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## Success criteria and critical success factors in project success: a literature review

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### Abstract

Project success criteria are dependent variables that measure the successful outcome of a project, while project success factors are the independent elements of a project that can increase the likelihood of success. In other words, success criteria are used to measure success whilst success factors facilitate the achievement of success. The purpose of this paper is to systematically record and identify project success criteria as well as critical success factors found in the literature and published in academic journals in order to form an effective and widely accessible framework to measure project success.

Time - schedule, cost - budget, user satisfaction, quality-performance, business and commercial performance are the most frequently used success criteria, followed by technical specifications and requirements, stakeholders' satisfaction, strategic goals/objectives and competitiveness, functionality, project team satisfaction and safety. Some researchers also refer to contractor satisfaction, future perspective and environmental impact, while handful are those that support that effectiveness and suppliers' satisfaction can influence project success. The critical factors influencing the success of projects are identified and commonly related to the following areas: project (e.g. clear goal, realistic schedule, adequate funds, resources, size, complexity), project manager and leadership (e.g. leadership, management of changes, effective conflict resolution, communication), project team members (e.g. communication, technical background, qualified team), organization (e.g. top management support, responsibility and authority chart) and external environment (client, technological environment, political environment, social environment, physical environment).

**Keywords:** project success; success criteria; critical success factors

### 1. Introduction

Project success is undoubtedly one of the most popular issues that has been particularly prominent in academic and business research over the past decades. The notion of what properties constitute a successful project has been much discussed in the project management field without being able to highlight a commonly acceptable definition until nowadays (Pinto και Slevin, 1988a; Baccarini, 1999; Müller και Judgev, 2012). From a scientific point of view, significant differentiations and deviations between the various considerations and approaches can be distinguished in respect with the ways that success can practically be attributed to a project. Project success should be interpreted

based on the perspectives of the different stakeholders (owner, contractor, project manager, client, user, community), as a result a project could be regarded a success for some parties and a failure for others respectively. The differentiation on the viewpoint of project success perception is characteristically transferred by Freeman and Beale (1992, p.8) as follows: “success means different thing for different people. An architect may consider success in terms of aesthetic appearance, an engineer in terms of technical competence and a human resources manager in terms of employee satisfaction”. However, De Wit (1988, p.165) cites one definition of project success, as derived from the previous research of Baker et al. (1983), “the project is considered an overall success if the project meets the technical performance specification and/or mission to be performed, and if there is a high level of satisfaction concerning the project outcome among key people”. Belassi and Tukul (1996) claim that the determination of project success or failure is a complex process surrounded by intense ambiguity due to the inability of clear interpretation and assessment of project success on behalf of the different stakeholders and the diversity of evaluation methods and tools inside the literature. Generally, project success is considered “as the achievement of some predetermined project goals, which commonly include multiple parameters” (Lim and Mohamed, 1999, p.244).

De Wit (1988) considers that a distinction should be made between the project management success and project success in attempt to properly evaluate success. These are two concepts that are closely related, but they can show significant differences. Project management success is determined based on fundamental success criteria/restrictions, while project success refers to the overall accomplishment of the goals and objective of a project. It is noted that “good project management can contribute towards project success but is unlikely to prevent project failure” (De Wit, 1988, p.165). According to Munns and Bjeirmi (1996), the relationship between project success and project management success is less dependent than originally believed, as these notions should be clearly separated so as to assess project success. Both concepts concentrate on the successful execution of a project, but they reflect completely different objectives and character. For example, there are projects that were not completed within the predetermined restrictions (poor project management) and tend to be great successes over time and vice versa (Munns and Bjeirmi, 1996). On the contrary, Baccharini (1999) distinguishes project success in two aspects: project management success (focusing on project process and predetermined restrictions) and product success (focusing on the effects of project outcomes). Complementary, Lim and Mohamed (1999) suggest two perspectives of analyzing project success, justifying to a certain extent the usual differences between the various perceptions. Specifically, the macro viewpoint is related to the implementation degree of the overall plan of a project in the operational stage and the micro viewpoint refers to the achievement route on the individual levels and components of a project at the completion of the execution stage respectively. Summarizing, an overlap between project success and project management success can be detected, but the latter is essentially a subset of the overall success of a project (Munns and Bjeirmi, 1996).

Furthermore, it is widely accepted that project success consists of two fundamental components, namely project success criteria and project success factors. Project success criteria are the dependent variables (principles, measures, standards) that measure and evaluate the successful outcome of a project, while project success factors are the independent elements of a project (set of circumstances, facts, elements, influences) that can increase the likelihood of success. In other words, success criteria are used to measure success whilst success factors facilitate the achievement of success respectively (Lim and Mohamed, 1999; Ika, 2009; Turner, 2009; Müller and Judgev, 2012).

