# PROJECT MANAGEMENT CRITICAL SUCCESS FACTORS – THE NEXT GENERATION

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## ABSTRACT

Critical Success Factors (CSF) should be the main focus of a manager when trying to achieve a successful process in an organization. Critical success factors in the project management area are clearly identified and are well understood to most project managers. Still, the rate of failed projects remains very high. This may be due to the fact that current CSF don't contain specific enough know-how, to better support project managers' decision making. This paper identifies specific planning processes that project success is most vulnerable to. Based on a field study, which involved 282 project managers, it was found that the most critical planning processes, which have the greatest impact on project success, are "definition of activities to be performed in the project", "schedule development", "organizational planning", "staff acquisition", "communications planning" and "developing a project plan".

**Keywords: project management, project planning, critical success processes, project success**

## INTRODUCTION

Most project managers can list the main reasons for project success. These factors are usually called Critical Success Factors (CSF). Despite this, the rate of failed projects still remains very high, i.e. [8] [9] [23]. One reason that may explain this contradiction is that CSF are rarely specific enough for project managers to act on. Therefore, the objective of this paper is to develop a more applicative and detailed list to be used by project managers. This list will include Critical Success Processes (CSP), which are the unique project processes that have the greatest influence on the success of projects. Being explored on this list is how a project manager will be able to focus on these critical project processes and to insure that they are performed with high quality in the project. Firstly, the following section briefly explains the development and meaning of CSF in the project management literature.

## CRITICAL SUCCESS FACTORS IN LITERATURE

CSF for any business consists of a limited number of areas in which results, if satisfactory, will ensure the organization's successful competitive performance. Being aware of CSF is of great importance, since it helps managers to focus on the most relevant factors. Daniel [4] was the first to introduce the concept of CSF. This concept became popular when it was later used to assist in defining the CEO's information needs that are most critical to the success of the business [17]. Since then, the use of CSF has become widespread in many areas. Leidecker & Brunu [10]

defined CSF for strategic planning and business strategy, as many others (e.g. [2] [17] [21] [22]) did for knowledge management.

Shenhar et al. [20] divided CSF models into three levels. The first level includes models that focus on product success [3] [12]. The second level includes strategic models that focus on the business unit [7]. The third level, which is the project management level, has received vast attention, and will be introduced in the following paragraphs.

The first application of CSF in the project management arena was made by Rubin & Seeling [18], who investigated the impact of project managers' experiences and the size of the previously managed project, on project success. They found that only the former has a significant impact. Avots [1] identified the main reasons for project failure to be the wrong choice of a project manager, unplanned project termination and non-supportive top management.

Pinto & Slevin [14] published a major research study on CSF within project-oriented environments. In their research, 418 project managers were requested to evaluate the importance of different factors relating to project success. The research identified ten CSF, including factors such as: top management support, project planning and customer involvement.

An analysis of the critical success factors in the project management literature identifies two major characteristics of the common CSF. The first one is that they all state an out-come with foggy advice, such as "improve the relationship with your customer" or "obtain management support". Although these factors may serve in improving project managers' general know-how, they are not specific enough to support better decision-making. Therefore, despite common knowledge, project managers still have difficulties implementing these ideas. The second characteristic derived from the analysis is that planning is repeatedly a critical success factor in most of these studies. However, the studies mentioned above were not specific enough to point out the relevant critical processes within the planning phase of a project.

The greatest impact of planning on a project's success, coupled with a lack of knowledge concerning the relative importance of each planning process, was the motivation for the present research. Moreover, since success factors vary over the life cycle of a project [11], it is important to focus on one phase of a project. Therefore, the objective of this study is to identify specific Critical Success Processes (CSP) required for the planning phase of a project. The concept of CSP may be more focused, exact and practical to project managers, compared to the traditional CSF concept. The next paragraph describes a literary review regarding the processes required in the planning phase of a project.

Planning is the second phase of a project, following initiation and prior to execution and closure [15]. The techniques of planning are diverse from simulation, buffer management, risk management and iterative planning, as dependent on project uncertainty, whether it is "variation", "foreseen uncertainty", unforeseen uncertainty" or a "chaos" project [6].

Project planning specifies a set of decisions concerning the ways that things should be done in the future, in order to execute the design for a desired product or service [24]. The project manager is responsible for completing the project to the satisfaction of all relevant stakeholders. Therefore, he or she should not only make sure that actions are executed according to plan, but

also insure that this plan is reliable and properly represents stakeholders' requirements. Some of the main models for project planning will be introduced next.

