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Project Cost Management: Does Information Technology Professionals Overlook Cost In Completing Project Within Budget?

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Abstract: ***Cost management within an information technology project is probably one of the most challenging tasks an organization will encounter. Estimating the various costs that go into an Information Technology project is extremely difficult to do from the start. It is imperative for a project manager to take well care of cost management to achieve success and ensure that the project runs smoothly to completion. Thus, the paper will provide insight on the: (1) why Information Technology professionals may overlook cost management, (2) the basic principles of cost management, (3) cost estimates and techniques. Project Management can be defined as a way of developing structure in a complex project where the independent variables of time, cost, resources and human behavior come together. Project managers must coordinate all of the knowledge areas, variables, throughout a project's lifecycle and one such area is cost management. Project cost management includes the processes required to ensure that a project team completes a project within an approved budget. Information technology projects have a poor track record in meeting budget goals. Cost management within an information technology project is one of the most challenging tasks an organization will encounter. The importance of project cost management is to keep track or record for meeting budget goals to avoid a problem such as cost overruns.***

Keywords: Project Cost Management;

I. INTRODUCTION

One of the biggest reasons why Information Technology (I.T) professionals have trouble with cost management is because many I.T projects have very vague or undefined requirements initially. For example, almost every software project is unique, so there is no clear path on which to formulate project costs. This initial lack of detail often results in underestimated development costs, which are quickly surpassed when multiple issues arise due to various factors. Not conducting a detailed requirements analysis almost always produces projects going over budget, because I.T projects are rarely as simple as initially thought (Kathikeyan, 2016). When IT professionals underestimate costs, it most certainly will lead to cost overrun. There are high possibilities that project will not run smoothly causing loss incurred due to I.T professionals do not understand and take the importance of project cost management seriously. It is very beneficial and reasonable to recognize whole Project Cost Management and its processes. There are four project cost management processes as shown in Figure 1.

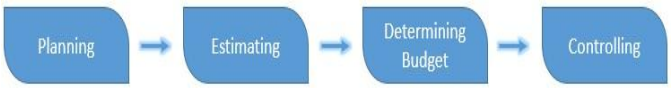

Figure 1a: Project cost management processes

A. PLANNING COST MANAGEMENT:

Plan Cost Management is the process that establishes the policies, procedures, and documentation for planning, managing, expending and controlling project costs. The key benefit of this method is that it provides guidance and direction on how the project costs will be maintained throughout the project. Next figure 1b shows the requirements,

regarding inputs, techniques to use and output of proper planning cost management. Adequate development of policies, procedures, and documentation for planning, managing and controlling project costs depends on inputs such as project charter and management plan, and organizational process assets consideration as well. Also, it is recommended to resort to specific tools and techniques to develop a realistic and useful strategy.

Figure 1.b: Requirements of inputs – Output Techniques of Planning cost Management

Project managers must make sure the projects are well defined, have accurate time and cost estimates. Careful planning will identify each of the costs within the project and will in later stages help to have realistic estimations and satisfying results. Next Figure 1c, data flow diagram illustrates the importance of inputs involved in developing the plan cost management which later on serves as s good basis for cost estimates and budget determination. Establishing good foundation will also help easier and more efficient monitoring and control of the costs.

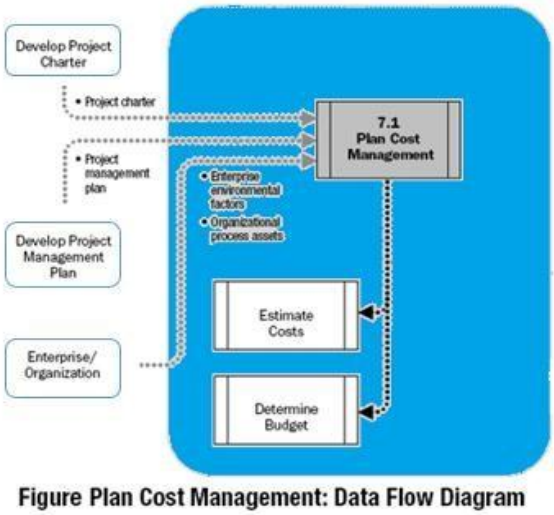

Figure Plan Cost Management: Data Flow Diagram

Figure 1.c: Data flow Diagram

Project manager develops an approximation of the costs of the resources needed to complete a project during a process of *cost estimation*. Estimates can be prepared when more information becomes available and will eventually result in a detailed unit cost estimate with probably high accuracy. More on cost estimates types and tools and techniques will be explained in the next part of the paper.