The rest of the paper is organized as follows: section 2 describes the methodology followed in the literature review research, section 3 presents the most cited success criteria and critical success factors, while section 4 concludes to useful remarks.

## **2. Methodology**

First of all, the main research subject covers the notion of project success and its two fundamental components (success criteria and critical success factors) inside the scientific field of Project Management. The adopted research methodology consists of three distinct consecutive stages. The first stage includes the systematic search of the potential references through well-known academic databases and search engines which are officially connected with prominent scientific handbooks and journals (e.g. Google Scholar, Microsoft Academic, Mendeley, Science Direct, Scopus, Springer Link, Wiley Online, Emerald Insight, etc.). The second stage encloses the collection of the literature that could contribute to the aimed research, while in the third stage the most useful scientific handbooks, chapters and papers are reviewed and studied in detail. The keywords used during the whole research are “project success”, “success criteria”, “success factors” and “critical success factors” respectively. It is also noted that the forementioned research process had been conducted between January 2016 and December 2017.

The successful execution of the first two methodological stages led to the collection of more than 250 references (handbooks, chapters and papers) with proven contribution to the research evolution. The detailed study of these sources demonstrated many theoretical and empirical aspects that are arranged and recorded appropriately according to the content of the three main thematic unities.

Subsequently, the various success criteria and critical success factors are segregated and recorded in detail in order to generate two tables, summarizing the significant success criteria and critical success factors. Referring to the success criteria, the systematic recording revealed over 20 different criteria from the theoretical and empirical studies. In case of the critical success factors, the methodology followed is slightly differentiated because of the large number of records originated from the research and study of the references (more than 400 critical success factors). Specifically, some critical success factors with same or similar meaning, content and function are merged and incorporated into a generic statement so as to reduce the number of different records and make the summary table more useful and flexible. Finally, the frequency of reference/occurrence of both success criteria and critical success factors is recorded as a mean of their significance evaluation. Essentially, this kind of index indicates the number of citation or emergence or repetition of the different success criteria and factors inside the considered literature.

## **3. Results and Discussion**

In this part of the paper, two summary tables (Tables 1 and 2) that present the results from the overall study of the literature regarding with the success criteria and the critical success factors in the scientific field of project management are cited and discussed. The tables are ranked in descending order based on the quantitative index of reference/occurrence frequency.

As it was stated before, success criteria are one of the basic components of project success. Necessary priority is to identify them precisely among all participants at the onset of a project. The formulation of a commonly agreed upon framework, taking into account the various criteria on behalf of all stakeholders, is a prerequisite for the rational assessment of project success. The classic approach of evaluating project success is based on the simplified scheme of the three basic success criteria (time, cost and quality / performance), known in the scientific community as the "Iron Triangle" or "Golden Triangle" or "Triangle of Virtue" (Atkinson, 1999; Westerveld, 2003; Ika, 2009). However, there are numerous projects that came in on time and under budget and are considered failures, while there are others that have finished late and far over budget and are branded as successes. The emerging need to broaden the concept of success has led many researchers to adopt additional success criteria over the years. Generally, the

conventional framework of project success assessment includes the following success criteria (Pinto and Slevin, 1988a; Ika, 2009): a) Cost – budget, b) Time – schedule, c) Performance – quality and d) Client satisfaction. During the last decades, several criteria have been proposed by various researchers for the evaluation of project success. The success criteria may differ between the various project types according to their different goals and objectives. It should be noted that the high percent of failed projects is explained to a great extent by the adherence to specific non inclusive success criteria (Atkinson, 1999).

Table 1 includes the most cited success criteria found in the literature.

Table 1. The most significant success criteria in the corresponding literature

Success criteria	Frequency of reference/occurrence	Success criteria	Frequency of reference/ occurrence
Time – Schedule (SC1)	39	Strategic Goals/objectives & Competitiveness (SC9)	16
Cost – Budget (SC2)	39	Use (SC10)	14
Quality – Performance (SC3)	30	Health & Safety (SC11)	14
Client/user Satisfaction (SC4)	30	Project Team/personnel Satisfaction (SC12)	12
Business & Commercial Performance (SC5)	24	Contractors' Satisfaction (SC13)	12
Stakeholders' Satisfaction (SC6)	20	Future Perspective (SC14)	12
Technical Specifications & Requirements (SC7)	19	Environmental Impact (SC15)	10
Functionality (SC8)	16	Effectiveness (SC16)	8
		Suppliers' Satisfaction (SC17)	2

