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THE APPLICATION OF THE EARNED VALUE METHOD IN THE MANAGEMENT OF CONSTRUCTION PROJECTS IN SUDAN

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ABSTRACT

This scientific paper aims to identify how to manage costs for engineering projects and to identify the acquired value in the project budget for the period of its implementation (financial flow), apply the acquired value for follow-up, analysis and prediction of project implementation variables and financial flow. Accordingly, a questionnaire was designed to study the possibility of engineering companies to apply the earned value method in project management it was distributed to a number of engineering companies in sudan.

KEYWORD: EVM, Cost Control, Questionnaire, Project Management.

INTRODUCTION

Earned Value an assessment of the value of the work done so far that allows the project manager to determine progress as an amount of money.

Earned value management in construction projects (EVM) is a technique used to assess the progress of a project by comparing the amount and cost of work that is planned to be completed at a particular stage with the amount that has already been done and what it has actually cost. It is also a project management methodology that integrates schedule, costs and scope to measure project performance based on the planned and actual values.

Earned value is linked to the project budget. Many projects ae constrainedby fixed budgets, others have floating or variable budgets. Earned value techniques can be applied in both cases, although, there differences in the details of the application[1] earned value basics are explained, first assuming a fixed budget condition and then progressing to the variable budgeting situation.

In construction, EVM can be based on quantities to measure physical progress, which is done by measuring installed quantities and comparing them to planned quantities on a period-by-period basis.[2]

Earned value management (EVM) is a systematic process that uses earned value as the primary tool for integrating cost, schedule, technical performance management, and risk management. Without using the EVMS, determining status can be difficult.[3]

When implementing the earned value management method in projects, itmust include the following basic features:

1. A project plan that specifies the work to be accomplished.
2. Evaluation of planned work, called planned value (PV) or budgetedcost of scheduled work (BCWS).
3. Predefined ‘earning rules’ (also called metrics) for measuring work completion, called earned value (EV) or budgeted cost of work performed (BCWP).

Earned value management applications for large or complex projects include many features, such as cost performance indicators and forecasts (over budget or under budget) and schedule performance (behind a schedule and ahead of schedule).

However, a prerequisite for an earned value management system is to measure progress using planned value and earned value.

The earned value system is an effective tool for project follow-up that links the actual completion of the planned work within the project with the time that has elapsed and the cost that has been spent compared to the project’s time and financial plan.

To apply the earned value method, you must know the following about the companies to be applied to:

- The company's method of saving project data
- The standard that the company is interested in to follow up on the time performance and

cash flow of projects

- In terms of time follow- up you should know:

1. Does the company set a timetable for each project before the startof implementation?
2. Who sets schedule for each project implemented by the company?
3. Is the computer used to set the schedule?
4. What is the method used to set these timetables?
5. Is the progress of the prepared schedule followed up after the beginning of the first implementation?
6. How is the schedule monitored during the course of the project?
7. How is the schedule monitored during the course of the project?
8. If there is a clear and significant delay in the project's time plan and may lead to financial penalties, how can the delay be rectified?

- In terms of financial follow-up, you must know:

1. Are schedules made for financial follow-up other than tables of prices and quantities so that it facilitates the process of following up on the cost of items during the course of the project?
2. Are the exchange items periodically monitored through financial reports during the progress of the project?
3. Is the project team allowed to review the financial statements whenever they wish?
4. What is the mechanism that the company relies on in monitoring the actual expenditure during the implementation of projects?
5. Is the actual exchange reviewed with the planned value for the completion of the specified item?
6. What type of contracts does the company make, which has a significant impact on the way the budget is monitored?
7. How is the budget monitored and dealt with in the event that there are advance payments for some resources for the purpose of booking them?

- In terms of monitoring the work of the project must know:

1. Which of the software packages do they use to monitor projects?
2. Is the project being followed up in terms of spending and time at the same time and in full agreement?

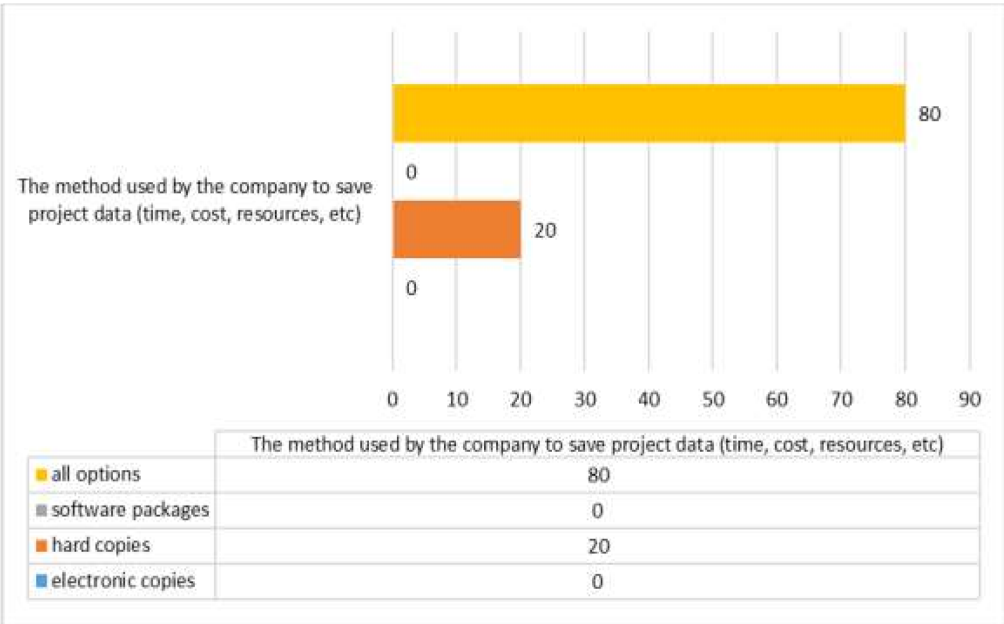
3. Does the difference in market prices have an impact on the schedule as well as on the cost?
4. How does the company include the difference in market prices on both the schedule and the cost for each new project?
5. Have you heard about the earned value method to follow up on projects and how they work?
6. What is the method used to monitor the progress of the project as a whole?
7. Are earned value properties used when using the planning, scheduling and tracking software packages
8. Do you think it is possible to use the earned value method in your company?

METHODOLOGY

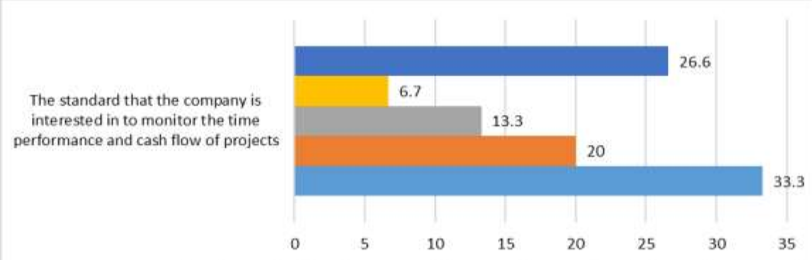
Designing a questionnaire to study the possibility of engineering companies to apply the earned value method in project management.

