating these costs. Site overhead costs are estimated to be between 5% - 15% of project total direct cost.

General overhead

The costs that cannot be directly attributed a specific project called general overhead. These are the costs that used to support the overall company activities. They represent the cost of the head-office expenses, managers, directors, design engineers, schedulers, etc. Continuous observations of the company expenses will give a good idea of estimating reasonable values for the general overhead expenses. Generally, the general overhead for a specific contract can be estimated to be between 2% - 5% of the contract direct cost. The amount of the general overhead that should be allocated to a specific project equals:

Project direct cost x general overhead of the company in a year

Expected sum of direct costs of all projects during the year

Having identified the direct costs, indirect costs, then the project total cost equals the sum of both direct and indirect costs.

When studying cash flow, it is very important to determine the actual dates when the expenditures (cost) will take place. At that time, the expenditures will be renamed as the expenses. Figure 6.1 illustrates the difference between the costs and the expenses. As shown, they are the same except the expenses are shifted (delayed) than the costs.

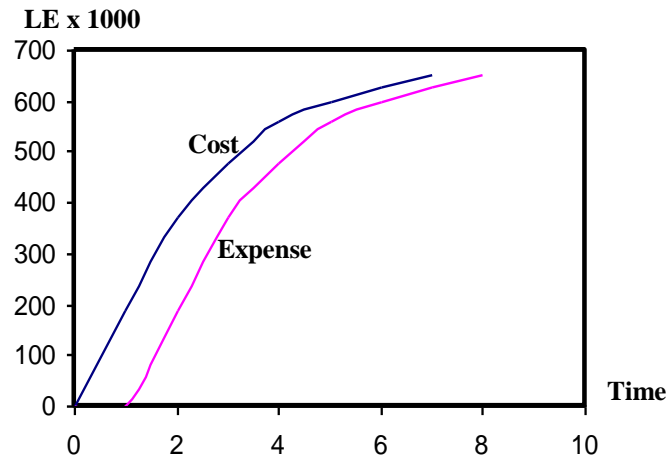


Figure 6.1: Project cost and expense curves

Example 6.1

Consider the construction of 8-week foundation activity with operation cost of LE8800.

The operation cost is broken down into the following elements:

- Labor LE1600 paid weekly
- Plant LE4000 paid weekly after 4 weeks credit facility
- Materials LE800 paid weekly after 5 weeks credit facility
- Subcontractors LE2400 paid weekly after 3 weeks credit facility

Determine the expenses (cash out) of this activity.

Solution

A time-scaled plan is developed for this activity for the payments for labor, plant, material, and subcontractors. The cost will be plotted weekly with the delay specified in Example 6.1.

Operation	Weeks
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	1	2	3	4	5	6	7	8	9	10	11	12	13
Labor	-	200	200	200	200	200	200	200	200				
Plant	-	-	-	-	500	500	500	500	500	500	500	500	
Material	-	-	-	-	-	100	100	100	100	100	100	100	100
Subcontractors	-	-	-	300	300	300	300	300	300	300	300		
Total payment (Expense)	-	200	200	500	1000	1100	1100	1100	1100	900	900	600	100

6.1.2 The S-Curve

The curve represents the cumulative expenditures of a project direct and indirect costs over time is called the S-curve as it takes the S-shape as shown in [Figure 6.2](#). In many contracts, the owner requires the contractor to provide an S-curve of his estimated progress and costs across the life of the project. This S-shaped of the curve results because early in the project, activities are mobilizing and the expenditure curve is relatively flat. As many other activities come on-line, the level of expenditures increases and the curve has a steeper middle section. Toward the end of a project, activities are winding down and expenditures flatten again ([Figure 6.2](#)). The S-Curve is one of the most commonly techniques to control the project costs.

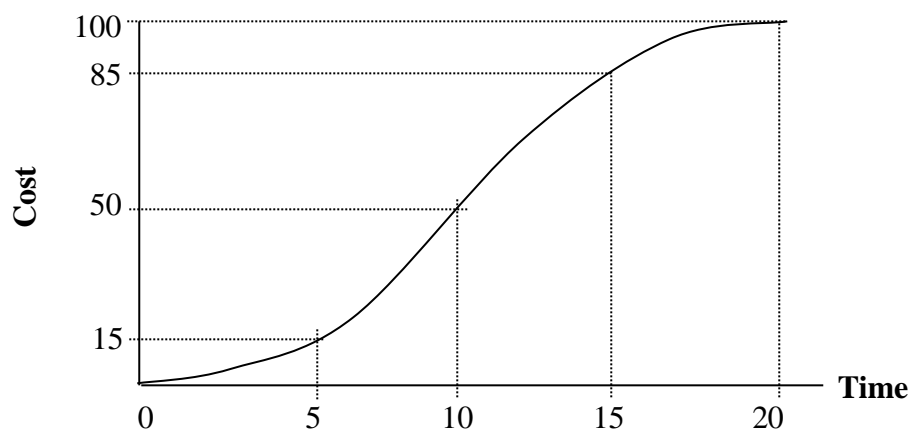


Figure 6.2: A sample S-curve

An S-curve for a project can be developed using the following steps:

- Constructing a simple bar chart for all the tasks of the project.
- Assigning costs to each task using task duration.
- Plotting the cumulative amounts of expenditures versus time by smoothly connecting the projected amounts of expenditures over time.

Example 6.2

Consider the project shown in Figure 6.3. The costs of activities are assumed as shown in Table 6.1. The indirect costs of tasks are calculated considering a daily cost of LE500. It is required to draw the S-curve of the total cost of the project.