The criteria of time – schedule (SC1), cost – budget (SC2) and quality – performance (SC3) occupy the first three positions in the final ranking based on the frequency of their occurrence/reference in the literature during the last four decades (e.g. Al-Tmeemy et al., 2011; Wai et al., 2012; Nguyen et al., 2013; Mukhtar and Amirudin, 2016; Silva et al., 2016a) . Certainly, these three parameters reflect the so called project management success and can be usually measured at the execution and the completion of each project. Another criterion with high significance is client/user satisfaction (SC4), which has been intensively suggested by many researchers since the ends of 1980 (e.g. Serrador and Turner, 2014; Silva et al., 2016a).

Business and commercial performance (SC5), stakeholders' satisfaction (SC6), and technical specifications and requirements (SC7) have a remarkable number of citations inside the considered references (e.g. Al-Tmeemy et al., 2011; Wai et al., 2012; Khan et al., 2013; Nguyen et al., 2013; Sliva et al., 2016a). The commercial success of a project and the satisfaction of its stakeholders are two important aspects relating to the midterm evaluation of project success. Also, stakeholders' satisfaction is incorporated in the emerging Knowledge Area of project stakeholder management in the scientific field of modern project management (PMBok, 2013). It could be assumed that the

technical specifications and requirements refer in a sense to the satisfaction of the various project stakeholders in comparison with their goals and expectations.

Subsequently, the criteria of functionality (SC8), strategic goal/objectives and competitiveness (SC9), use (SC10), and health and safety (SC11) are referred to a satisfactory degree by the corresponding literature demonstrating some relatively newer dimensions of project success (Thomas and Fernandez, 2008; Al-Tmeemy et al., 2011; Wai et al., 2012; Khan et al., 2013; Nguyen et al., 2013; Mukhtar and Amirudin, 2016; Silva et al., 2016a). Both the use and the functionality of a project are closely related to the stakeholders' expectations and requirements evaluated in the period after its completion.

Furthermore, some researchers include project team/personnel satisfaction (SC12), contractors' satisfaction (SC13), future perspective (SC14) and environmental impact (SC15) in the proposed frameworks or lists of project success assessment (e.g. Turner, 2009; Khan et al., 2013; Nguyen et al., 2013; Mukhtar and Amirudin, 2016; Silva et al., 2016a). It should be noted that team/personnel satisfaction and contractors' satisfaction essentially consist specializations of the wider parameter of stakeholder's satisfaction, a fact that clearly explains the trend of adoption of additional success criteria in the recent years. The criterion of future perspective is closely related to the achievement and maintenance of the success of a project after its completion and during its operation phase. Effectiveness (SC16) and suppliers' satisfaction (SC17) are placed in the last positions of the final ranking cited by a relatively small part of the considered literature (e.g. Atkinson, 1999; Turner and Müller, 2006; Khan et al., 2013; Silva et al., 2016a).

Generally, it is observed that the criteria of time – schedule, cost – budget, quality – performance, stakeholders' satisfaction and project team/personnel satisfaction are enclosed to five of the primary Knowledge Areas of project management (time management, cost management, quality management, human resource management, stakeholder management) as presented by Project Management Institute (PMBok Guide, 2013). Moreover, the general attempt for the broadening of the concept of project success and the high necessity of adoption of additional success criteria, as originated from the considerations of the corresponding literature, are clearly verified by the results of the research.

Table 2 summarizes the 15 most significant critical success factors exported from literature review.

Table 2. The 15 most significant critical success factors in the corresponding literature

Critical Success Factors	Frequency of reference/ occurrence	Critical Success Factors	Frequency of reference/ occurrence
Project mission, project goals & objectives, project scope, project definition/perception, project vision (CSF1)	48	Social environment, social factors, social support (CSF9)	24
Top/senior management support, top/senior management support commitment (CSF2)	42	Monitoring & feedback, feedback abilities (CSF10)	23
Project communication, communication/information systems/channels/procedures, internal project communication (CSF3)	37	Risk confrontation/evaluation/analysis/identification, project risk management, project management training, project risks (CS11)	21