Meredith & Mantel [13] identified six planning sequences, including preliminary coordination, detailed description of tasks, adhering to project budget, adhering to project schedule, a precise description of all status reports and planning the project termination. Russell & Taylor [19] identified seven planning processes - defining project objectives, identifying activities, establishing precedence relationships, making time estimates, determining project completion time, comparing project schedule objectives and determining resource requirements to meet objectives.

The Project Management Body of Knowledge - PMBOK [15] suggests a more detailed construct of processes for the planning phase. It identifies 21 planning processes, out of the 44 processes required to manage a project. That is to say, planning processes consist of 47% of all processes that should be properly performed by a project manager during the entire life cycle of a project. However, project literature does not clearly identify which of the 21 planning processes are more crucial than others. The end result is that project managers, who are short of time and therefore unable to properly perform all planning processes, may choose to perform those processes which are easiest to execute or those mandatory to the start of a project, rather than those that actually contribute the most to the success of the project. The remainder of this paper deals with identifying those planning processes, which the project's success is more vulnerable to.

## RESEARCH METHOD

A critical success process will be defined as a project process which has a significantly higher impact on project success, compared to other planning processes. A successful project is defined as one which was completed on time, on cost, achieving performance envelope and with high customer satisfaction [23]. Hence, four dependent variables are introduced – cost overrun, schedule overrun, technical performance and customer satisfaction.

A linear model was designed, where the independent variables of the model are project planning processes and the dependent variables are project success measures. The independent variables consist of planning processes that have to be performed by project managers. In order to identify and analyze planning processes, a measurement tool is needed. Recently, a Project Management Planning Quality (PMPQ) model was introduced by Zwikael & Globerson [23], to evaluate the quality of project planning processes. This model, briefly described in the next section, was used in the present research as the vehicle for the identification of CSP.

The objective of the PMPQ model is to assess the quality of project planning, based on knowledge areas from the fields of Project Management, Control, Organizational Maturity and Organizational Support. The model consists of one major planning product that should be generated by the end of each planning process. The extent of use of a planning product is easy to measure and therefore was used to express the frequency with which a process is performed.

The PMPQ model consists of 16 major planning processes, which generate 16 products. These products were grouped according to the nine knowledge areas, identified by the PMBOK [15].

Based on this model, a questionnaire was designed and was used in a pilot exercise. All participants also received an oral explanation and a written guide describing all planning processes and products. The model's reliability was calculated using a number of statistical tests. Results were also found to be independent of the person answering the questions, be it a project manager or a senior manager.

The model's validity was evaluated by comparing the overall project planning quality indicator derived from the model (PMPQ index), with the projects' success. It was found that the PMPQ index was significantly correlated with the perception of projects' success, as measured by cost, time, performance envelope, and customer satisfaction. The extent of use of planning processes was correlated with each of the project's final results. All results are statistically significant with p-values under .01. The PMPQ model also assisted us in identifying 16 planning processes. In order to find out which of them has the greatest impact on project success, the model presented in Figure 1 was charted. The model includes 16 planning processes, as appears in the PMPQ model to become independent variables, and four project success measures, act as the model's dependent variables.