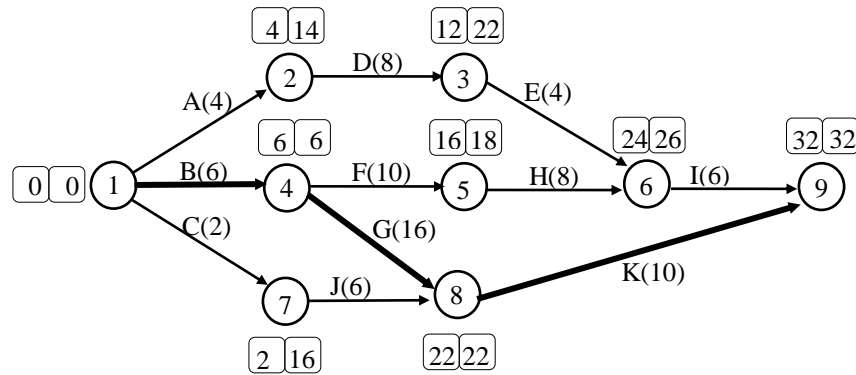


Figure 6.3: Project network of Example 6.2

Table 6.1: Cost data of Example 6.2

Activity	Duration	Direct Cost	Indirect Cost	Total Cost
A	4	2,000	2,000	4,000
B	6	9,000	3,000	12,000
C	2	3,000	1,000	4,000
D	8	12,000	4,000	16,000
E	4	18,000	2,000	20,000
F	10	15,000	5,000	20,000
G	16	8,000	8,000	16,000
H	8	20,000	4,000	24,000
I	6	9,000	3,000	12,000
J	6	9,000	3,000	12,000
K	10	5,000	5,000	10,000

Solution

The S-curve is calculated based on the project's bar chart and the expenditures of each activity. As illustrated in Figure 6.3, the eleven activities of this project are scheduled across a 32-day time span. A bar chart representation of these activities is drawn in Figure 6.4 showing the total costs associated with each activity above each activity's bar. The figure shows the total expenditures and the cumulative bi-daily expenditures across the life of the project. The S-curve of the cumulative expenditures over time is plotted in Figure 6.5.

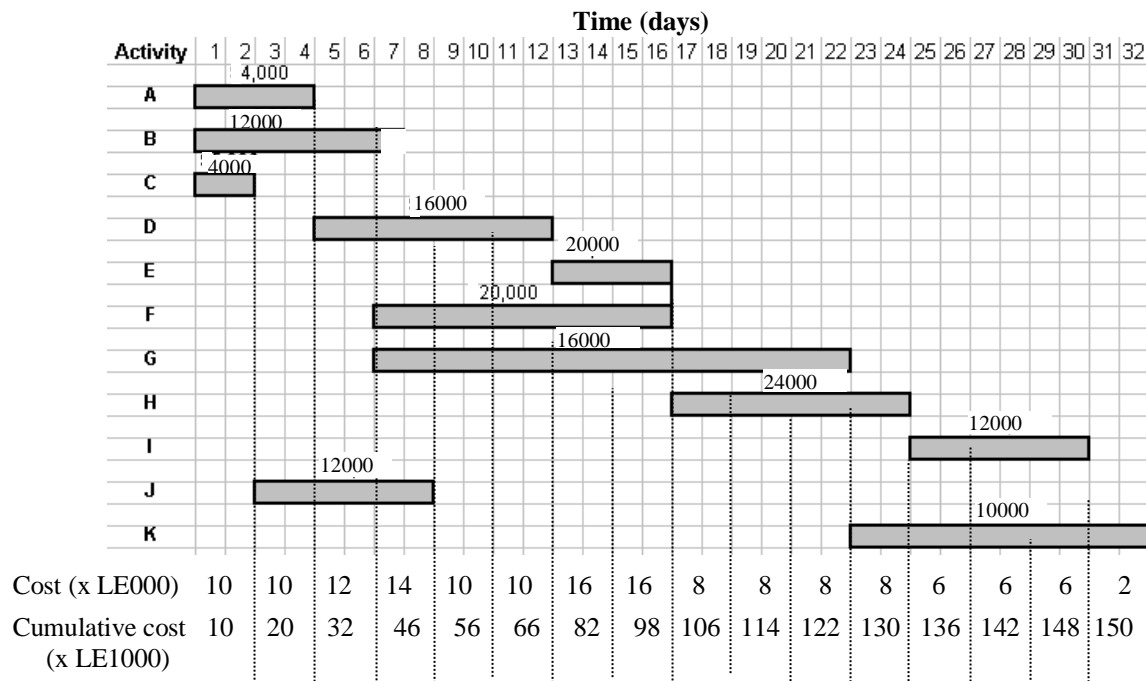


Figure 6.4: Project bar chart of Example 6.2

6.1.3 Project Income (Cash-in)

The flow of money from the owner to the contractor is in the form of progress payments. Estimates of work completed are made by the contractors periodically (usually monthly), and are verified by the owner's representative. Depending on the type of contract (e.g., lump sum, unit price, etc.), these estimates are based on evaluations of the percentage of total contract completion or actual field measurements of quantities placed. Owners usually retain 10% of all validated progress payment submitted by contractors. The

accumulated retainage payments are usually paid to the contractor with the last payment. As opposed the expenses presented in Figure 6.1 with smooth profile, the revenue will be a stepped curve. Also, when the contractor collects his/her money it is named project income (cash in) as shown in Figure 6.6.