Determining budget is the process of allocating the overall cost estimate to individual work items to establish a baseline for measuring performance. The WBS is a required input to the cost budgeting process since it defines the work items. The main outputs of the cost budgeting process are a cost performance baseline, which is a time-phased budget that project managers use to measure and monitor cost performance, project funding requirements, and project document updates as demonstrated in Figure 1.d Input-Output Tools and Techniques.

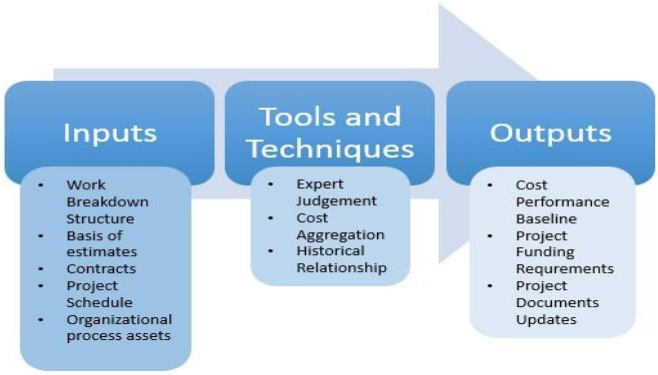

Figure 1.d: Input-Output Tools and Techniques

You would need lots of information to start putting together your overall project budget. The tools and techniques for the Determining Budget process aren't rocketed science. In fact, the whole process is really about adding up your estimates, making sure nothing is overlooked and then presenting the total as a summary. Cost budgeting, as well as requested changes or clarifications, may result in updates to the cost management plan, a subsidiary part of the project management plan. Cost budgeting also provides information for project funding requirements. An important goal is to produce a cost baseline. The cost performance baseline is an aggregation of all budgets approved by period, and this process allows tracking and controlling the overall cost performance of the project.

Controlling cost is concerned with taking effective corrective action to the project budget so that a company will not face cost overrun. Project cost control includes:

- ✓ Monitoring cost performance
- ✓ Ensuring that only appropriate project changes are involved in a revised cost baseline
- ✓ Informing project stakeholders of authorized changes to the project that will affect costs

All those processes above of the project cost management are fundamental to project managers to recognize them, understand and appropriately utilize not to overlook anything, prevent projects overrun cost and plans from complete failures. The aforementioned unique nature of IT projects also includes a heavy reliance on new technologies and full business process analysis. Any use of modern technology has an associated risk, which often leads to complex problems or even abandonment of the technology itself. Both of these situations inflate project costs, and can quickly turn an on budget project into a costly undertaking. This fact is well understood by many IT professionals, which is yet another

reason why they don't put a whole lot of faith in project cost management.

Moreover, it is inaccurate as it is hard to put a figure on something that has not been developed. With the poor planning of initial requirements, combined with an unforeseen technology update such as the new release of software update during IT professionals are in the process of developing IT project may cause IT, professionals, to suffer cost incurred. A great example of how not placing emphasis on project cost management can quickly derail an I.T project is the work involved in creating an app that is independent of the operating system (i.e., Android, OS X, Windows) is mostly underestimated (due to the cost estimates being passed off to accountants by the IT staff). This mistake quickly results in development times that second project plan estimates. Also, Google launches a new Android OS during the software development phase of the project. This unanticipated technology change adds further complexity to the OS-independent requirement. The poor planning of fundamental elements, combined with an unforeseen technology update, has now resulted in software development labor inputs that are triple initial estimates, placing project cost 50% above budget. This example demonstrates how overlooking project cost management can easily spin I.T projects out of control.

Also, many I.T professionals think preparing cost estimation is a job for accountants and finance, but it is a crucial skill that project managers need to acquire, which includes understanding the importance of primary accounting and finance principles. These concepts include net present value analysis, return on investment, and payback analysis. Not understanding these tenets typically lead to projects never finishing or having cost overruns because of cost management problems. For instance, a project manager did not plan to have a reserve for replacing new hardware for a department. The budget includes the amount quoted to purchase the equipment by the supplier. However, by the time the project got started, the company went out of business. The project manager found another supplier, but the hardware will be replaced at a much higher cost. Because there wasn't enough money set aside in the budget for this unknown, the project had to be pushed off until the department could receive more funding. If the original budget included a management reserve, the project delay could have been avoided.

II. THE BASIC PRINCIPLES OF COST MANAGEMENT

Cost management involves the processes necessary to ensure a project team completes a project within an approved budget. Cost management principles help communicate to upper management the return on investment, net value analysis, and other financial aspects of the project to garner support and understanding of what is involved for the organization. I.T Professionals to better understand the basic principles of cost management need to understand the terms used in a commercial section or the language of the accountants. Therefore metrics of managing costs includes as follows in diagram 2.a:

Figure 2.a: Metrics of Managing Costs

Profits are revenues minus expenditures. A company can increase revenues, decrease expenses, or try to do both. *Profit margin* is the ratio of revenues to profits. If revenues of $100 generate $2 in benefits, there is a 2 percent profit margin.

