

Appropriate Time and Costs Estimates for the Building Project Feasibility Analysis

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Abstract

In a high competitive market as the one we are living in, project oriented companies frequently need to go through quicker, more objective and precise feasibility analysis. Feasibility analysis mistakes can lead to losing a contract to a competitor or cause financial loss that may compromise the company's bottom line results. In such environment, this paper intends to study the tools and techniques that provide reliable estimates regarding budget and schedule, which can help making good decisions whether a project should or should not be chosen to the detriment of others. Good estimates will also improve the success chances of one project and will make its coordination easier as well. Another purpose goal of this study is to identify the main problems that can lead to incorrect analysis and distortions in project decision making. The research methodology used was a field study, with the implementation of structured interviews, with project managers at four firms in the São Paulo city, Brazil. After review and analysis of the interviews, it was possible to understand that to achieve the best estimates for the project is appropriate to consider the balance between accuracy, time and resources available to accomplish it. With the definition of such requirements is possible to identify best practices to be implemented to bring good results and quality in the estimates.

Keywords: estimates, feasibility analysis, project management, time, cost

1. The importance of estimates in projects

In recent years, there has been a growth of companies engaged in projects. Although projects have been made for centuries and administration tools have developed for decades, only from the nineties there has been a growing demand for information and concepts related to a good project management.

However, a company that studies the performance of a particular project needs to conduct a good feasibility study before the implementation of these management concepts.

Vargas (2005) and PMI (2005) identify problems with estimates that are among the most common causes of failures in projects. The studies quote the lack of resource allocation, implementation methodologies, empirical experience and other items are factors that produce poor results.

In this environment, there is a need for a study on the subject, in order to identify the most common techniques for performing estimates time and costs and problems of such procedures.

According to Kerzner (2002), a project in any area, is characterized by an enterprise with identifiable goal, which consumes resources and is under pressure of time, cost and quality.

PMI (2004) defines project as a temporary endeavor to create a product, service or unique result.

The preparation of estimates is an essential part of a project, the defendant before the definition of the entire scope and later to its planning.

To carry out the estimates are necessary basic information and models of what actually happens in the project. This information can be realistic if the activities are known in detail or if there is experience in conducting similar activities.

However the projects are unique. The more differentiated from the other, the harder it is to cherish them, it will be used a different set of assumptions. Moreover, these assumptions are not clear when the scope is still undefined. There is, then, the complexity inherent in the estimation process on projects.

Besides the uniqueness of a project, Verzuh (1999) identifies other factors considered unpredictable that directly affect the performance of estimates:

- People who are part of the project team do not participate in the estimate, although their skills and knowledge affect the project productivity;
- Projects that use new technologies have problems regarding the reliability of the methodology and the learning curve of the team;
- Experts set changes in each project, but usually cannot predict how many will be;

- Wrong time estimates cost money and wrong cost estimates influence the schedule;
- Project managers and team members will be evaluated based on their ability to meet estimates.

All these aspects show the complexity of drawing up an estimate and this fact must be taken into account in subsequent use of the result.

2. Ratings estimate

Several classifications and methodologies are identified by several authors, such as Dingle (1997), Maximiniano (2002), Verzuh (1999), Meredith & Mantel (2003), Gould (1997), but in general it appears that the amount of detail and accuracy depend on the time that is invested in the planning process. More time means more precision. After determining the need to estimate the degree of accuracy, we can adopt different techniques for its realization.

Specifically in the analysis of costs in general, we can summarize the estimates in *Top-down* and *Bottom-up*.

Top-down costs estimates use the results observed previously in similar projects as a basis for estimating the cost of the current project, or an estimate by analogy. This kind of estimate hasn't got great precision, although the effort or the resources allocated for its realization are small.

To slightly improve the precision, you can use a parametric modelling, or build a mathematical model based on some key parameters, which results in estimates closer to the reality of the project (when compared to open analogies).

The other way to estimate, called *bottom-up* involves the estimation of the specific cost of each activity (as the level of detail required) and the subsequent summation of the costs for the project as a whole. This presents another systematic greater precision and is more expensive (in some cases even impossible).

You can consolidate the ratings in 3 different groups, as identified in Table 01.