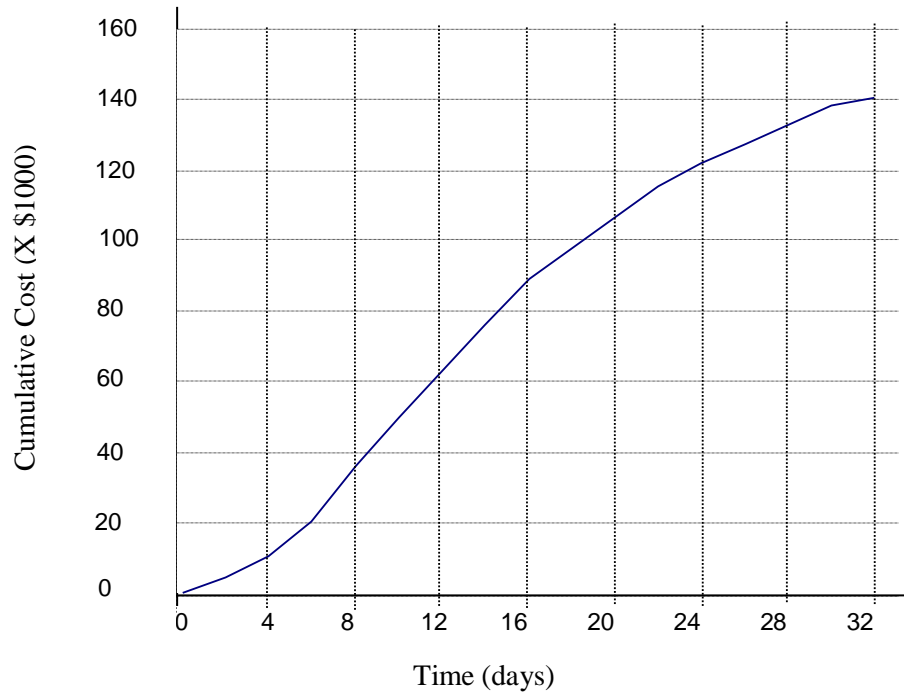


Figure 6.5: The S-Curve for the Example Project

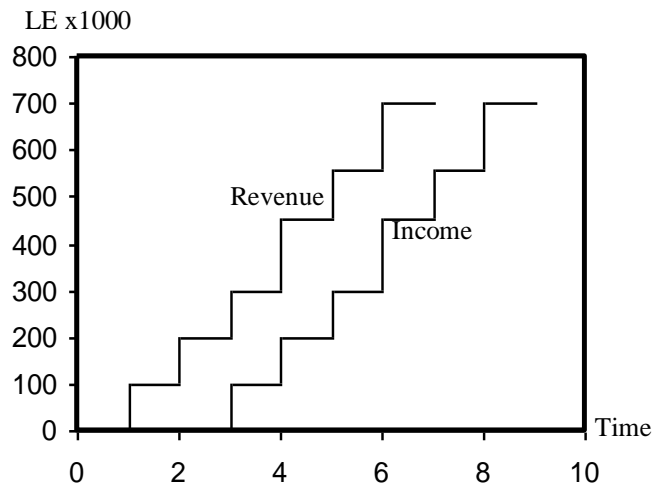


Figure 6.6: Project revenue and income curves

The time period shown in Figure 8.6 represents the time intervals at which changes in income occur. When calculating contract income, it is necessary to pay attention to the retention and/or the advanced payment to the contractor if any.

Retention

Retention is the amount of money retained by the owner from every invoice, before a payment is made to the contractor. This is to ensure that the contractor will continue the work and that no problems will arise after completion. This retainage amount ranges from 5% to 10% and hold by the owner from every invoice till the end of the contract. The whole amount will be paid to the contractor at the end of the contract.

Advanced payment

This is amount of money paid to the contractor for mobilization purposes. Then, it is deducted from contract progress payment. Applying this strategy improves the contractor cash flow and prevents him/her from loading the prices at the beginning of the contract. This strategy, however, may be used only in projects that require expensive site preparation, temporary facilities on site, and storage of expensive materials at the beginning of the project.

6.1.4 Calculating Contract Cash Flow

Having determined the contract expenses and income as presented in the previous section, it is possible to calculate the contract cash flow. If we plotted the contract expense and income curves against each other, then the cash flow is the difference between the points of both curves. [Figure 6.7](#) shows the cash flow of a specific contract. The hatched area represents the difference between the contractor's expense and income curves, i.e., the amount that the contractor will need to finance. The larger this area, the more money to be financed and the more interest charges are expected to cost the contractor.

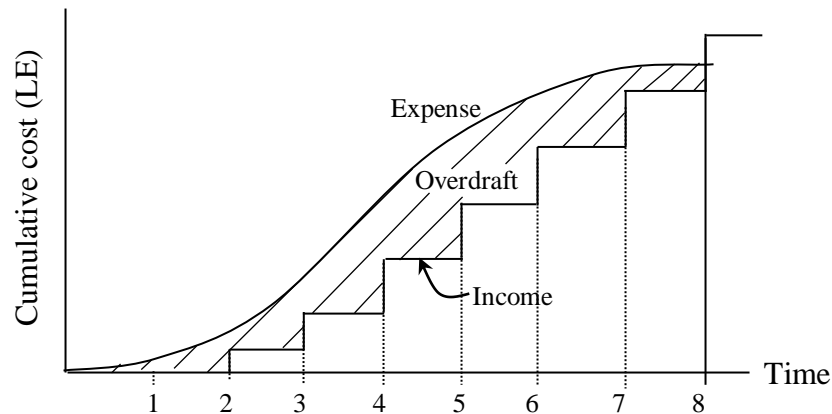


Figure 6.7: Cash flow based on monthly payments

The contractor may request an advanced or mobilization payment from the owner. This shifts the position of the income profile so that no overdraft occurs as shown in Figure 6.8.

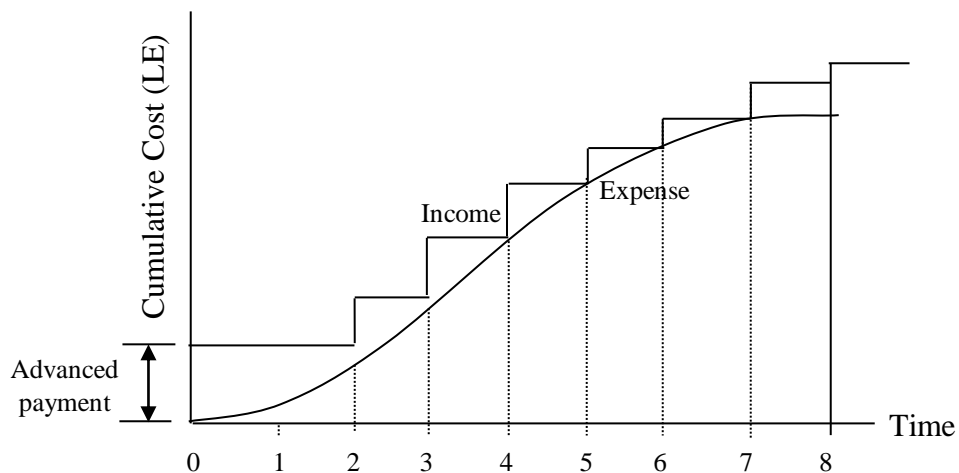


Figure 6.8: Effect of advanced payment on improving cash flow

In case of less number of payments (two or three payments) along the contract period, this will lead to increase the overdraft as shown in Figure 6.9. From the previous study, the factors that affect the project finance (cash flow) should be considered when calculating the cash flow:

- The project bar chart (project schedule).
- Activities' direct and indirect cost.