Life cycle costing allows you to see a big-picture view of the cost of a project throughout its lifecycle. This helps you develop an accurate projection of a project s financial costs and benefits. Life cycle costing considers the total cost of ownership, or development plus support costs, for a project.

Cash flow analysis is a method for determining the estimated annual costs and benefits for a project and the resulting yearly cash flow. Project managers must conduct cash flow analysis to determine net present value.

Tangible and intangible for determining how definable the estimated costs and benefits are for a project. *Tangible costs or benefits* are those costs or benefits that an organization can easily measure in dollars. Conversely, *intangible costs or benefits* are costs or benefits that are difficult to measure in monetary terms.

Direct costs are costs that can be directly related to producing the products and services of the project. You can attribute direct costs directly to a specific project. *Indirect costs* are costs that are not directly related to the products or services of the project but are indirectly related to performing the project. Indirect costs are allocated to projects, and project managers have very little control over them. *Sunk cost* is money that has been spent in the past. Consider it gone, like a sunken ship that can never be returned.

Curve theory states that when many items are produced repetitively, the unit cost of those items decreases in a regular pattern as more units are provided. The cost of the first handheld device or unit would be much higher than the value of the thousandth unit.

Learning curve theory should help estimate costs on projects involving the production of large quantities of items. Figure 2.b demonstrates the curve theory.

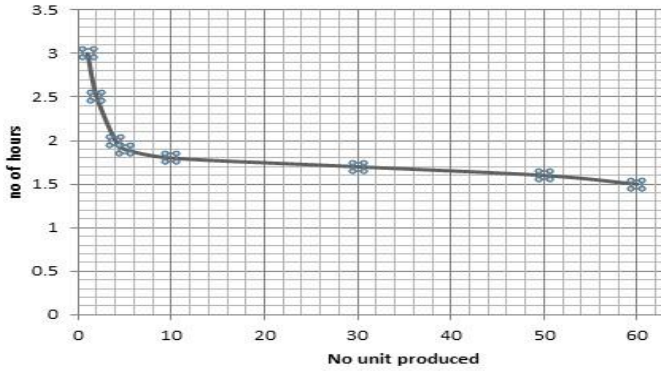

Figure 2.b

Reserves are dollars included in a cost estimate to mitigate cost risk by allowing for future situations that are difficult to predict. *Contingency reserves* allow for future conditions that may be partially planned for (sometimes called known unknowns) and are included in the project cost baseline. *Management reserves* allow for future situations that are unpredictable (sometimes called unknown unknowns) (Kathy Schwalbe, 2011, p. 258-260)

III. COST ESTIMATE AND TECHNIQUES

Planning cost management is essential for project managers for any project to take cost estimation seriously as they need to complete their projects within the budget constraints. The three types of cost estimates are:

A. ROUGH ORDER OF MAGNITUDE (ROM)

A rough order of magnitude (ROM) cost estimate is completed in the very early project, often three or more years before project completion, or even before a project officially starts to help the project managers make project selection decision. Rough order of magnitude (ROM) launches with not many details and information. In general, when a company or business wants a ROM estimate completed they are looking more for a ballpark estimate or a board gauge.

According to a guide from the project management body of knowledge (PMBOK® Guide), a ROM estimate typically varies from −25% to +75%. For technology projects during business case analysis, ROM estimates often range from -50% to + 50% of actual costs. Depending on how the ROM was developed, the ballpark number may be enough to decide that the project is feasible and to proceed with that bid proposal or not.

A project manager plans on a project of creating a new computer system. The rough order of magnitude was estimated at the cost of $200,000. Since the average accuracy to the actual costs could be 50% below or 50% above the estimation, its lowest variance may be $100,000, and its highest difference might be $300,000, which is the worst case scenario. As mentioned the earlier rough order of magnitude will be in the early project life cycle, and this will thus help the project manager to realize and reduce the uncertainty of cost outcomes when project details have been identified.

B. BUDGETARY ESTIMATE

The budgetary estimate is a method of cost estimation used when funds are appropriately allocated within a periodic time basis into an organization's budget usually made one to two years before project completion. The accuracy of budgetary estimates typically varies between -10% to +25%. The budgetary estimate is not accurate enough to provide a basis for a firm's commitment. It represents only the budget maker's understanding of the scope and expenses of what needs to be done.

The example is given a project management plan on upgrading their computer system in the organization. Their budget estimate cost at $100,000 in total for the duration of 4 months from May to August. Supposedly, the project manager estimated $25,000 would be used monthly. Depending on the work completed during the months the cost may be slightly higher or lower.