DISCUSS THE RESULTS

- The company's method of saving project data

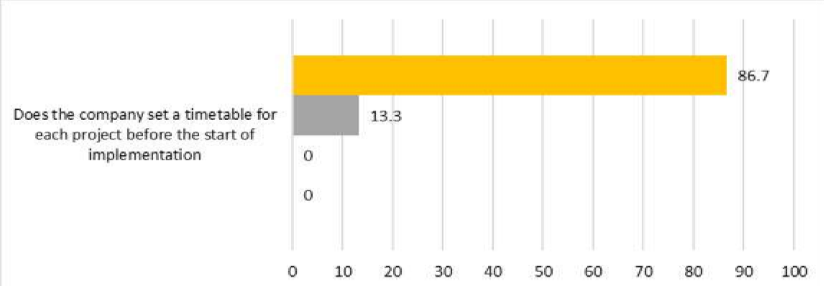


- The standard that the company is interested in to follow up on the timeperformance and cash flow of projects



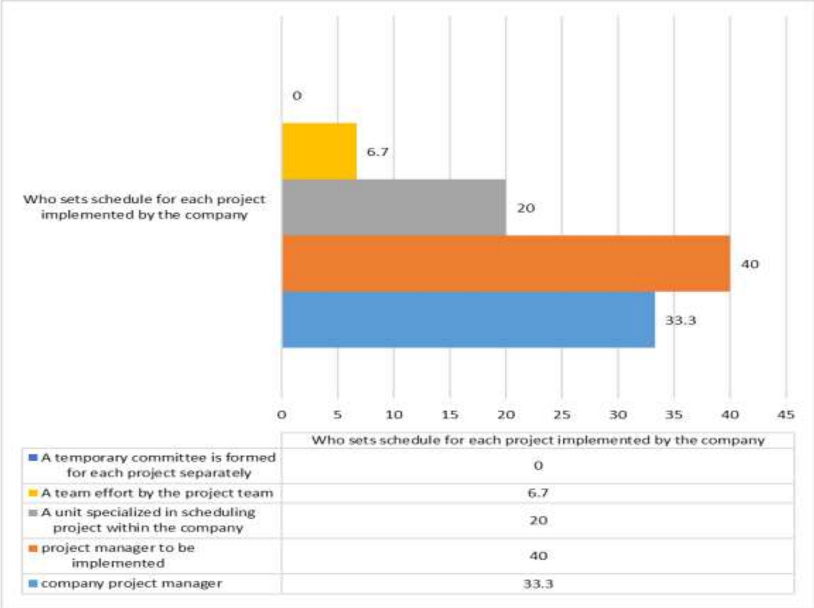
	The standard that the company is interested in to monitor the time performance and cash flow of projects
project size	26.6
project profits	6.7
type of contract	13.3
owner's wish	20
nature of the project	33.3

In terms of time follow- up you should know:1

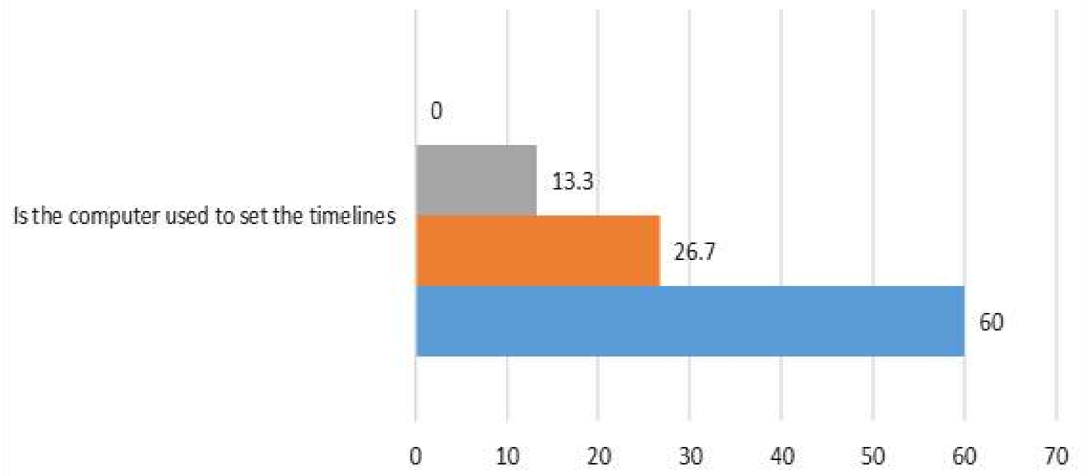


	Does the company set a timetable for each project before the start of implementation
yes always	86.7
yes most of time	13.3
yes but rarely	0
never set a timetable	0

2

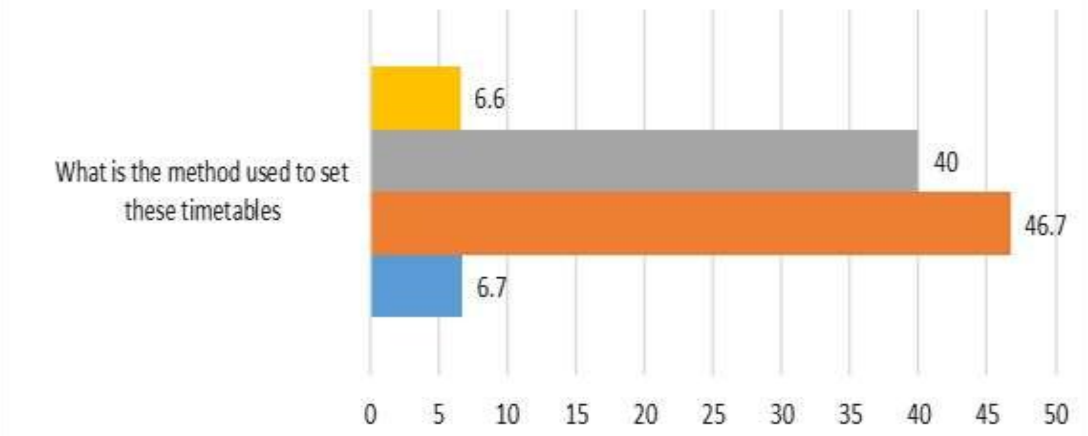

Who sets schedule for each project implemented by the company
0
6.7
20
40
33.3
0 5 10 15 20 25 30 35 40 45
Who sets schedule for each project implemented by the company
A temporary committee is formed for each project separately 0
A team effort by the project team 6.7
A unit specialized in scheduling project within the company 20
project manager to be implemented 40
company project manager 33.3

3



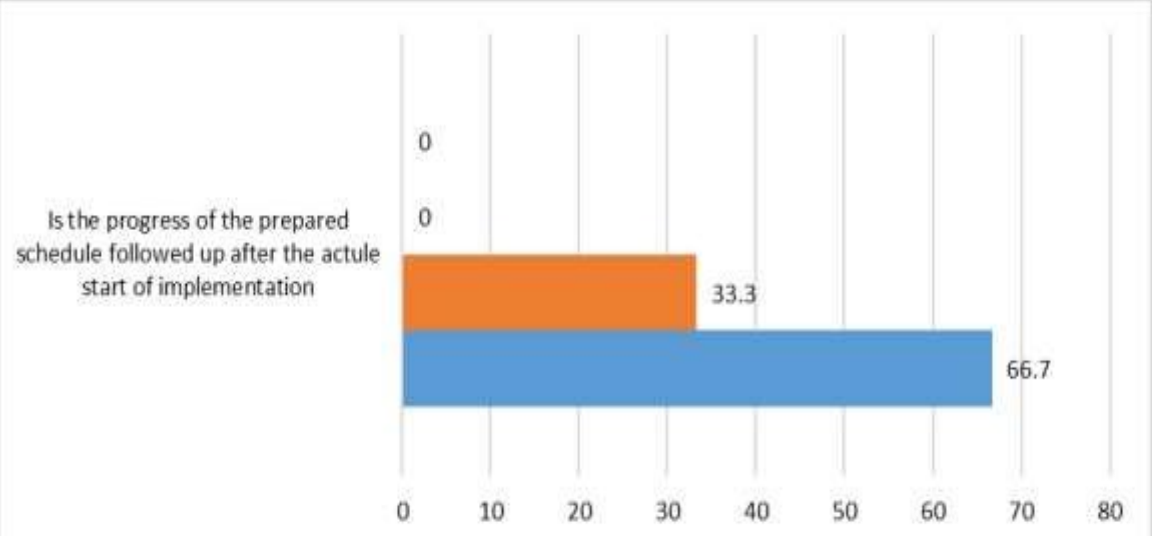
	Is the computer used to set the timelines
never use a computer	0
yes but rarely	13.3
yes most of the time	26.7
yes always	60