- Contractor method of paying his/her expenses.
- Contractor's markup (mainly the profit margin).
- Retention amount and its payback time.
- Time of payment delay by owner.
- Advanced or mobilization payment.

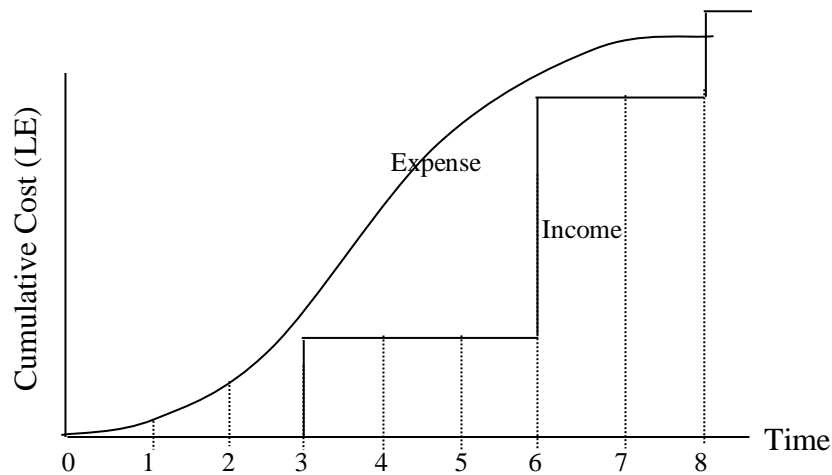


Figure 6.9: Effect of receiving two payments on cash flow

The cash flow calculations are made as described in the following steps:

- Perform project schedule and determine project and activities timing.
- Draw bar chart based on early or late timings.
- Calculate the cost per time period.
- Calculate the cumulative cost.
- Adjust the cost according the method of paying it to produce the expenses.
- Calculate the cumulative revenue (revenue = cost x (1 + markup)).
- Adjust the revenue based on the retention and delay of owner payment to determine the income.
- Calculate the cash flow (cash flow = income – expense) at the contract different times.

Example 6.3

To illustrate the steps of cash flow calculations, consider the same project presented in Figure 8.3. The total cost of the activities is presented in Table 6.1.

In this project, the markup equals 5% and the contractor will pay his expenses immediately. Retention is 10% and will be paid back with the last payment. The calculations will be made every 8 days, i.e., the contractor will receive his/her payment every 8-days (time period). Owner's payment is delayed one period, while the contractor will submit the first invoice after the first period. No advanced payment is given to the contractor.

Solution

The project revenue of each activity is calculated as $\text{revenue} = \text{cost} (1 + \text{markup})$ as shown in Table 6.2. The activities timing is presented in Example 6.2.

Table 6.2 Project cost and revenue

Activity	Duration (day)	Total Cost (LE x 1000)	Total Revenue (LE x 1000)
A	4	04.00	04.20
B	6	12.00	12.60
C	2	04.00	04.20
D	8	16.00	16.80
E	4	20.00	21.00
F	10	20.00	21.00
G	16	16.00	16.80
H	8	24.00	25.20
I	6	12.00	12.60
J	6	12.00	12.60
K	10	10.00	10.50

By summing up the activities cost and revenue, then the contract total cost equals LE 150,000 and the total revenue equals LE 157,500. By considering that both the cost and

the revenue are evenly distributed over the activities durations. The calculations are presented as shown in [Figure 6.10](#). The calculations will be made every 8-days period.

As shown in [Figure 6.10](#), the project duration is divided into four periods each one equals 8 days. In addition, one period is added after project completion. Simple calculations are then performed with the top four rows showing the project expenses. The next five rows for income, and the last row for cash flow. As shown, after summing up the costs it became direct expenses to the contractor as there is no delay in paying them.

The expected owner payments are then added up to from the project revenue. The retention is subtracted from the owner payment and will be paid back to the contractor with the last payment (row 7 in [Figure 6.10](#)). Then, the revenue is delayed by one period to form the contractor income. The calculations in the last row are the difference between the project income and project expense. Having two values in some periods shows the sudden change of the cash flow as the contractor receives more payments from the owner. For example, in the second period, just before the contractor receive his/her payment the cash flow was $(0 - 98,000 = - 98,000 \text{ LE})$. As the contractor receives a payment of LE 43,470, the cash flow improves and becomes -54,530 $(43,470 - 98,000)$.

As seen from [Figure 6.10](#), the maximum overdraft money (maximum cash) is LE 98,000 and will be needed at the 16th day of the project. Thus shows the importance of studying the contract cash flow. Accordingly, the contractor can make his arrangements to secure the availability of this fund on the specified time.

[Figure 6.11](#) shows the contract expense and income curves. These curves will be needed to calculate the contractor cost of borrowing or investment of the overdraft money (area between expense and income). [Figure 6.12](#) shows the contact net cash flow.