Figure 3.a is a chart which illustrates the distribution of cost among different activities involved in the project during the flow of forecasted four-month time. In earlier stages the project management plan to use most of the cost and expenses on the idea generation, spending initially $10,800 in a first month period. Concept development activity is predicted to total up to $38,100 and present the most significant fraction of all other functions. Testing and marketing would involve more expenses at the later stages, but the first two will reduce, striving to make still the budgetary estimate entirely accurate.

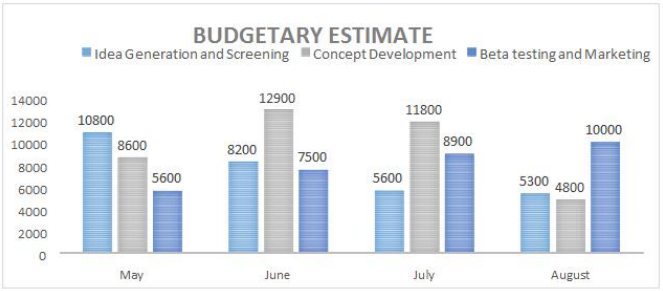

Figure 3.a

C. DEFINITIVE ESTIMATE

Definitive estimates are used for making many purchasing decisions for which accurate estimates are required and for estimating final project costs. Definitive estimates are made one year or less before project completion. An independent assessment should be the most accurate of the three types of evaluations. The accuracy of this kind of evaluation usually is -5% to +10%, meaning the actual costs could be 5% less or 10% more than the final evaluation. Thus preparing the cost estimates for the project using a final assessment requires a significant amount of research to get the variation down this low. A definitive estimate should be prepared from entirely designed plans with different scenarios that can be projected out. Any costs associated with the project whether it is direct costs or indirect, it should be itemized. A contingency should also be incorporated into a definitive estimate which can cover a project manager if the market conditions change. To help reduce the impact of this situation, indirect costs should also be budgeted for a project. As definitive estimate is based on

detailed information from each work package within the work breakdown structure or assessments completed at the every activity level, and it is quite timely, that makes it a definitive estimate the most accurate of all types of estimates.

IV. TECHNIQUES FOR CREATING A COST ESTIMATE

Project cost management consists of at least four processes required to make sure that the project is accomplished within the bounds of an approved budget. One of these methods is known as Cost Estimation. Estimating costs means developing an approximation or anticipated cost for specified work scope of a program, project, or operation. Establishing a reasonable cost estimate is difficult, since project underestimation of resources and expenses is the usual reason for project failure, so project managers must take cost estimates seriously if they want to complete projects within budget constraints.

Fortunately, there are some tools and techniques accessible to aid in generating one. Frequently used tools and techniques include similar cost estimating, bottom-up estimating and parametric modeling. Reliable cost estimates are necessary for responsible management at every stage of the project. A primary purpose of cost estimations is a feasibility decision, funding arrangement and making a bid or contract. An accuracy of the estimate is depended on the details of input information.

A. ANALOGOUS, TOP-DOWN FORECAST

Analogous estimates also called top-down forecast, use the actual cost of a previous, similar project as the basis for estimating the value of the current project. This technique requires a good deal of expert judgment and is less costly than others are, but it is also less accurate. Analogous estimates are most reliable when the previous projects are similar in fact, not just in appearance. Even, the groups preparing cost estimates must have the needed expertise to determine whether certain parts of the project will be more or less expensive than analogous schemes (Kathy Schwalbe, 2011, p. 263)

Since this technique is based on analogy, similarities, and things in common, it is best to apply this tool when a project is similar to tasks and deliverables in the old plans. This technique, analogous estimating, will improve the time and cost estimates for your project, but before beginning any cost estimate, you must first gather as much information as possible about the project and look through a number of previously completed projects to find tasks and/or deliverables that are roughly similar to those in their new project. Analogous estimating doesn't provide a perfect solution, but it is accurate and based on data instead of wishes and hopes. It also has the potential to substantially increase the organization's project success as it will be shown in the following example. The educational session for the employees who will work on the new technology and processes the project produces. The event has already taken place before, and many details are already recognized. Still, new plans are not identical to the completed projects as there are more and new challenges.

a. IDENTIFICATION OF PREVIOUSLY COMPLETED PROJECTS

The project manager has obtained as much data as it was possible regarding previous projects. The organization had an excellent tracking of past projects and have established a database for estimating new projects. The team builds these archives of its project work and cost data for a long time, so it is more valuable and useful. This data gives project manager the best possible insight and is the basis for analogous estimating.

b. USE HISTORICAL DATA WITH ADJUSTMENTS

Past project required the involvement of all stuff at one department, so the project manager could consider the number of work hours used to create the educational class curriculum in a previous project. They might also look at the actual classroom time used in the last plan. Then the project manager would consider the differences in complexity, scale, scope, and focus on the old and new projects. These are the analogous deliverables they will use in their estimating process. Let's imagine, that workshop was organized for 30 representatives and required 50 hours of preparation and 16 hours delivery. This cost $12,600 including the trainers, brochures, and coordination. Furthermore, the Project manager should include team members and other stakeholders in examining the previous projects, since analogous estimates include historical data but also requires expert judgment. They will help develop factors for adjusting the work and cost data.