4



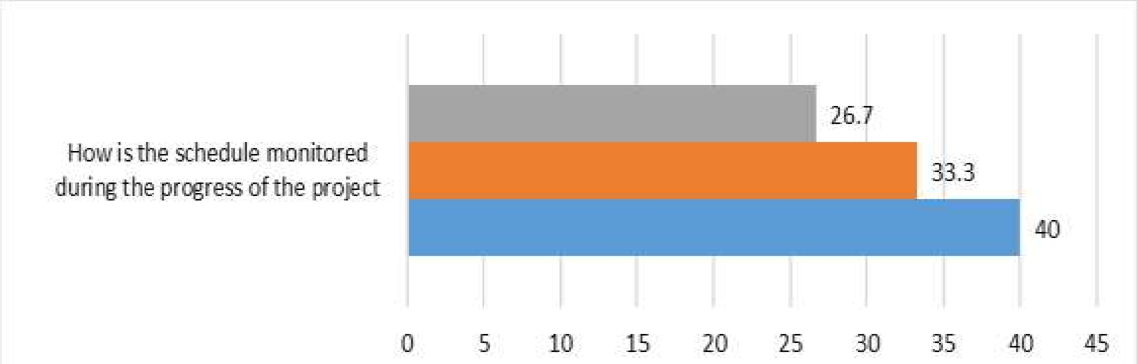
	What is the method used to set these timetables
There is no representation of the timetable	6.6
Complete excelspreasheets for all activities	40
Detailed graph that includes all activities and minute details	46.7
Diagram showing only the main activities	6.7

5



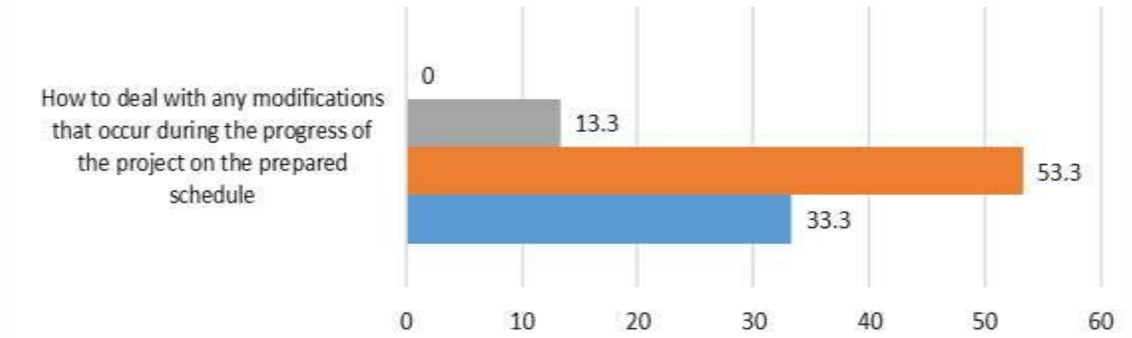
	Is the progress of the prepared schedule followed up after the actule start of implementation
never follows the schedule	0
yes but rarely	0
yes most of the time	33.3
yes always	66.7

6



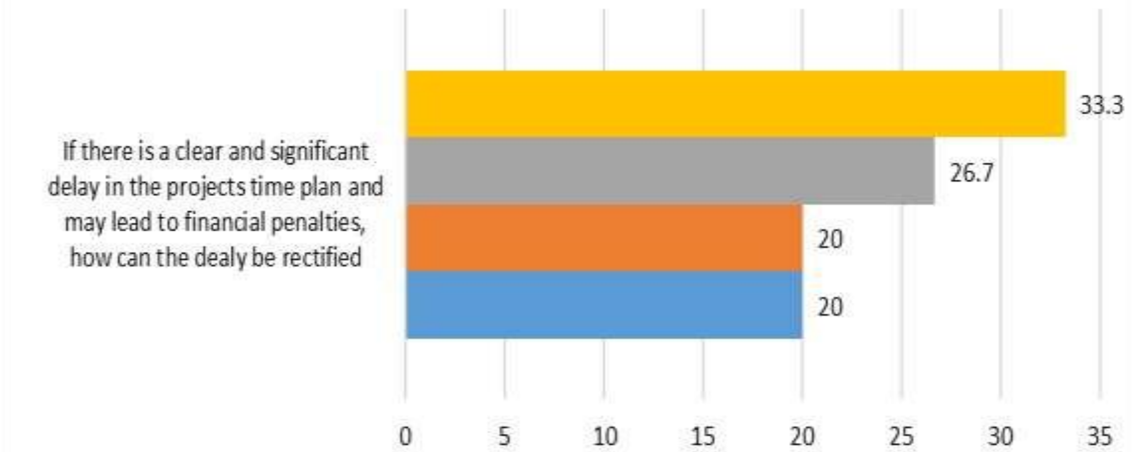
	How is the schedule monitored during the progress of the project
by measuring the number of production units that have been completed in the activity with the estimated time	26.7
by calculating the percentage of completion in the activity in terms of time	33.3
By comparing the number of estimated days remaining to complete the activitywith the actual remaining days	40

7



	How to deal with any modifications that occur during the progress of the project on the prepared schedule
no modification is made to the schedule	0
a new schedule is set	13.3
an attempt is made to rectify the change so that it does not affect the prepared schedule	53.3
the amendment depends and the schedule occurs accordingly	33.3

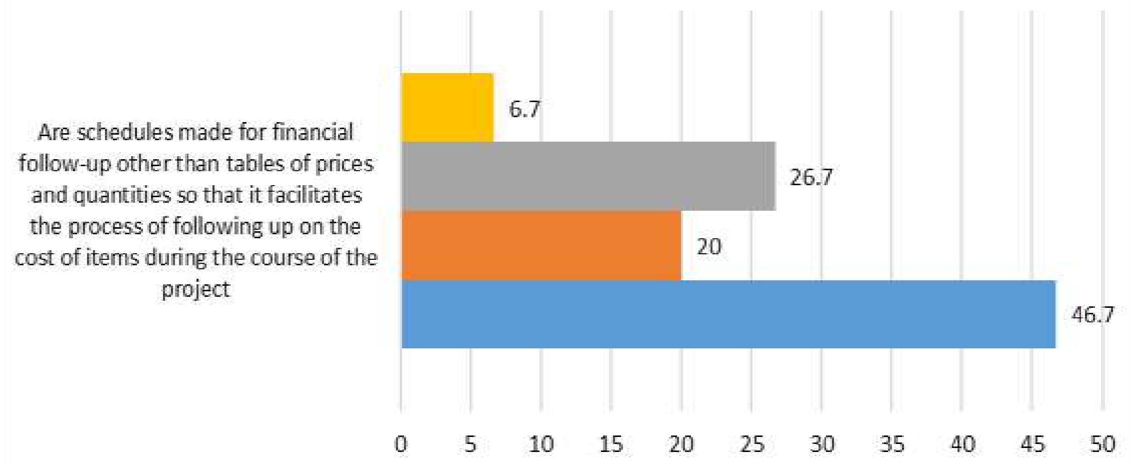
8



	If there is a clear and significant delay in the projects time plan and may lead to financial penalties, how can the dealy be rectified
eviewing the owner (consultant) regarding the extension of the time period	33.3
reviewing the times of critical activities(such as placing some of them in parallel)	26.7
stressing critical activities	20
Re-examinationof the time plan for the project as a whole	20