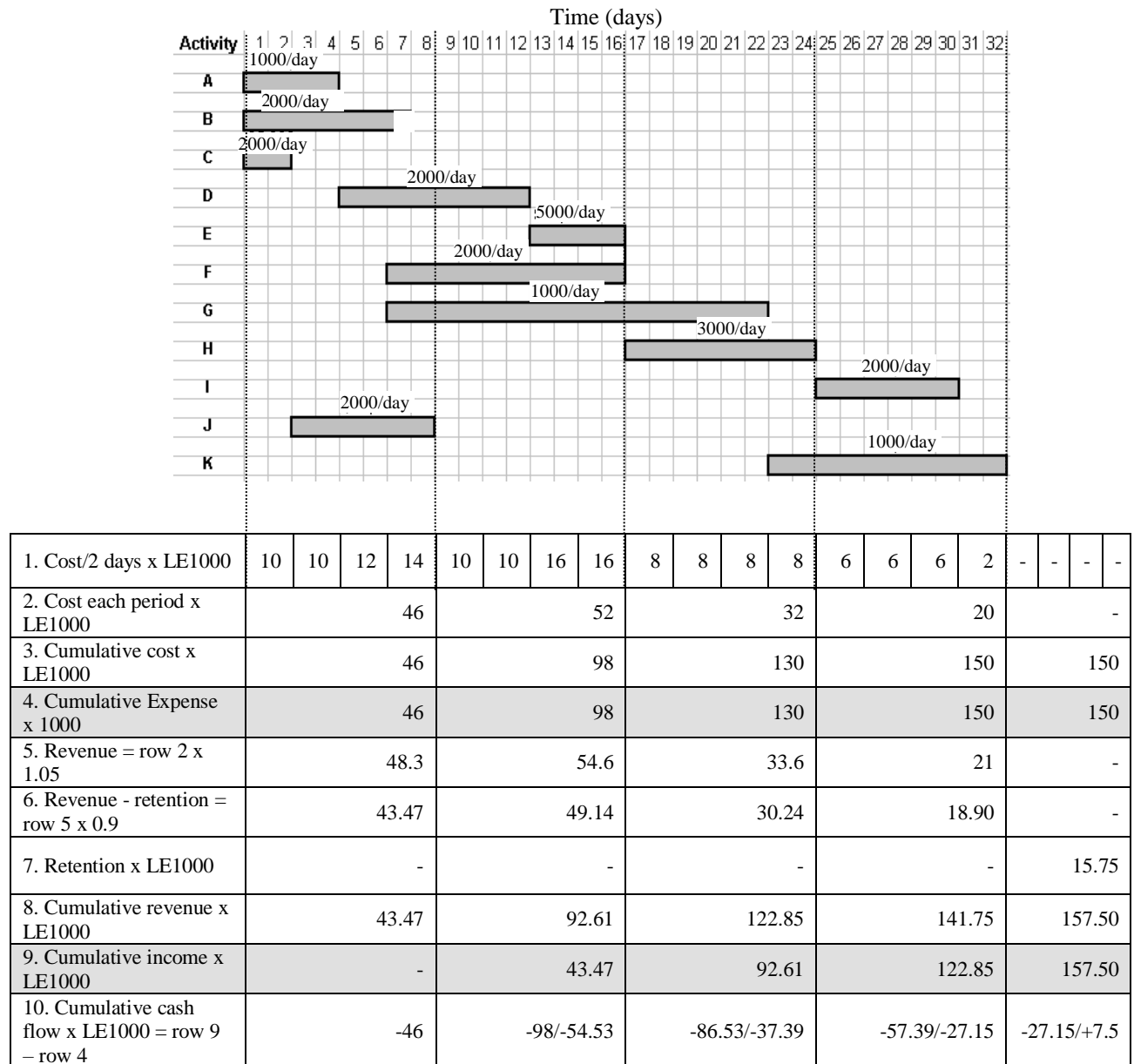


Figure 6.10: Cash flow calculations of Example 6.3

6.1.5 Minimizing Contractor Negative Cash Flow

It is very essential to the contractor to minimize his/her negative cash flow because this may hinder him/her during performing the contract due to lack of financial resources. Among the procedures the contractor may follow to minimize negative cash flow is:

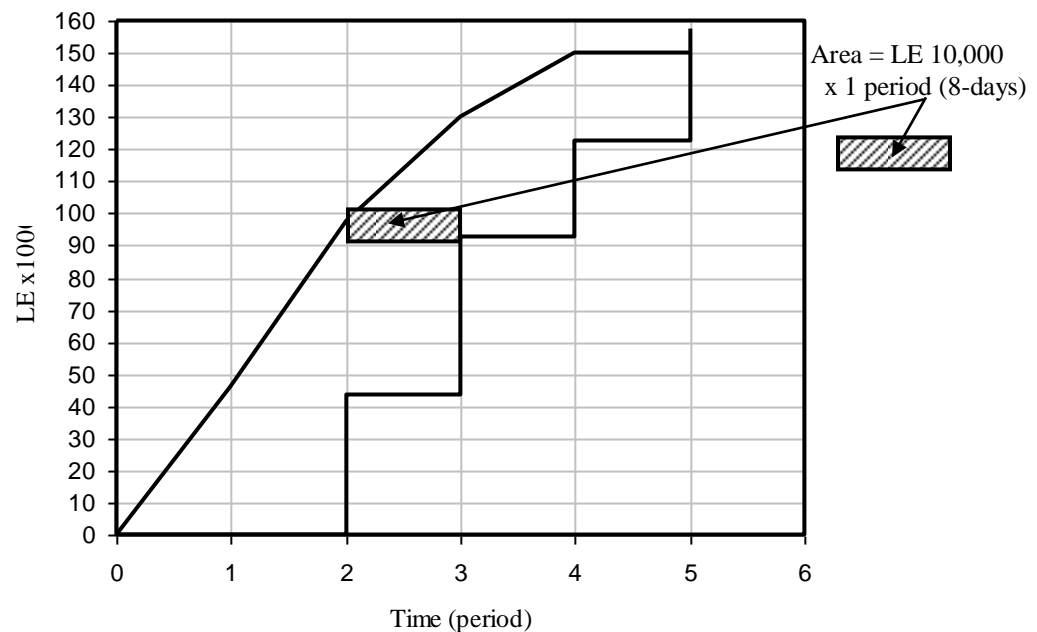


Figure 6.11: Expense and income curves for Example 6.3

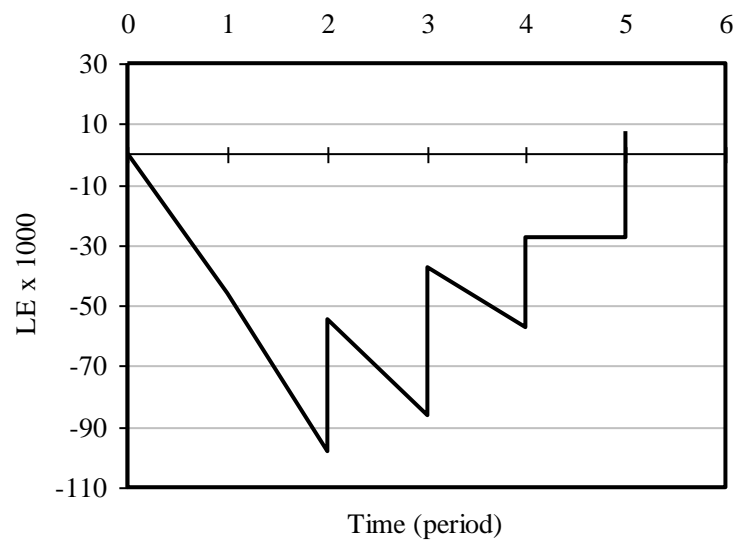


Figure 6.12: Contract net cash flow

- Loading of rates, in which the contractor increases the prices of the earlier items in the bill of quantities. This ensures more income at the early stages of the project. However, this technique might represent a risk to the contractor or the owner.
- Adjustment of work schedule to late start timing in order to delay payments. In this case, the contractor should be aware that in this case in delay might happen will affect the project completion time and may subject him/her to liquidated damages.

- Reduction of delays in receiving revenues.
- Asking for advanced or mobilization payment.
- Achievement of maximum production in the field to increase the monthly payments.
- Increasing the mark up and reducing the retention.
- Adjust the timing of delivery of large material orders to be with the submittal of the monthly invoice.
- Delay in paying labor wages, equipment rentals, material suppliers and subcontractors.

6.1.6 Cost of Borrowing (Return on Investment)

Cash requirements (negative cash flows) during a project result in a contractor either having to borrow money to meet his/her obligation or using funds from the company reserves, which may have been more profitably if employed elsewhere. Accordingly, there should be a charge against the project for the use of these funds.

One of the methods to determine the amount of interest to be charged during a contract is to calculate the area between the expenses and income curves. To simplify the calculations, the area is calculated in terms of units of LE x time period (money x time). The time may be in days, weeks, months, etc. The underneath the expense curve is considered as negative area (negative cash), while the area above the expense curve is considered positive area (positive cash). The total net number of area units is calculated and multiplied by the value of the unit and the result is multiplied by the interest rate or rate of investment.

$$\text{Cost of borrowing} = \text{net area} \times \text{interest rate} \quad (6.1)$$

Note that, the interest rate should be calculated in the same time period as the time period of the unit areas. For example, if the units' areas are calculated in LE.month, then the interest rate should be in months.

Example 6.4

Consider example 8.3, it is required to calculate the cost of borrowing if the interest rate is 1%-every time period (8-days).

Solution

Referring to Figure 6.11, the approximate number of unit areas between the expense and the income curves equals 24 units. Each unit equals LE 10,000-time period. Then, the cost of borrowing = $24 \times 100000 \times 0.01 = \text{LE } 2400$. This value must be added to the contract price.

Example 6.5

The expense and income curves for a specific contract are shown in Figure 6.13. During construction, money will be borrowed from the bank as required at an interest rate of 15% per year. Income from project earns an interest of 12% per year. Calculate the net interest to be charged to the project.

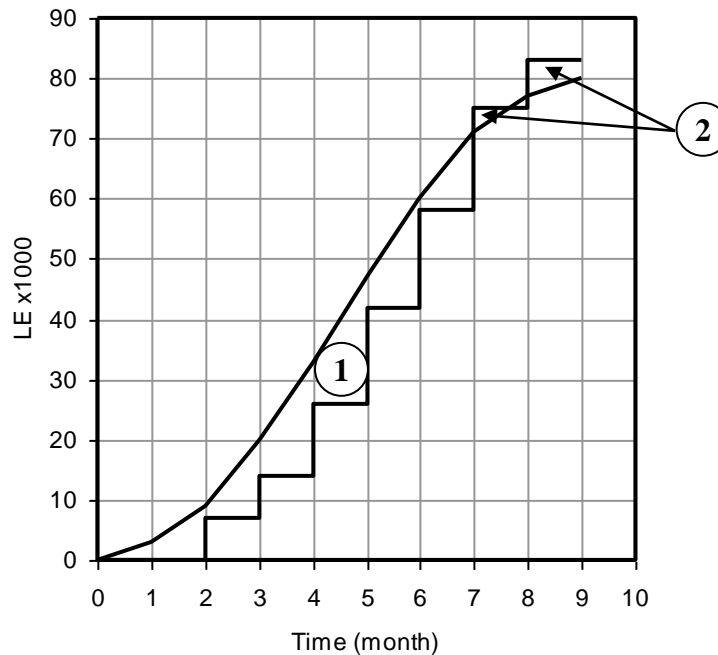


Figure 6.13: Cash flow diagram for Example 6.5

Solution

- Each square represents LE 10000 month
- Note that the interest rate is given per year and the square area is measured in month, then, it is required to calculate the interest per month by dividing by 12.

Negative area, area 1 (income curve below expense curve)

- No. of negative squares = 5.7
- Interest charge = $5.7 \times 10000 \times 0.15 / 12 = \text{LE } 712.5$

Positive area, area 2 (income curve above expense curve)

- No. of positive squares = 0.6
- Interest charge = $0.6 \times 10000 \times 0.12 / 12 = \text{LE } 60$

Net interest to be charged to the project = $712.5 - 60 = \text{LE } 652.5$

Example 6.6

Table 6.3 shows a contractor's project budget and profit distribution for a newly awarded contract. The contractor will receive monthly payment less 10% retention and will be paid to the contractor one month later. Half the retention is released on project completion and the other half is released six months later. To reduce administrative costs, the owner proposed to the contractor that measurements and payments be made every two months with a delay of one month before the contractor receives payment. It is required:

- Prepare graphs of cumulative cash out and expenses for both monthly and bi-monthly measurements. Assume an average payment delay of one month of the contractor's cost.
- Calculate the maximum amount of capital needed to execute the project with monthly and bi-monthly measurements.
- Calculate the cost of borrowing for extra funding needed, if the measurement is made bi-monthly. Given that the investment rate is 15% per annum.