Previous cost				
Employees	Hours of preparation	Hours of delivery	Brochures/ Guidelines	Total cost

*Employees * ((Hours of preparation * 30 50 16 30 Cost) + (Hours of delivery * Cost)) + Brochures Cost*

Table 4: Historical Cost Data

First of all, managers and his team members realized there are more trainees this time. Instead of previously 30 employees, there are 40 of them now. This will require more trainers, more hours of preparation and delivery, and ultimately more brochures. Also, the project manager would ask the Human Resources trainers to compare the two training efforts, and they are told the new one is 10% more difficult and will take 20% more time than the old one.

c. DELIVERING COST ESTIMATION

It is recognized there are more employees to participate in the educational seminar on the use of the new technology and processes that lead to a need for more trainers, more hours of work and more materials. So if the cost of the project before was $12,600, taking in consideration adjustments mentioned above and more resources needed, it is roughly calculated that price would be around $24,400 this time as it can be seen in the table (4.a) provided below. This project requires more hours of preparation and delivery, more brochures, and guidelines and involves more employees.

Per Unit	$5	$10		$10	$12.600
Estimation Cost					
Employees	Hours of preparation	Hours of delivery		Brochures/Guidelines	Cost Estimates
40	70	25	40		Employees * ((Hours of preparation * Cost)+(Hours of delivery * Cost)) + Brochures Cost
Per Unit	$5	$10	$10		**$24.400**

Table 4.a: Cost Estimation

Analogous estimating is not perfect. However, it is much better than using pretend numbers that are attractive at the beginning of the project but disastrous at the end. It's inexpensive to implement analogous estimating, and it has the potential to substantially increase the organization's project success rate to above 60%, and you can quickly achieve it.

B. BOTTOM-UP ESTIMATES

Bottom-up estimates involve estimating individual work items or activities and summing them to get a project total. The size of the different work items and the experience of the estimators drive the accuracy of the estimates. It is sometimes referred to as activity-based costing and is also known as the "definitive technique". This is the most accurate technique of all the methods presented but can only be used when every detail about the project is available. Although it gives the most reliable and trustworthy result, the drawback is it is time-consuming and therefore expensive to develop. If a detailed WBS is possible for a project, the project manager could have each person responsible for a work package build his or her cost estimate for that work package or at least a view of the number of resources required. The total project work is broken down into the small work components. Each component cost is estimated, and then, finally, it is aggregated to determine the project's cost estimate.

A University introduction of e-student center, a platform where students using their credential may login and check for news, Examination Time Table, Results, etc. It is conceived as a simple and relatively necessary platform that may be upgraded later on more in advance to a platform for sharing course-related material such as lectures. As for now, we will remain on lower levels, simple software and cloud database, but still try to present quality but not very large work breakdown structure for the sake of cost estimation not as a detailed project plan, with duration and proposed cost estimation. As it is graphically presented in Figure 4. A University introduction of the e-student center platform where students are using their credential to log in and check for news, examination timetable, results, etc. It is conceived as a simple and relatively necessary platform that may be upgraded later to a platform for sharing course-related material such as lectures. As for now, at lower levels, simple software and cloud database.

Figure 4: Component of Cost Estimate

Figure 4. Presented each component cost estimated and aggregate to determine the project's cost estimate. Total estimated cost using bottom-up method would be $17,850. First of all, the plan requires some planning, that is done internally by the project manager and the management, externally with experts and furthermore the vendors selected for project development. This demands some costs as well, so project manager estimates spending one working day or 8 person-hours only for this specific project considerations and proposal with his team, at around $25 per hour for himself and the rest of the team, consisting of 3 people, at $12.5 per hour. Note that project manager and the team are already under contract and receive a salary, but specifically for on this project they extra income that is being part of cost estimate and budget as well. This brainstorming idea, consultations, and proposal in planning phase would cost exactly $500 a day.