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Project planning/monitoring/control, monitoring & control, project monitoring/control mechanisms/systems/procedures (CSF4)	36	Project organizational structure, project organization structure, organizational policy/philosophy (CSF12)	20
Project manager/team leader competence & relative/past experience (CSF5)	33	Economic environment, economic factors/risks, national economy (CSF13)	20
Technological environment, modern/advanced/appropriate technology, automatization, technology knowledge/transfer, knowledge & expertise utilization/support, technology level/availability, technological advancement (CSF6)	26	Project team/team members competence & effectiveness (CSF14)	20
Project finance/funding, project economics/budget, adequate/guaranteed project funding, reliable funding source, project cash-flows (CSF7)	25	Project personnel, project personnel ability/quality, adequate/skilled project personnel, project personnel issues (CSF15)	19
Political environment, political stability/instability, political risks, political factors, political influences (CSF8)	24	Project size/value/complexity, project duration (CSF16)	19

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It is obvious that the two most cited critical success factors in the corresponding literature are project mission/goals and objectives (CSF1) and top/senior management support (CSF2) (e.g. Silva et al., 2016b; Yong and Mustafa, 2017). Project mission is thought to be one of the most important parameters in a project enclosing the determination of its scope, directions, goals and objectives. The proper definition of the project and its goals and objectives among all stakeholders is a prerequisite for its success. Also, the support from top/senior management and the commitment of the senior organizational executives provide a special meaning to a project and can significantly increase the possibility of its success from the early development stages.

Moreover, the factors of project communication (CSF3), project planning/monitoring/control (CSF4), and project manager/leader competence and experience (CSF5) are placed in very high positions in the final ranking according to the quantitative index of reference/occurrence frequency (e.g. Alias et al., 2014; Montequin et al., 2014; Osei-Kyei and Chan, 2015; Silva et al., 2016b; Yong and Mustafa, 2017). The first two critical success factors are associated with basic processes of a project and can play an important role in its evolution route. It should be highlighted that the proper and accurate project monitoring and control give the opportunity to the project manager and each stakeholder to get informed about the progress of project execution so as to be ready to intervene in case of potential deficiencies or omissions. Also, the internal and external communication of a project is a top priority and intention by all project stakeholders during all its lifecycle. On the contrary the project manager/leader competence and experience refers to the so-called human factor of project management. The human element tends to be a very decisive parameter for the achievement of project success. It is also noted that the project manager is proved to have a greater impact on project success compared to the traditional technical success factors.

Technological environment (CSF6), project funding/economics (CSF7), political environment (CSF8), social environment (CSF9) and economic environment (CSF13) occupy relatively high positions in the table and consist the concept of the external environment that surrounds every project (e.g. Alias et al., 2014; Montequin et al., 2014;

Osei-Kyei, 2015; Silva et al., 2016b; Yong and Mustafa, 2017). The external environment is separated by the majority of researchers for many years, because it reflects the general conditions in which every project should be adapted and continuously develop. As a consequence, such factors can dramatically influence the performance of a project at all stages of its lifecycle.

A particular reference is made for the project team (project team competence, project personnel), to which the successful or not completion of a project is mainly attributed (e.g. Ofori, 2013; Wai et al., 2013; Montequin et al., 2014; Silva et al., 2016b). The members of the project team should have the proper managerial and technical competencies in order to carry out the project as it was planned and designed.

The other ranked success factors presented in Table 2, such as monitoring and feedback (CSF10), project risk management (CSF11), project organization structure (CSF12), and project characteristics (CSF16) refer to main internal processes and the general structure of a project (e.g. Khan et al., 2013; Ofori, 2013; Wai et al., 2013; Alias et al., 2014; Silva et al., 2016b; Yong and Mustafa, 2017). It should also be highlighted that project risk management tends to be one of the most contemporary issues concerning the construction field and modern project management.

In general context, project definition, top/senior management support and project communication constitute the most cited and significant factors that can influence the success of a project. Furthermore, the external environment is a critical success factor distinguished by the literature many decades ago, which should be carefully examined before and during project development.

#### **4. Conclusions**

Project success is undoubtedly one of the most discussed issues with intensive research activity in the modern academic field of project management. However, a commonly acceptable definition of project success has not been detected until nowadays. Project success criteria and critical success factors constitute the two fundamental components of project success. Success criteria are the dependent variables that measure and evaluate project success, whilst critical success factors are the independent variables that can influence and increase the likelihood of project success respectively. The present paper attempts to systematically study and record the project success criteria and critical success factors through an extensive academic research in the project management literature.

The first finding of the detailed research is that time – schedule, cost – budget and quality – performance are the three most cited and significant success criteria in the considered literature followed by the relatively contemporary criterion of client/user satisfaction. It is also noted that these criteria constitute the traditional framework of project success evaluation. Furthermore, the most important critical success factors from the literature review are project definition, top/senior management support and project communication, while special attention should also be paid to the external environment of a project. Finally, the quantitative index of reference/occurrence frequency was used as a means of the evaluation of the significance of the examined success criteria and factors.

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