Table 6.3: Budgeted value and profit distribution of Example 6.6

Month	1	2	3	4	5	6	7	8	9	10
Value of work each month (LE x1000)	3	4	5	8	8	8	7	6	5	2
Profit (% of value)	15	15	10	10	10	10	10	10	5	5

Solution

The calculations of the project's cash in and cash out passed on monthly and bi-monthly measurements are presented in Table 6.4. As shown, the time scale of Table 6.4 is 16 months. As given in the example, the project duration is 10 months, and half of the retention will be paid after six month of project completion. The total project value is LE 56,000. Then the total retention is LE 5,600 ($0.10 \times 56,000$).

The cumulative expense and income curves are shown in Figure 6.14.

- The maximum cash needed in case of monthly measurement is LE 6850 at month 6 and 7 immediately before payment is received as shown in row k of Table 6.4.
- The maximum cash needed in case of bi-monthly measurement is LE 14050 at month 7 immediately before payment is received as shown in row l of Table 6.4.

The extra fund required to finance the project if measurements and payments are made every two months is represented by the shaded area on Figure 6.14.

Table 6.4: Cash in and cash out calculations of Example 6.6

a. Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
b. Monthly value of work (LE x1000)	3	4	5	8	8	8	7	6	5	2	-	-	-	-	-	-
c. Monthly value – retention = 0.9b (LE x1000)	2.7	3.6	4.5	7.2	7.2	7.2	6.3	5.4	4.5	1.8	-	-	-	-	-	-
d. Retention (LE x 1000)	-	-	-	-	-	-	-	-	-	-	2.8	-	-	-	-	2.8
d. Cumulative value (LE x 1000)	2.7	6.3	10.8	18	25.2	32.4	38.7	44.1	48.6	50.4	50.4	50.4	50.4	50.4	50.4	50.4
e. Cumulative income on monthly measurements (LE x1000)	-	2.7	6.3	10.8	18	25.2	32.4	38.7	44.1	48.6	53.2	53.2	53.2	53.2	53.2	56
f. Cumulative income on bi-monthly measurements (LE x1000)	-	-	6.3	6.3	18	18	32.4	32.4	44.1	44.1	53.2	53.2	53.2	53.2	53.2	56
g. Profit (% of value)	15%	15%	10%	10%	10%	10%	10%	10%	5%	5%	-	-	-	-	-	-
h. Cost = b(1-g) (LE x1000)	2.55	3.4	4.5	7.2	7.2	7.2	6.3	5.4	4.75	1.9	-	-	-	-	-	-
i. Cumulative cost (LE x1000)	2.55	5.95	10.45	17.65	24.85	32.05	38.35	43.75	48.5	50.4	-	-	-	-	-	-
j. Cumulative expense (LE x1000)	-	2.55	5.95	10.45	17.65	24.85	32.05	38.35	43.75	48.5	50.4	50.4	50.4	50.4	50.4	50.4
k. Cash flow monthly measurements = e - j (LE x 1000)	0	$\frac{-2.55}{0.15}$	$\frac{-32.5}{0.35}$	$\frac{-4.15}{0.35}$	$\frac{-6.85}{0.35}$	$\frac{-6.85}{0.35}$	$\frac{-6.85}{0.35}$	$\frac{-5.95}{0.35}$	$\frac{-5.05}{0.35}$	$\frac{-4.4}{0.1}$	$\frac{-1.8}{2.8}$	2.8	2.8	2.8	2.8	5.6
l. Cash flow bi-monthly measurements = f - j (LE x 1000)	0	-2.55	$\frac{-5.95}{0.35}$	-4.15	$\frac{-11.35}{0.35}$	-6.85	$\frac{-14.05}{0.35}$	-5.95	$\frac{-11.35}{0.35}$	-4.4	$\frac{-6.3}{2.8}$	2.8	2.8	2.8	2.8	5.6

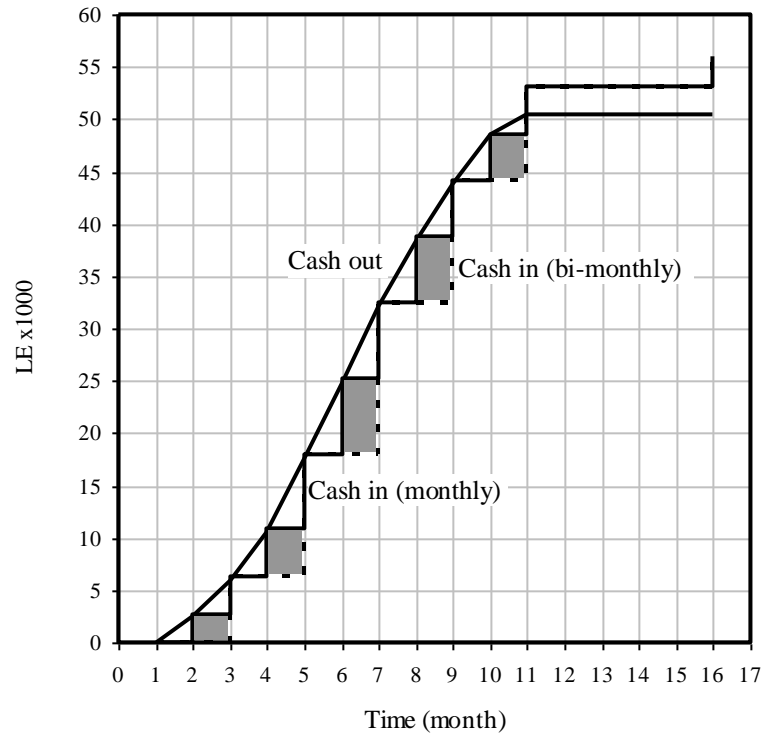


Figure 6.14: Cash out and cash in based on monthly and bi-monthly measurement intervals

The extra financed area (shaded area on Figure 8.14) = 2.7×1

$$\begin{aligned}
 &+ (10.8 - 6.3) \times 1 \\
 &+ (25.2 - 18.0) \times 1 \\
 &+ (38.7 - 32.4) \times 1 \\
 &+ (48.6 - 44.1) \times 1 \\
 &= 2.7 + 4.5 + 7.2 + 6.3 + 4.5 \\
 &= 25.2 \times 1000 \text{ LE.month}
 \end{aligned}$$

Interest charge of extra funding = $25.2 \times 1000 \times 0.15 / 12 = \text{LE } 315$.