The project management team will hold a meeting with the experts from the field of project, and while doing this, they are paid for their efforts as well as two expert judges have to be appropriately rewarded. For this two days constant attempt, the cost will be two thousand dollars, out of which five hundred dollars is a payment for each of two judges. The final stage of the planning process will be evaluation and selection of proposal adjusted to expert opinions and suggestions, and it will take one working daytime for the project manager and his team. Lastly, the planning stage and its components summed to the total estimation of $3000. Information technology-based project is outsourced to a company, vendor selected by management, specialized in creating such platforms. So the system design, development, delivery, and installation will be conducted by the vendor based on the requirements of the project manager stated in the project charter and management plan. System design and development will consume around 20 working days. Coding and development of Programme would take 20 days itself, while interface design and guidelines making off will take five days but the work will be done simultaneously with different teams deployed to the total duration should not be longer than 20 days. Cost estimated and agreed with the vendor for this work is not supposed to reach over $11.000.

Moreover, Delivery and Installation phase of the project is also planned to be carried out by the vendor. This step consists of items such as Delivery, Integration, Installation and Management Inspection and Consent. This activity should

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take only one working day, so the cost of vendor's technicians is estimated to 450 dollars. Since this operation requires the attendance of project management team this will contribute to additional 500 dollars, therefore in total, this phase cost is expected at $950. Once the system is installed, there has to be system testing comprising of: Unit testing, Management Testing and Approval and User testing. Duration of such undertaking is presumed to 1 day, and skilled personnel is providing it will most likely cost only $200. Since the management presence during testing phase is significant, and their approval of system functioning correctly will be requested this will require additional $500. System testing cost estimates equal to $700.

Also, once the system has been deployed it is beneficial to educate potential users how to consume it. This endeavor is conceptualized in two training sessions. One is behind closed doors and is only meant for the project manager and his team so that they will be first introduced and educated on proper use of such system. Later on, management can assist and help to other levels and users in using such platform. Still, it is planned to organize another seminar where developers of such platform will share their knowledge and explain the correct utilization of Programme to curious stuff and students at one of the University's facilities. Total estimation of cost for this phase of project accounts to one thousand dollars as it can be seen more in details in the table provided in Figure 4.

Finally, once the project may be closed-out, there is significant note that the newly developed system may experience some downtime or failures occurring, so management has to take precautions measures to make sure Programme runs smoothly. So project manager considered paying in a one-year advance subscription to the vendor for Support and Maintenance. This cost estimate is around $1200 and aggregates to the total cost estimates shown in Figure 4. The aggregation of individual forecasts for each work item in the Work Breakdown Structure (WBS) is presented in the next table comprising of Project phases and its work packages, durations (daily format) and cost estimates. Note that in our example there are no indirect or hidden costs included.

	Duration	Cost Estimation
1. Planning		
1.1 Top-level management considerations and proposals	1 day	$500
1.2 Expertise consultations	2 days	$2.000
1.3 Vendor selection	1 day	$500
2. System Design and Development		
2.1 Features and Interface prototyping	5 days	$3.000
2.2 Apply coding	20 days	$7.000
2.3 Provide guidelines material	5 days	$1.000
3. Delivery and Installation		
3.1 Delivery	1 day	$100
3.2 Integration	1 day	$150
3.3 Installation	1 day	$200
3.4 Management Inspection and Consent	1 day	$500
4. System testing		
4.1 Unit testing	1 day	$100
4.2 Management Testing and Approval	1 day	$500
4.3 User testing	1 day	$100
5. User training		
5.1 Management training	1day	$500
5.2 Students and Stuff training	$500	1days
6. Support and Maintenance		
6.1 Post Implementation Services	12 Months	$1.200
	Total Estimated Cost	$17.850

Table 2.a

This technique may be time-consuming but provides a more precise picture of cost estimation.

C. PARAMETRIC MODELING

Parametric modeling uses project characteristics (parameters) in a mathematical model to estimate project costs. Parametric models are most reliable when the historical information that was used to create the model is accurate, the parameters are readily quantifiable, and the model is flexible regarding the size of the project (Kathy Schwalbe, 2011, p. 264). Parametric estimating uses statistical modeling together with historical data of key cost drivers to calculate an estimate for different parameters such as cost and duration. For example, a parametric model might provide a view for a software development based on previously recognized prices. So if the price per line of code for a software development project, the level of expertise of the programmers, and the size and complexity of the data involved are known from before and accurate, then the parametric modeling may provide very reliable cost estimates.

Another way to conduct parametric modeling requires published rates. Let's say you need to estimate the cost, so you resort to publication and find that the cost of creating or developing something would be $50 per unit. You would select the appropriate rate and multiply it by the number of units you need to deliver your product. That would give you the estimated cost. Parametric estimating tends to be less satisfied with tasks that don't produce tangible outputs; it is less accurate when you try to develop parametric rates for functions with intangible outputs. Still, for our example, we will go back and relate it to the previous model of University e-students center project. Now University wants to expand their e-platform by just providing students with University-related news, schedules, exam time table and results to a more advanced platform. The new system is supposed to have course-related materials such as lecture notes, the option of taking quizzes and conduction of online tutorials using the parametric modeling. The project manager will define the specifications of each deliverable and then previous research data on key cost drivers and published information about how many hours of work are required for each unit of the deliverable as well as the cost.