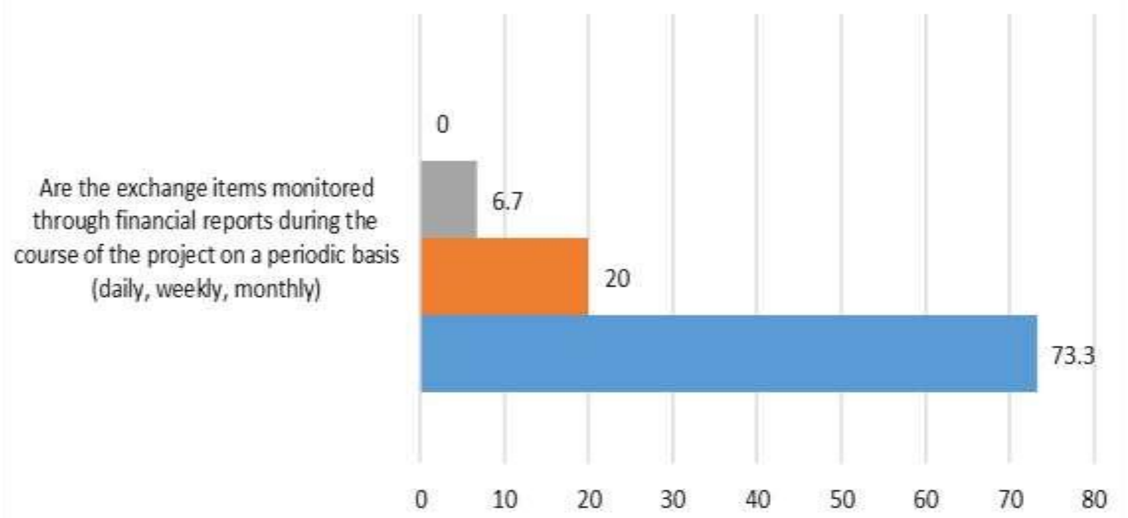
- **In terms of financial follow-up, you must know**

1



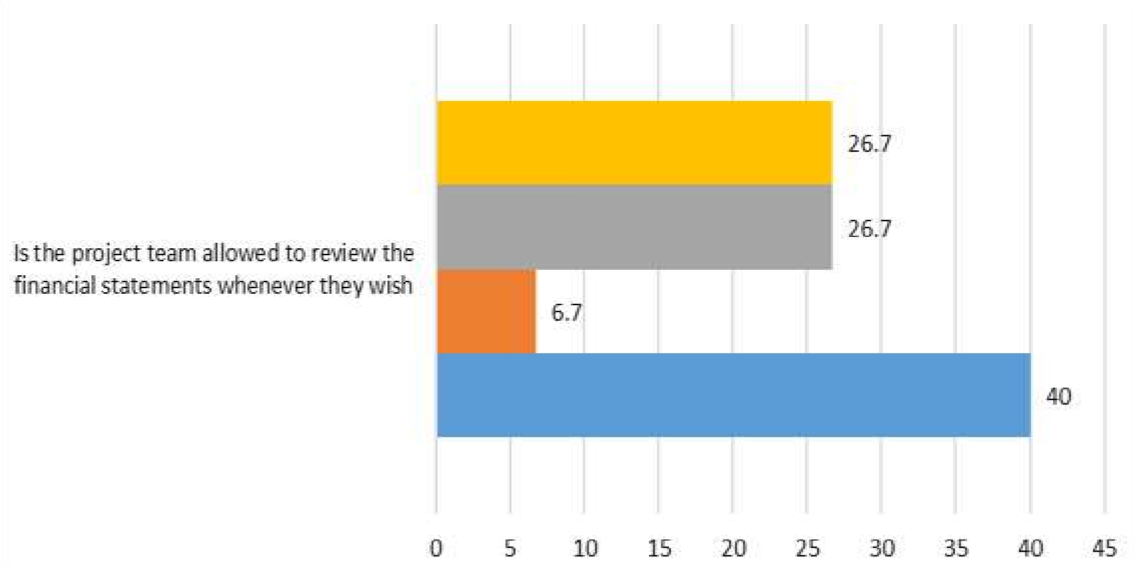
	Are schedules made for financial follow-up other than tables of prices and quantities so that it facilitates the process of following up on the cost of items during the course of the project
other schedules are never made	6.7
yes but rarely	26.7
yes, in most of the two brothers	20
yes always	46.7

2



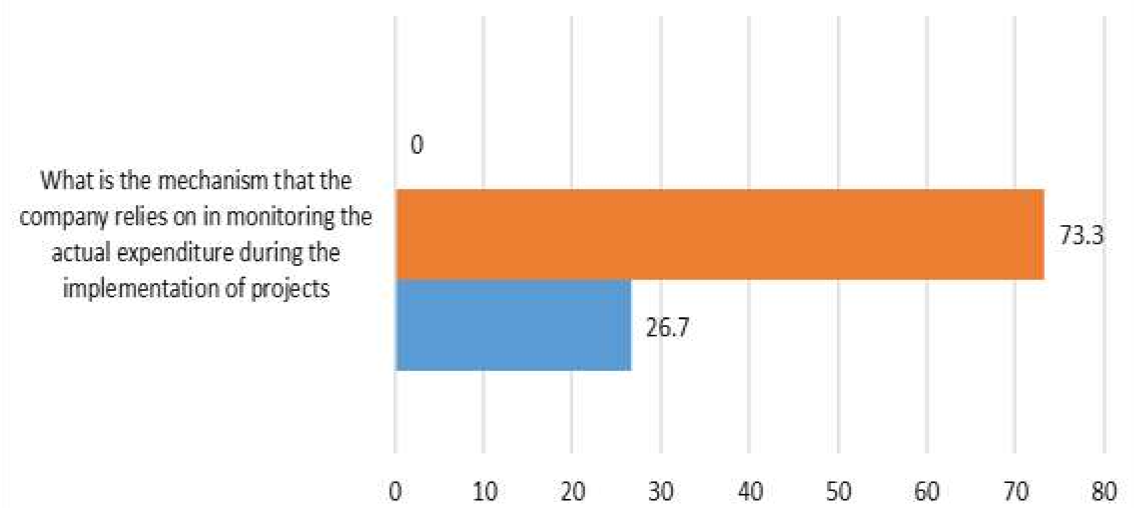
	Are the exchange items monitored through financial reports during the course of the project on a periodic basis (daily, weekly, monthly)
no reports are ever made	0
yes but rarely	6.7
yes most of the time	20
yes always	73.3