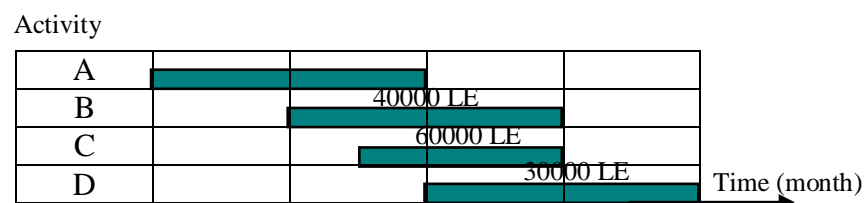
6.2 Exercises

1. The activities involved in the construction of a small building are given below. The price of each activity is listed in the table. The contractor undertaking this project would like you to prepare graphs of cumulative expense and income to date against time for activities starting as early as possible. The mark-up is 10%

of tender value and retention is 5%. Measurement is made monthly with a payment delay of one month. The retention is paid at the end of the contract. To simplify the calculations, you may assume that all costs must be met by the end of the month in which they are incurred. What is the maximum amount of cash the contractor needs to execute this contract and when does he require this amount?

No.	Activity	Duration (months)	Predecessors	Overlap	Value (LE)
10	Excavation	2	-	-	9000
20	Concrete bases	3	10	1	12000
30	Erect frames	1.5	20	1	18000
40	Concrete floor slab	1	20	1	15000
50	Fix cladding	1.5	30	1	6000
60	Install plant	1	40, 50	-	20000

2. A simplified project shown in the following figure. The direct costs associated with each activity is shown above each bar. It is assumed that project indirect cost is 5000 LE monthly. The contractor included a profit mark-up of 10000 LE to his bid so that the total bid price was 210000 LE. The owner retains 10% of all validated progress payments until one half of the contract value (i.e. 105000 LE). The progress payments will be billed at the end of the month and the owner will transfer the billed amount minus any retains to the contractor's account 30 day later. Determine the expenses and income profile of this project.



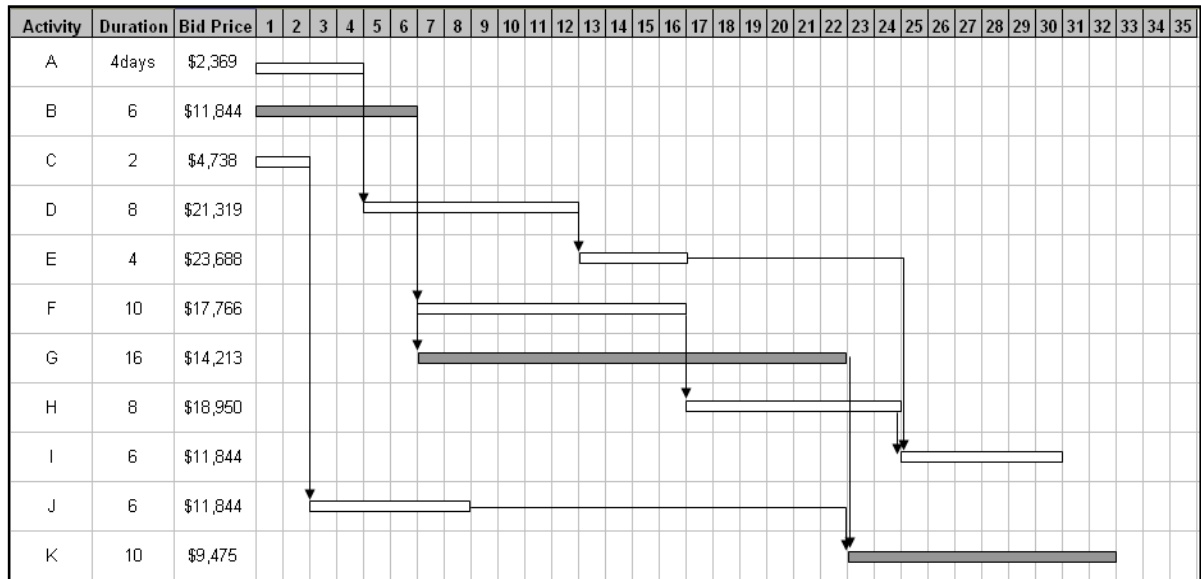
3. The table below lists the cumulative monthly expenses incurred by a contractor and the corresponding monthly payments which are received from the client of a

project. Calculate the cost to the contractor of providing the working capital necessary to finance the project if the chosen annual investment rate is 10%. If the client makes his payments one-month later than anticipated in the table, by what percentage will the financial charge increase?

End of month	Cumulative expense (LE x 1000)	Cumulative income (LE x 1000)
0	0	0
1	12	0
2	20	0
3	54	0
4	90	14
5	130	40
6	180	100
7	220	130
8	240	190
9	260	210
10	290	300
11	290	320
12	290	340

4. The following figure shows the Bar Chart for a small project, durations, schedule, Bid Prices, and logical relationships among activities are all shown. Use the following additional information to calculate the maximum amount of cash the contractor needs and when dose him/her requires this amount.

- Indirect cost is \$ 1000 per day
- Contractor markup is 5%
- Time period is 8 days with interest rate of 1% per period
- Retainage amount is 10%, and all withheld retainage money will be paid back 2 periods after the last payment
- Owner's payment delay of any invoice is one period.



5. Given the project below, and the minimum attractive annual rate of return of 30%, how much would you mark up the project based on cash flows? Lag factors for all costs incurred are zero. No office overhead is considered. Income is received one period after expense incurred. Assume retainage equals 10%.

Month	Mobilization Demobilization	Subcontractors	Equipment	Materials	Payroll	Site overhead
0	LE 40,000	0	0	0	0	0
1	-	10,000	20,000	10,000	10,000	1,000
2	-	30,000	10,000	20,000	15,000	5,000
3	-	30,000	20,000	30,000	20,000	6,000