Project manager similarly to analogous estimating, resorting to the parametric estimation would use historical data to compute cost estimates based on similar or same variables from related projects and applies them to the current project. In contrast to analogous estimating, parametric is a more accurate technique since it also uses the relationship between variables to calculate the cost or duration. Those links are recognized as Cost Estimating Relationships (CERs), and they will be a part of next table illustrating parametric modeling.

	Duration	Cost Estimation	CERs	Duration	Cost Estimation
1.0 PLANNING					
1.1 Top-level management considerations and proposals	8 hours	$500	x5	40 hours	$2,500

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1.2 Expertise consultations	16 hours	$2.000	x3	48 hours	$6,000
2.0 System Design and Development					
2.1 Features and Interface prototyping	40 hours	$3.000	120%	48 hours	$3,600
2.2 Apply coding	160 hours	$7.000	300%	480 hours	$21,000
2.3 Provide guidelines material	40 hours	$1.000	150%	60 hours	$1,500
3.0 DELIVERY AND INSTALLATION					
3.1 Delivery	8 hours	$100	100%	8 hours	$100
3.2 Installation	8 hours	$200	150%	12 hours	$300
3.3 Management Inspection and Consent	8 hours	$500	100%	8 hours	$500
4.0 SYSTEM TESTING					
4.1 Unit Testing	8 hours	$100	x2	16 hours	$200
4.2 Management Testing and Approval	8 hours	$500	X2	8 hours	$200
4.3 User Testing	8 hours	$500	X1	8 hours	$500
5.0 USER TRAINING					
5.1 Management Training	8 hours	$500	200%	16 hours	$1,000
5.2 Students and Staff Training	16 hours	$500	300%	48 hours	$1,500
6.0 SUPPORT AND MAINTENANCE					
6.1 Post implementation Services	12 months	$1.200	200%	2 months	$2,400
			Total Cost Estimate		**$41,300**

Table 3

Those above mentioned, Cost Estimating Relationships, are indicators that help previous data is adjusted and scaled appropriately by scope, time and cost requirements. So as we can see in table overhead, these relationships are either presented as multipliers or percentages and serve as a function of one or more technical parameters influencing the new cost estimate. In our case those settings may be the scope and complexity of the work to be done, time duration demanded tasks to be completed or just cost changes to some specific goods or services. So, starting from the planning phase, we can see two similar work packages regarding the last project. Reason for that is that vendor remains the same, so there is less effort needed in this activity. Still, two processes continued, which will require three to five times more time effort and hence more resources. Project management will have to conduct more consultations and meetings with experts to realize requirements and make decisions on the system to be developed features and functions.

Regarding system design, there are insignificant increments about the interface development since the core product is not being changed but just additional features are added. Still, because of those extra features, new guides are to be developed and updated to ensure smooth and convenience of utilization of such platform. Anyway, new features in the system demand notable coding. It is estimated to create desired programmes it will take 300% more lines of code and time as well. So the cost is estimated accordingly to that adjustment, and it elevates to $26.100 for this phase only. For the delivery and installation such software at the University's database and I.T center, it will not necessitate much more than in the previous case. System testing will, on the other side, call for more exertion and time for testing the system from the various aspects.

Management training demands more time to be able to acknowledge all the functionalities and proper ways of using them. So Project manager also estimates three hundred percent more efforts needed to educate the other stuff in other divisions and on another level, as well as the student to make sure the proper usage will be conducted. Compared to the last project and the same phase, this time cost estimate is 2.5 times larger. Also, project manager realized the bigger need for proper support and maintenance, and the cost estimate for such venture this time is doubled, to make sure the flow is continuous and consistent without errors and collapses. So the total cost estimates calculated using parametric modeling mounts to the $41,300.

V. SUGGESTIONS / RECOMMENDATIONS

As it was said in the introduction, "the report will provide an insight" on four topics regarding Project Cost Management. Answering all those matters provided insight in key important subjects about project cost management, such as discussion on why some managers overlook it, what are the basic principles, explaining different types of cost estimates and providing in details example of proper use of cost estimate tools and techniques. So each of these parts in body section identified key elements and recognized significant issues related to them, furthermore, to some extent providing suggestions on how to take proper care of them. One of the biggest reasons IT professionals have trouble with cost management is because many IT projects have very vague or undefined requirements initially. The unique nature of IT projects also includes a heavy reliance on new technologies and full business process analysis. Any use of modern technology has an associated risk, which often leads to complex problems or even abandonment of the technology itself. Both of these situations inflate project costs, and can quickly turn an on-budget project into a costly undertaking. IT Professionals to better understand the basic principles of cost management need to understand the terms used in a commercial section or the language of the accountants.