3



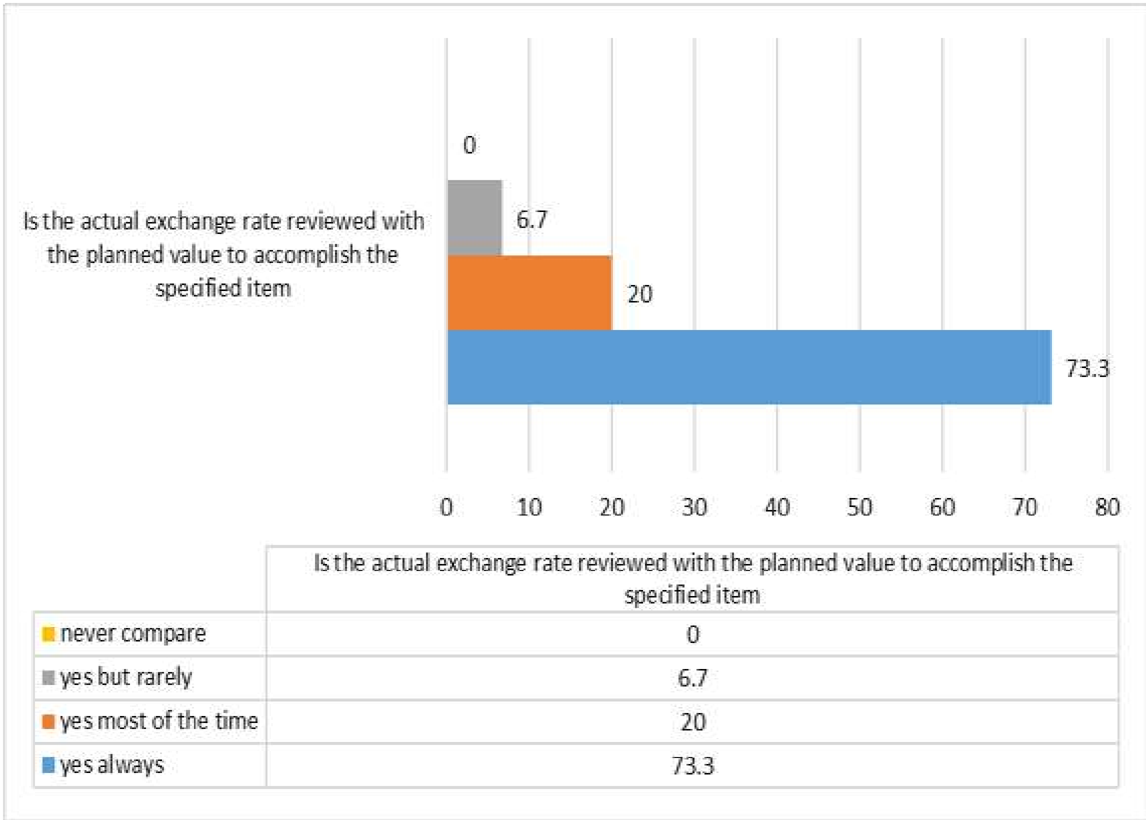
	Is the project team allowed to review the financial statements whenever they wish
never allowed	26.7
yes but rarely	26.7
yes most of the time	6.7
yes always	40

4

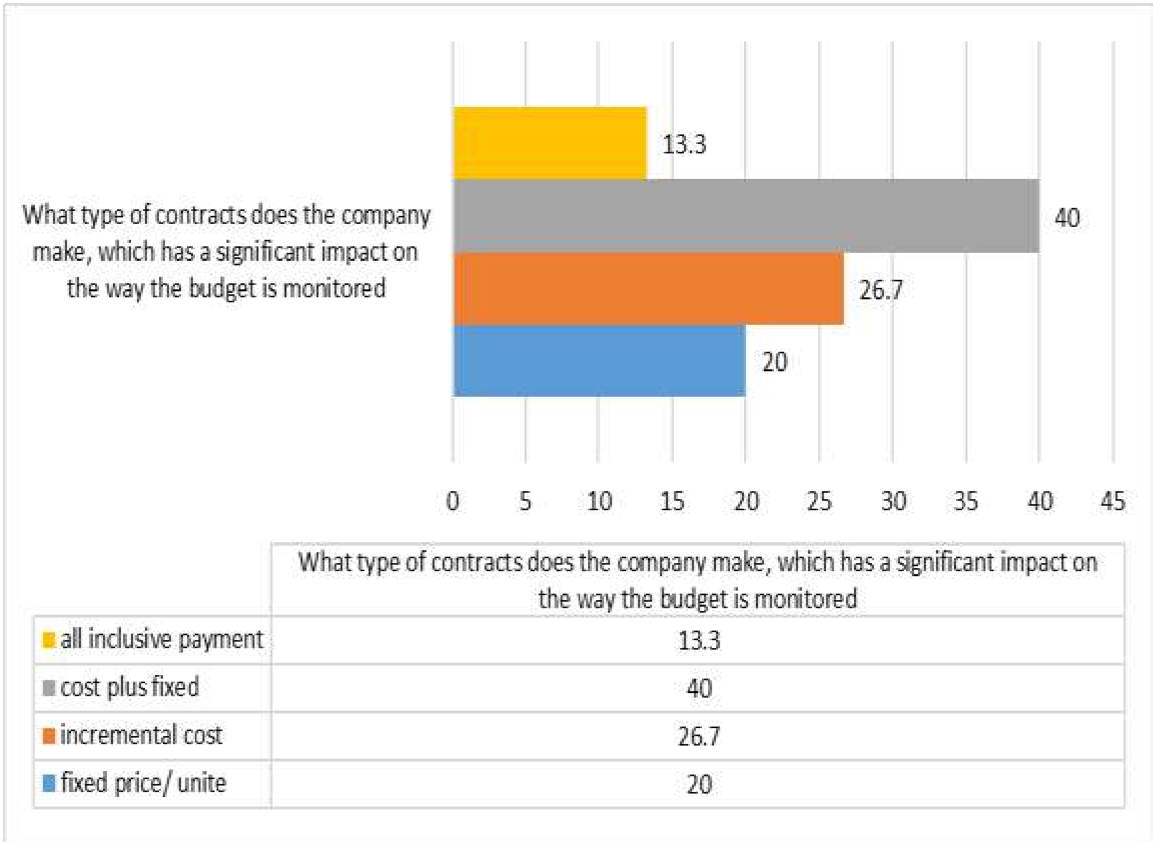


	What is the mechanism that the company relies on in monitoring the actual expenditure during the implementation of projects
total payments at project end	0
payments (the work done for each stage)	73.3
periodic reports (daily, weekly or monthly)	26.7