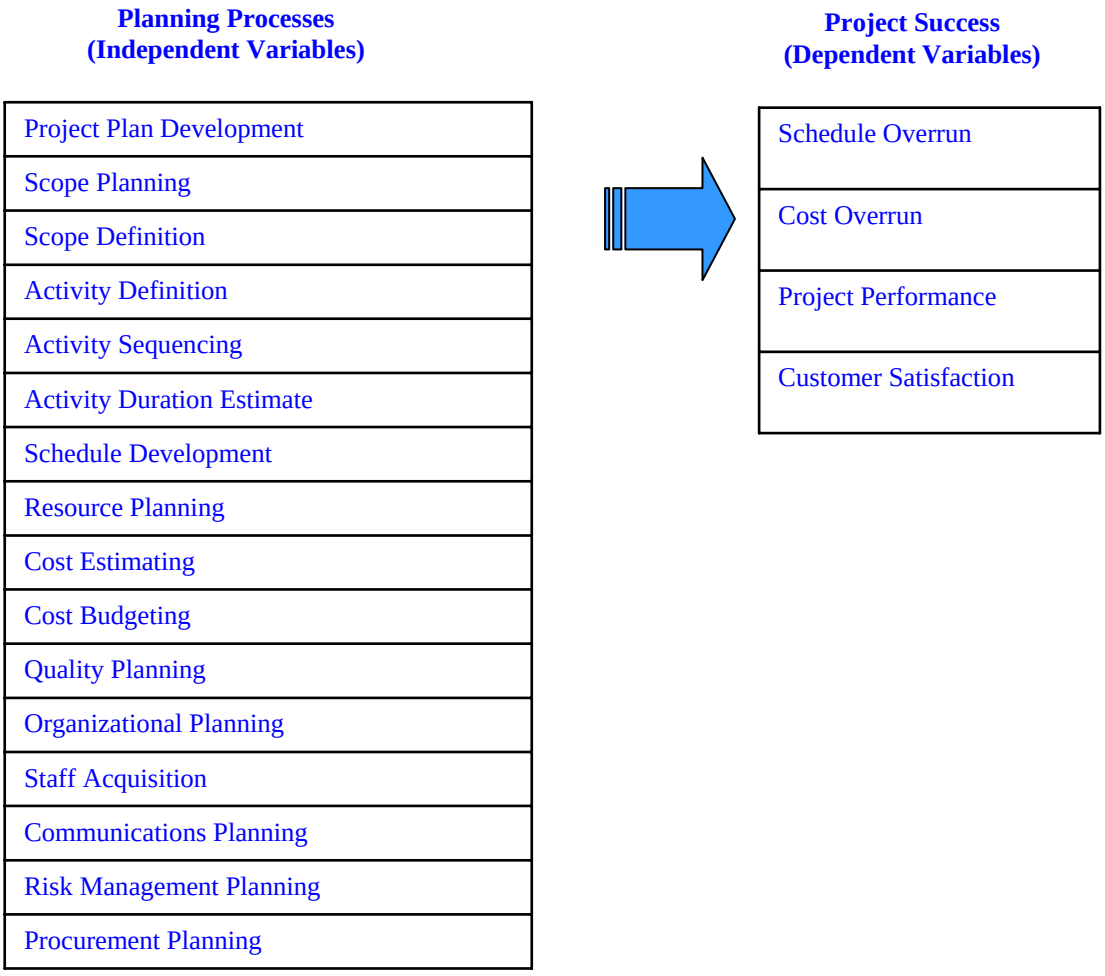


**Figure 1: Sixteen Planning Processes and Four Project Success Measures**

A process may be considered as 'critical' for a project's success if its impact is greater than most of the other planning processes. Therefore, we will identify critical processes by comparing the linear coefficients coming out of multi-variable linear regressions with each of the four project success measures. Following the literary review, the following hypothesis was raised:

It is expected that different planning processes have different impacts on project success. According to literature review, processes involved with scope, schedule and quality planning have the greatest impact on project success. Hence, the research hypothesis will be phrased as follows:

H1: scope planning, schedule planning and quality planning have a greater impact on project success, compared to all other planning processes

Data for the model was collected via questionnaires, which were administered in about 50 different organizations in Israel. Participants came from different industries, such as engineering, construction, software development, services, etc. Together, 282 project managers completed the questionnaire. A questionnaire was included in the final analysis, if at least 80% of its data had been completed. Using the above criterion, 202 questionnaires remained for the final analysis.

Participants were requested to evaluate the extent of use of the 16 planning products. This was reported by using a scale ranging from 1 (low extent of use) to 5 (high extent of use). In addition, we collected data representing the following four project success dimensions: Cost overrun and schedule overrun, measured in percentages from the original plan; technical performance and customer satisfaction, measured on a scale of one to ten (1 representing low technical performance and low customer satisfaction, and 10 representing high technical performance and high customer satisfaction).

The average cost overrun was 25%, ranging from savings of 20% and up to spending 400% more than the original budget. The average schedule overrun was 32%, ranging from 5% ahead of time, up to a schedule overrun of 300%. Similar overrun findings were found in previous studies (i.e. [8]). Average scores of technical performance and customer satisfaction were around 8.

## RESULTS AND ANALYSIS

In order to identify CSP, the relative impact on project success of each planning process was calculated. A multi-variable regression was calculated using 16 planning processes (as independent variables) and one project success measure (as the dependent variable) at a time. For each run of the regression analysis, the linear coefficients (beta) were used to evaluate the importance of a planning process on a project success variable. Then, the 16 planning processes were ranked by their impact on project success. This calculation was repeated four times for all project success indices. Table 1 ranks the impact of all 16 planning processes on each project success measure.