Table 1: Types of estimation

<i>Necessity</i>	<i>Accuracy required</i>	<i>Decisions involved</i>	<i>Estimates indicated</i>
<i>Scenario Analysis (evaluation of the initial idea and definition of concepts)</i>	<i>Low accuracy (errors of up to 90%)</i>	<i>Invest or not in the proposal, mobilize resources, conduct more detailed estimates</i>	<i>Top-down (expert opinion or benchmarking)</i>
<i>Study design (selection / approval of the project)</i>	<i>Average accuracy (errors around 20% and funds for contingency)</i>	<i>Definition of PMP, ID code of accounts / WBS, approval of the beginning of the planning</i>	<i>Parametric (extrapolation of similar projects, mathematical models with historical data)</i>
<i>Planning and Budget (project control)</i>	<i>High accuracy (detailed, with errors of less than 10% and few resources for contingencies)</i>	<i>Approval of planning for implementation, analysis of results / projections, redesign.</i>	<i>Bottom-up (detailed estimates of each activity and sum of results)</i>

As the objective of the study is related to the initiation process of a project, the first two classifications are very important for the study.

3. Improvement or refinement of estimates

Regardless of the technique used to estimate there are recommendations for it to be more appropriate and provide better results.

Keeling (2002), Verzuh (1999), Shtub et al. (1994), Moylan (2002) and Lewis (1999) suggest ways to improve the performance of estimates. These practices are summarized in the Table 02 and were used in order to structure a research protocol which would verify if these practices were really applied in companies of the sector.

Table 2: Criteria for improving estimates

<i>Focus</i>	<i>Suggested Practice</i>
<i>People involved</i>	<i>Using experienced people, but open to market fluctuations and new technologies;</i> <i>Involve people responsible for the project implementation;</i> <i>Involve customers or other stakeholders.</i>
<i>Methods of implementation estimates</i>	<i>Consider appropriate techniques according to the required accuracy;</i> <i>Analyze actual performance of finished projects to refine the estimate model, evaluate the applicability of past experiences to current conditions;</i> <i>Perform estimates the resources at the same time they identify the time;</i> <i>Not use applications closed (with standard indicators) without relevant adaptations;</i> <i>Include, if possible, the likelihood of events;</i> <i>Not set criteria with the best performance possible (but very likely);</i> <i>Request more than one individual to the estimate activity and they come together to validate the results.</i>
<i>Breakdown of time items</i>	<i>Include support tasks (not just the main tasks), like approvals, orders or delivery;</i> <i>Consider enough time for quality activities (training, inspections and corrections);</i> <i>Avoid safety margins calculated without reference, consider the learning curve</i>
<i>Breakdown of cost items</i>	<i>Include in the cost of labor, the taxes, incentives and overhead;</i> <i>Watch for the possibility of using equipment on other projects simultaneously;</i> <i>Allocate costs of raw materials (losses inherent in the process);</i> <i>Investigate possible cost additional delay, consider the economic environment variables such as inflation, taxation or exchange rate.</i>
<i>Further use of the estimate</i>	<i>Do not accept changes in the estimates with no change in productivity or product requested;</i> <i>Matching estimation procedures accounting and cost management in the organization;</i> <i>Develop systematic recording of historical data and use of new estimates.</i>

4. Research methodology

Since the characteristics of the processes of estimates vary greatly according to the project area, we tried to define a population with similar characteristics. Defined as managers or people responsible for implementing construction projects within the city of São Paulo.

The purpose of the interviews was to determine whether the techniques identified in the theoretical literature are used by the market and how this occurs. Also, identify problems and suggestions for improving the methods used.

The interviews were conducted based on a script in order to direct the replies of the respondents, seeking greater compatibility between the results. However, other relevant information provided by respondents was also collected and helped the conclusions of this work.

Used as sample 4 companies, even though they act in different market niches, some common features, as always external customers, number of employees reduced, low degree of formality and few projects. Business features are described in Table 03.