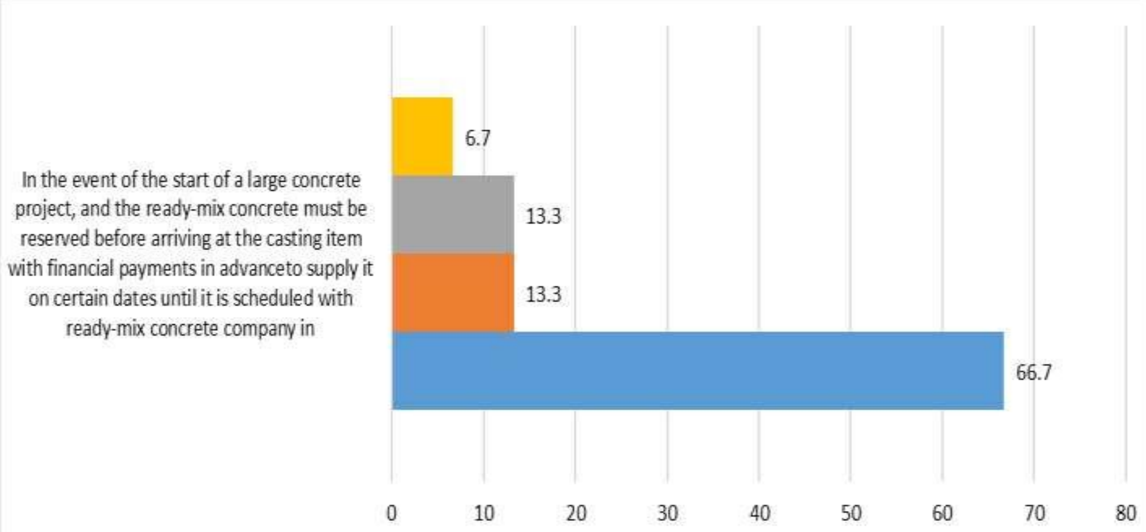
5


Is the actual exchange rate reviewed with the planned value to accomplish the specified item
0
6.7
20
73.3
0 10 20 30 40 50 60 70 80
Is the actual exchange rate reviewed with the planned value to accomplish the specified item
never compare 0
yes but rarely 6.7
yes most of the time 20
yes always 73.3

6

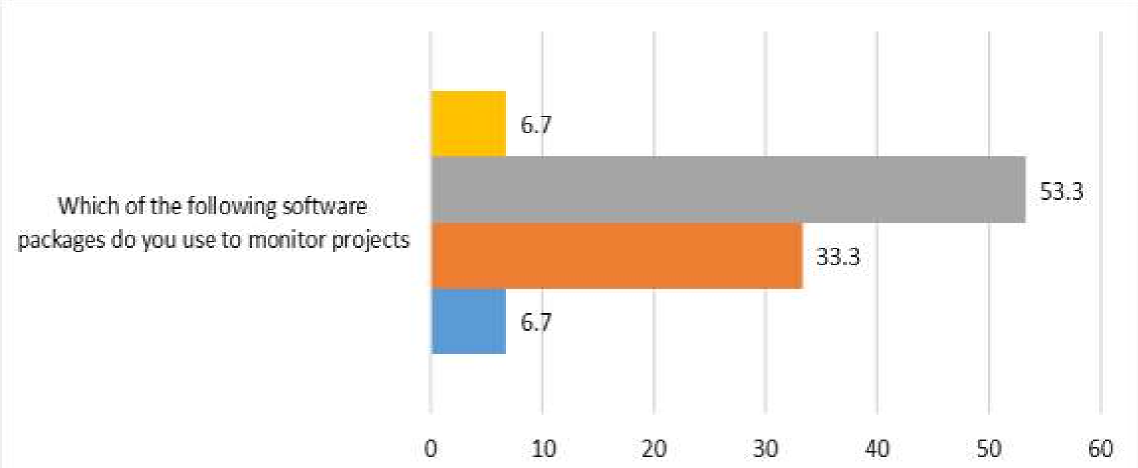

What type of contracts does the company make, which has a significant impact on the way the budget is monitored
13.3
40
26.7
20
0 5 10 15 20 25 30 35 40 45
What type of contracts does the company make, which has a significant impact on the way the budget is monitored
all inclusive payment 13.3
cost plus fixed 40
incremental cost 26.7
fixed price/ unite 20

7



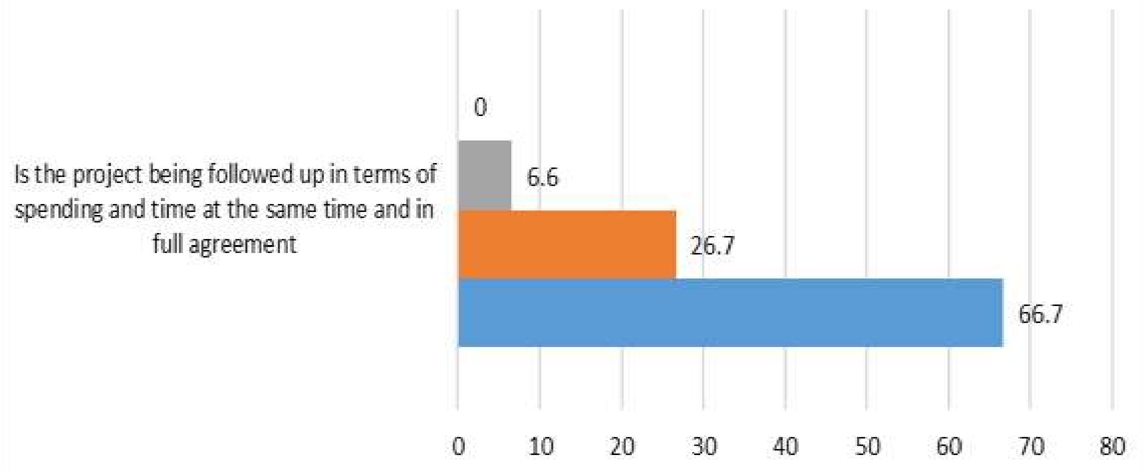
	In the event of the start of a large concrete project, and the ready-mix concrete must be reserved before arriving at the casting item with financial payments in advanceto supply it on certain dates until it is scheduled with ready-mix concrete company in
no upfront payments for the purpose of booking but agree on specified period and dose not affect buget before supply	6.7
it is deducted from the budget and not included in the tables follow-up	13.3
they are listed for proportions for each an item in which you will use it yes	13.3
it is included in the list direct payments	66.7

- **In terms of monitoring the work of the project must know:1**



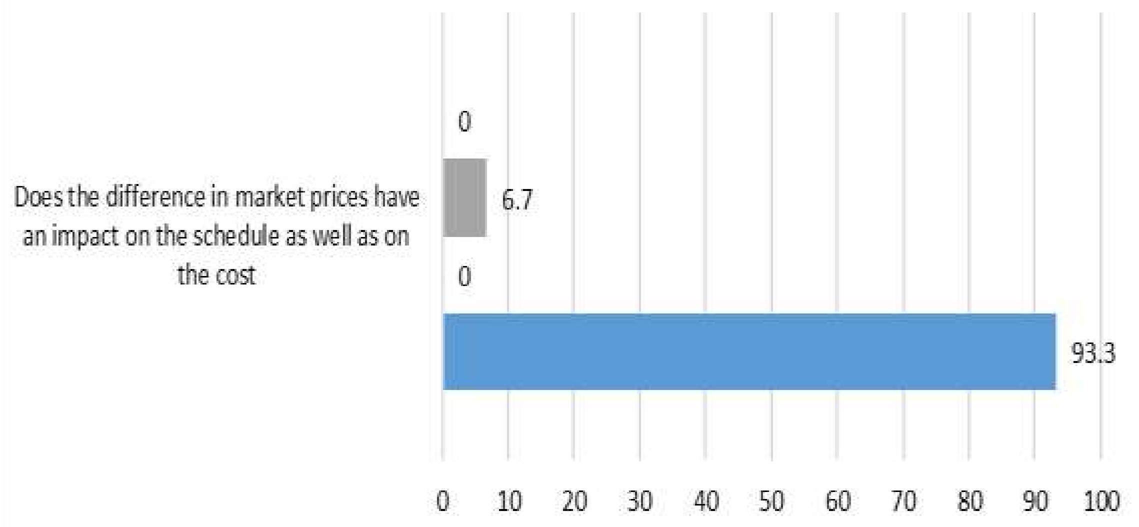
	Which of the following software packages do you use to monitor projects
do not use any of them	6.7
microsoft Excel	53.3
primevera	33.3
microsoft management(B/Msproject)	6.7