| Project Success Measure / Planning Process | Schedule Overrun n=171 $R^2$=0.17 F=0.015 | Cost Overrun n=144 $R^2$=0.25 F=0.002 | Technical Performance n=190 $R^2$=0.23 F<0.001 | Customer Satisfaction n=189 $R^2$=0.15 F=0.030 |
|---|---|---|---|---|
| **Activity definition** | 1 * | 1 * | 1 * | 5 |
| **Activity duration estimating** | 14 | 13 | 8 | 7 |
| **Activity sequencing** | 10 | 8 | 14 | 10 |
| **Communications planning** | 9 | 10 | 7 | 2 |
| **Cost budgeting** | 4 | 5 | 9 | 9 |
| **Cost estimating** | 13 | 15 | 10 | 11 |
| **Organizational planning** | 2 | 7 | 4 | 4 |
| **Procurement planning** | 12 | 4 | 12 | 12 |
| **Project plan development** | 6 | 3 | 3 | 1 |
| **Quality planning** | 5 | 9 | 5 | 8 |
| **Resource planning** | 16 | 16 | 16 | 15 |
| **Risk management planning** | 15 | 11 | 15 | 16 |
| **Schedule development** | 3 | 2 | 13 | 3 |
| **Scope definition** | 8 | 12 | 11 | 13 |
| **Scope planning** | 7 | 6 | 6 | 14 |
| **Staff acquisition** | 11 | 14 | 2 * | 6 |

* $p<0.05$

**Table 1: Ranking of the Impact of Planning Processes on Project's Success**

As can be seen from Table 1, "activity definition" is the first CSP, since it has the greatest significant influence on three project success measures – cost overrun, schedule overrun and technical performances. This process has a lower impact on the "customer satisfaction" success measure, since the customer is not directly influenced by the exact definitions of activities in a project. This means that proper identification of a project's activities is one of the most critical planning processes to be performed by the project manager. This finding makes a lot of sense, since if an activity is left out during the planning phase, its late inclusion afterwards may cause a strong negative impact on various aspects, such as scheduling and required budget.

The second process in Table 1 is "schedule development", which has a great impact, yet not significant, on three out of four project success measures. This process has a direct impact on schedule overrun, since it involves the planning of start and end dates for each activity of a project. This process has indirect impact on the satisfaction of the customer (who is affected by the duration of the project) and on project cost (which is impacted by project duration as well). The "schedule development" process may have a limited impact on technical performance, due to the fact that the time the activities are performed doesn't affect its performance.

The third process in Table 1 is "project plan development". This process involves the development of a formal plan for the project, which is based on the integration of several planning processes related to duration, time, cost, risk and others. It has a great impact on all project success measures.

A planning processes that hardly impact project success is “resource planning”, but still is performed in every single project. For example, activities will not be performed and the project will fail, if the definition of the required resources needed for executing activities is inadequate. In other words, this process is mandatory to the start of a project, but project success will not be improved if the project manager invests more effort in performing it.

Another low impact process is “risk management planning". Lately, this process has been frequently quoted in the project management literature, but it is rarely performed in a formal manner [16]. According to this research, the relative impact of risk management planning on project success is low, compared to other important processes the project manager has to execute during the planning phase of a project. Risk planning has a significant positive correlation only with the project’s cost overrun. This means that project risk planning is probably perceived as a cost containment tool, rather than a comprehensive technique for dealing with all aspects of the projects.

The hypothesis of this research claimed that planning processes in the areas of scope, schedule and quality have the greatest impact on project success. Analyzing the above research hypothesis, we found that it is processes in the areas of schedule, human resources and communications that actually have the greatest impacts on project success. Unfortunately, human resources and communications project processes get very little attention in the project management literature and project management software tools.

## CONCLUSION

Not all of the 16 project planning processes analyzed in this study and included in the PMBOK have an equal impact on project success. The six processes with the highest impact include “definition of activities to be performed in the project”, “schedule development”, “organizational planning”, "staff acquisition", "communications planning" and “developing a project plan”.

By far, the identification of project's activities is the most significantly critical planning process. This process is part of the "Schedule" knowledge area and is detailed described in the project management literature. In order to correctly execute this planning process, a project manager has to own a Work Breakdown Structure (WBS) and a project management plan. Then, decomposition is required, subdividing the project work packages into smaller, more manageable components, called activities. The activity definition process defines the final outputs as schedule activities rather than as deliverables, as is done in the WBS [15]. Implementing these steps in performing this process in every single project may increase the chance of project success.

The two low impact processes include: “risk management plan” and “resource planning”. Obviously, it is impossible to execute a project without performing these processes. One may also assume that the above processes may be performed in different ways by each project manager, without his awareness concerning their actual execution (for example, developing a risk management plan without applying the formal risk management approach). Yet, expanding the efforts invested in these processes may not contribute to project success, when compared to the expanded efforts relating to the critical processes.

The low R squared achieved may indicate that other CSP, which are not included in the model, exist. They may be found in the planning phase of the project, but with processes that are not being authorized by the project manager, such as organisational support, training, tools, software and involvement in the initiation phase of the project. Yet, adding these variables, the effect of project planning on project success may still be limited. CSP from other phases of the project may have additional impact on project success. Still, it is hard to estimate the effect of project planning alone on project success.

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