Table 3: description of the case study companies

<i>Companies Type</i>	<i>Company A</i>	<i>Company B</i>	<i>Company C</i>	<i>Company D</i>
<i>Area / Market</i>	<i>Real State (Construction)</i>	<i>Construction / Builder</i>	<i>Facilities</i>	<i>Construction Management</i>
<i>Clients (sector)</i>	<i>Private</i>	<i>Public (mainly)</i>	<i>Private (mainly)</i>	<i>Public and Private</i>
<i>Projects Time</i>	<i>2- 3 years</i>	<i>4 - 6 months</i>	<i>6 months – 1 year</i>	<i>6 months – 2 years</i>
<i>Projects Costs*</i>	<i>15 - 25 millions</i>	<i>100.000 - 1 million</i>	<i>100.000 - 1 million</i>	<i>100.000 - 300.000</i>

(*) *Brazilian currency*

5. Conclusions and recommendations

After the review and analysis of the interviews, it was concluded that the first step for appropriate estimating time and cost to the project is to balance between the accuracy required and the time and resources to accomplish it. Next, we must choose one type of estimate which allows to meet the requirements identified.

After doing this, the project manager can check which of the practices identified in item 3 can be useful.

5.1 Search results

One of the factors identified that may influence the accuracy required is whether the project serves the internal or external customers. In the companies surveyed, the project and external customers are directly linked to core business. As the projects are the main sources of revenue of these companies, accurate estimates of time and cost assume a critical role in the survival of the organization.

The profitability of the market analysis also influences the accuracy of the estimates. In markets with tighter results, the importance of precise estimates will be higher, since small deviations undermine the outcome of the project. In markets with large results, the estimates may be less accurate and will be useful to determine which projects are more profitable.

Organizational culture also influences the need for precision in the estimates. Depending on the organization, the projects will be approved only if they can justify their result by a complete and well founded estimate.

It was identified in the research field for the analysis of the feasibility of projects, the techniques mentioned are basically parametric. This can be explained by some reasons described below.

The construction sector (area of operation of companies) has characteristics that facilitate the use of parametric techniques. This is an industry with extensive bibliography of direct costs indexes, productivity of labor force and market prices. Furthermore, with regard to companies and professionals specializing in market research and evaluation of products, which may contribute greatly to the improvement or development of other indexes.

Another favorable condition is the type of product. Buildings or works are fully measurable and can be subdivided into several subsystems with inputs also measurable. This facilitates the creation of indexes for the various parts of the product. Thus, even using parametric techniques, it is possible that the initial estimates are accurate for a feasibility study. For different sectors such as IT and research field, where most of the inputs are hours of work, which are more difficult to preview and forecasting.

Finally, the surveyed companies work on very similar projects. They have clearly defined scopes of design more conducive to their businesses, which also help to justify the techniques adopted.

A final important observation was to verify the greater importance given to the final estimate of the cost than the time (feasibility analysis).

Thus it is concluded that the project manager needs to understand clearly the environment of the enterprise and raise other factors that may influence decisions on estimates. Knowing the factors that influence the need for precision in the estimates we can choose more adequate estimate methods and techniques.

5.2 Recommendations

Research shows that many of the practices identified in the literature and recommendations for the improvement of the estimates are performed by the companies interviewed, but some of them so ineffective.

Admittedly there is no systematic for the treatment of lessons learned or acquired knowledge management projects. This fact undermines the implementation of best estimates, which are only achieved by more experienced professionals.

In fact, experience is necessary to do a good estimate, but personal experiences are different, the lack of information management does not allow the synergy of this information.

Another very important fact was the lack of participation of those responsible for implementing the project in preparing the estimate. Changing this reality it will contribute to the improvement of the estimates, helping to increase the involvement of field staff with the goals of time and cost.

It is also evident in interviews that the consideration of different scenarios and assigning probabilities to each of these practices are not a daily practice in these companies. This probably occurs because estimates of scenario are more complex and take longer to get things done.

5.3 Conclusion

To be able to validate the findings, it recommended a new larger study, with companies from other regions of the country and in larger amounts. The approach of large companies, or organizations that operate in sectors less specific, with innovative projects, would also be very interesting, and would bring new variables to the study.

Furthermore, the analysis methods and practices related to planning processes (instead of the processes of initiation or feasibility analysis) complement these findings.

There is also the importance of a more detailed study of other research themes, which were treated fairly generic in this text, such as, the knowledge management.

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