2



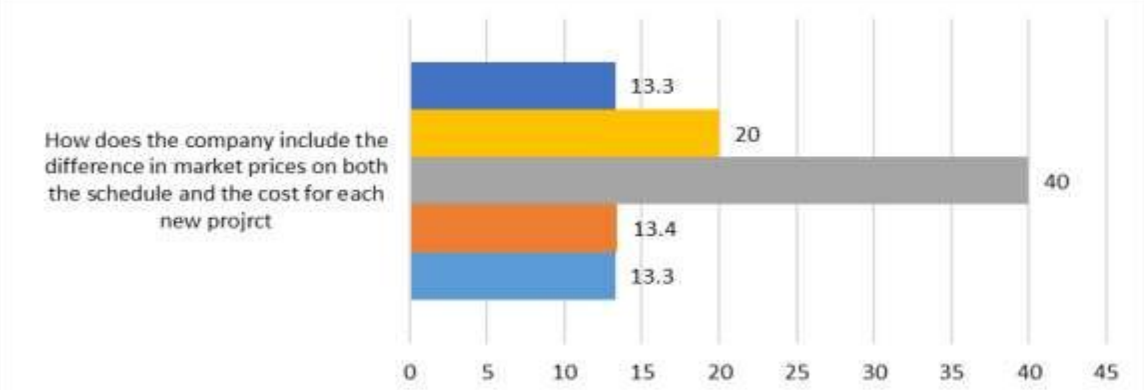
	Is the project being followed up in terms of spending and time at the same time and in full agreement
never follow up	0
yes but rarely	6.6
yes most of the time	26.7
yes always	66.7

3



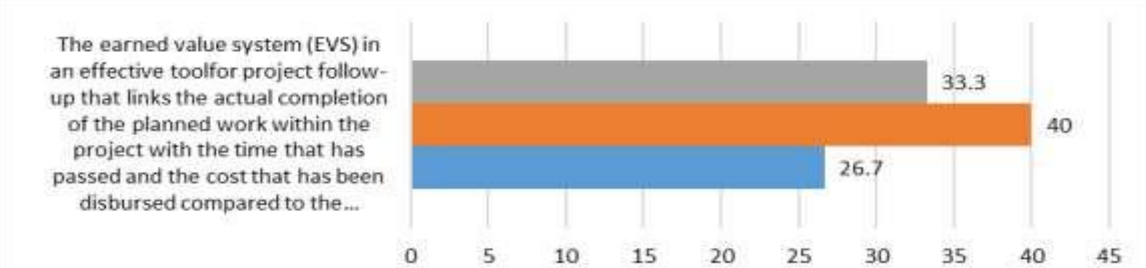
	Does the difference in market prices have an impact on the schedule as well as on the cost
It has no direct effect	0
seldom affect	6.7
Its effect is simple	0
Its effect is great	93.3

4



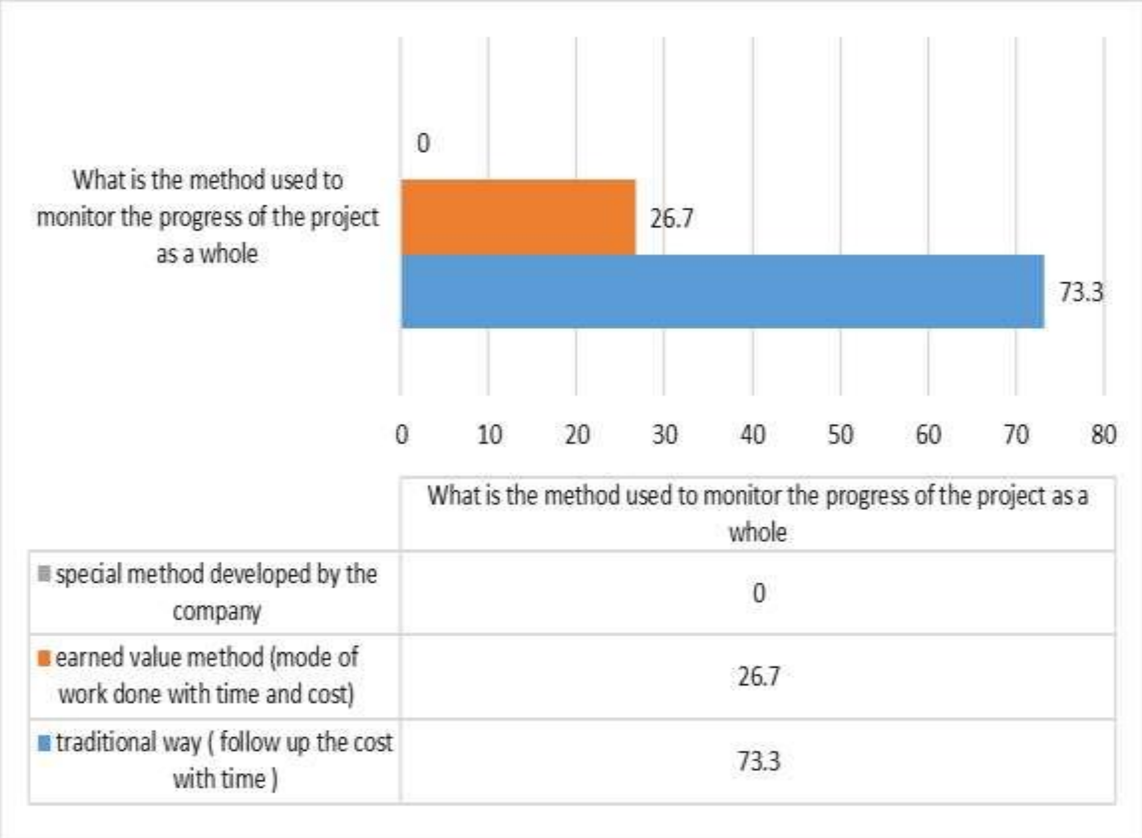
	How does the company include the difference in market prices on both the schedule and the cost for each new projrct
paying attention to items with high specifications with temporal and financial risk and extend of the assistance available from the owner to solve problems	13.3
by studying the economic environment and its impact on the project prices, taking into account the time period of the project	20
using a sound administrative method that ensures the distributionof risks to all parties involved in the project	40
by conducting an economic evaluation of the project to controlthe offer price and delivery time	13.4
knowing the impact of the contract in terms of conditions, policies and implementation period on the cost of the project	13.3