The initial and prevalent suggestion is that project managers must coordinate all of the knowledge areas, variables, throughout a project's lifecycle and one such area is cost management. Cost management within an information technology project is probably one of the most challenging tasks an organization will encounter. That's why the systematic approach is essential, and some steps are just a must. First of all, one may take trivially into consideration and acknowledgment stakeholder's actual needs and wants.

Neglecting those can lead to unidentified goals and expectations on both sides of the table. If a project manager, sponsors, team members and vendors don't have a solid grasp of on stakeholders' true desires, it's almost impossible to identify what the requirements are for the project.

Project Cost Management then should start with scope management. Therefore project manager must identify what resources and how much of them are needed to complete the project, including physical resources, time, equipment and the like so that associated costs can be determined. If you have the right resources in place, then that money is well invested, and if you don't then, you'll be spending more and more to revise and repair that situation. Once again, it is critical for Project Manager to understand basic cost principles, since cost management principles help communicate to upper management the return on investment, net value analysis, and other financial aspects of the project to garner support and understanding of what is involved for the organization. Not to mention how communications are crucial to success. An essential part of staying on budget is to make sure all team members are aware of the current budget status as well. An informed team is an empowered team that takes ownership of its projects. Project managers who carefully watch budgets of their projects will keep stakeholders and management happy and thus experience more great project and career success.

Additionally, in producing cost estimates for information technology projects, many of the conventional cost estimation practices do not adapt well to Agile project development. Fortunately, there are various types of cost estimates and some tools and techniques accessible to aid in generating one. Frequently used tools and techniques include analogous cost estimating, bottom-up estimating and parametric modeling. Those, as being explained above, can be helpful and establish a profound basis for cost budgeting. Still, the critical suggestion is to when it comes time to estimate costs, be as realistic as possible and to get input from all relevant stakeholders. Make sure to avoid winning numbers at the beginning of the project that turns to be disastrous at the end. When budgeting you need to factor in things outside of your control, such as external environmental considerations that may impact the pricing of supplies, resources, labor, financing, product/service shortages, and currency exchanges. Today's price or rate may not carry through to the later stages of a project. Accordingly, plan a budget for surprises, so you aren't blindsided. Then, a cost baseline, a time-phased budget is approved and used as a starting point for measuring the plan's actual performance progress. Tracking if the project is on target with your schedule and budget can be more difficult with IT Projects. The method of Earned Value Analysis (EVA) measures project progress through the cost performance index (CPI) and schedule performance index (SPI). Another way is establishing the KPIs (Key performance indicators) that help you ascertain how much has been spent on a project, the extent to which the project's actual budget differs from what was planned, and so on. Here are just a few commonly known and used project KPIs that are essential to effective project budget management: Actual cost (AC), Cost variance (CV) Earned value (EV), Planned value (PV), and Return on investment (ROI). By knowing cost and finance, you can present, discuss, defend, and explain all those numbers to management. As much as possible, as it is said afore, be ready to translate technical terms into a financial perspective, or the other way around, so that senior executives can understand better.

Lastly, it is not only about planning, estimating, budgeting and monitoring. Once the project is running, it is necessary and critical to establish and perform cost control and conduct reasonable and effective cost changes, making the necessary adjustments to help minimize unforeseen and undesirable costs. Another, last but not the least, the recommendation is to resort to projecting management software for keeping on top of what your expenditures are, and that can track resource allocation, too. You need to maintain a money trail, but also to manage the recurring expenses your project might require. The right tool can save you money regarding reducing admin time across the project by simplifying resource management and reporting. Robust cost management has capabilities that span the planning cycle, from estimating, to budgeting and forecasting, through all stages of project execution. Today's project cost management technology ensures projects can come in on time and budget, with a comprehensive record of where that budget was spent.

VI. CONCLUSION

Information technology projects have a poor track record in meeting budget goals. Project management professionals should observe good practices and consider suggestions to effectively and efficiently manage their projects. Cost management involves the processes necessary to ensure a project team completes a project within an approved budget. Project cost management consists of estimating, budgeting, and controlling costs with the ultimate goal of delivering a finished project on-time and within budget. It is principal to remember that providing your project under budget that doesn't meet the purposes of the stakeholders is not a completed project. For a project to be successful, it's essential to predict cost estimates accurately. We then use those ratings to establish an approved authorized cost baseline. With the cost baseline established, cost control now involves collecting actual costs to date, preparing expenditure reports, examining cost trends, forecasting the total project cost, and comparing estimated overall costs with the approved budget. It is very consequential to resort to useful tools and techniques and to employ software during all those processes to deliver projects within agreed budgets.

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