5

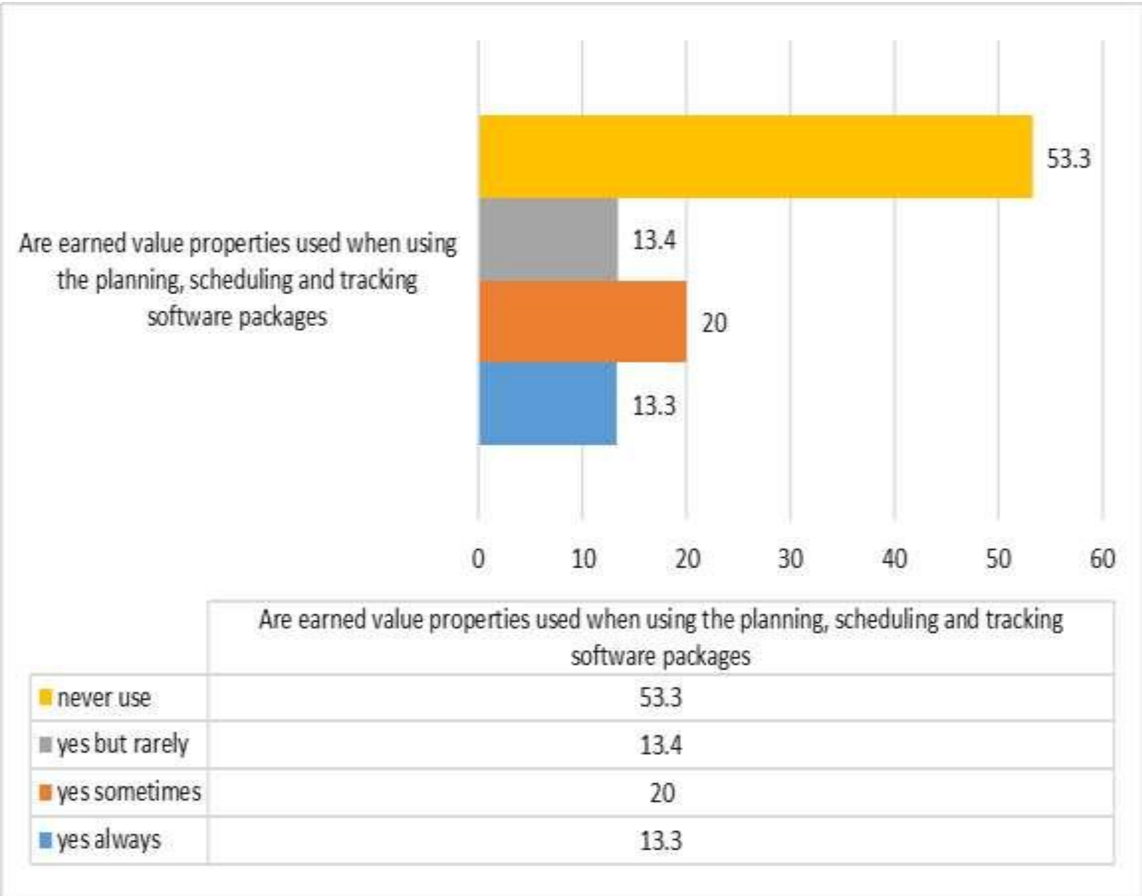


	The earned value system (EVS) in an effective toolfor project follow-up that links the actual completion of the planned work within the project with the time that has passed and the cost that has been disbursed compared to the project's time and financial
No, I have not heard of it or about it how it works	33.3
yes I heard about it but I have no idea about the mechansim her job	40
yes, I heard about it and about a mechanism her job	26.7

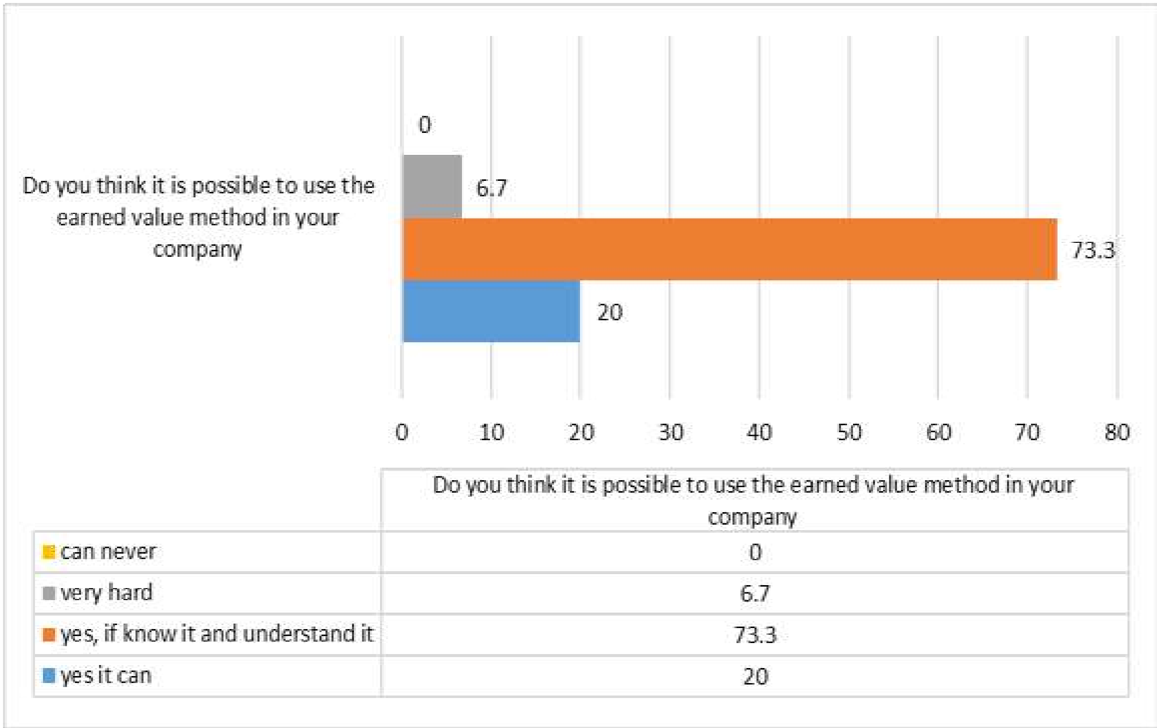
6


What is the method used to monitor the progress of the project as a whole
0
26.7
73.3
0 10 20 30 40 50 60 70 80
What is the method used to monitor the progress of the project as a whole
special method developed by the company 0
earned value method (mode of work done with time and cost) 26.7
traditional way (follow up the cost with time) 73.3

7


Are earned value properties used when using the planning, scheduling and tracking software packages
53.3
13.4
20
13.3
0 10 20 30 40 50 60
Are earned value properties used when using the planning, scheduling and tracking software packages
never use 53.3
yes but rarely 13.4
yes sometimes 20
yes always 13.3

8



CONCLUSION AND RECOMMENDATIONS

Follow-up and control constitute a large part of the project management tasks, and whenever there is good follow-up, the project manager will be able to overcome many of the problems that occur to the project duringits implementation.

The earned value method takes special importance in companies, because this system allows the management to follow up on the main elements of the project, which are time, cost and scope of work, which makes the incoming reports mainly express what is done in the project with future expectations, the extent of commitment to the plan, existing deviations, and corrective decisions necessary for the success of the project.

- Project managers should take advantage of the use of (EVM) byproviding data on costs and time schedules, linking the elements of budget estimates to the stages specified in the contract, as well as determining the extent of progress in the implementation of works.
- As well as the performance auditors to benefit in evaluating the efficiency and effectiveness of performance by linking the estimated costs of the project to the performance tables and the possibility of predicting future costs and thus the performance rates.

Finally, the commitment to apply the acquired value management approach in measuring the achievement of projects has become a necessity, especially in large projects, in order to judge their effectiveness and avoid waste and waste of time or financial credits inthe future, and benefit from the projects at the time specified for them.

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