

Critical Success Factors of Information Technology Projects

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Abstract—Information Technology (IT) is being used by almost all organizations throughout the world. However its success at supporting and improving business is debatable. There is always the risk of IT project failure and studies have proven that a large number of IT projects indeed do fail. There are many components that further the success of IT projects; these have been studied in previous studies. Studies have found the most necessary components for success in software development projects, executive information systems etc. In this study previous literatures that have looked into these success promoting factors have been critically reviewed and analyzed. 15 Critical Success Factors (CSF) of IT projects were enlisted and examined. These factors can be applied to all IT projects and is not specific to a particular type of IT/IS project. A hypothesis was also generated after the evaluation of the factors.

Keywords—Critical Success Factors, CSF, IT Projects, IS Projects, Software Development Projects.

I. INTRODUCTION

DUE to the rapid development of IT industry, people today have hugely recognized the importance of implementation of IT projects. IT/IS project management often encounter many issues, such as rapid technological upgrade, fast changes in the environment and frequent movement of people. Consequently, discussing and finding out factors for success goes a long way in improving and establishing IT projects. Combining project management ideology and methods with information technology during the implementation of IT projects is very significant for attainment of IT projects. The success of IT project relates to innumerable factors, and it is important to find the critical ones. IT project's complexity and high uncertainty also call for critical success factors in IT project to be analyzed from different angles.

A casual search of the term Critical Success Factor on Google will result in thousands of links; however, the initial appearance of the term Critical Success Factor in research works was in the 1980s. This was due to the interest in finding out why some organizations were more successful than others. To establish the reasons, studies were carried out and the success factors were hence determined [1]. CSFs can be defined as- "those things that must be done if a company is to be successful". CSFs must be few in quantity; quantifiable and manageable [2].

The success of IT projects is important because the

dependency on IT/IS has increased manifolds nowadays. The research problem is finding the critical success factors for IT projects in today's scenario. The objective of this review article is to find the critical success factors for IT projects and summarize and analyze them. Determining the CSFs have great practical significance as the project manager or any other concerned authority can utilize these factors for the realization of their project.

II. RESEARCH METHODOLOGY

The goal of this study is to review past CSFs research relevant to IT project. To identify papers which adequately represent this topic, we searched the full-text of articles within Google Scholar, Science Direct, IEEE Explorer, ACM and Emerald databases. The articles were searched based on the combination of keywords CSFs-IT project, CSFs-Information System, CSFs-Software Development projects; the articles selected in this study were published within 1999 to 2012.

The diagram in Fig. 1 depicts the research path followed in this study.

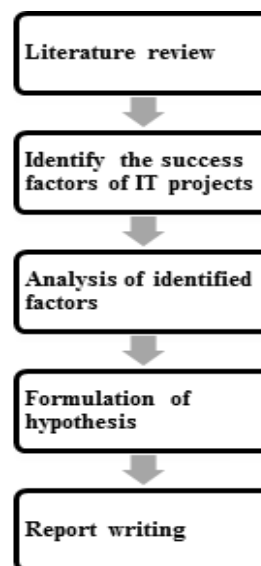


Fig. 1 Research Methodology

III. FINDINGS

Upon analyzing the research articles found in our exhaustive search we enlisted 15 factors that we believe are critical for the success of IT projects. The factors were selected based on strong evidence given in their corresponding studies. Next, each of these factors has been explained and we

also present a hypothesis based on our analysis.

A. Top Management Support

In [3], research work described Top Management Support as the most commonly cited factor when implementing complex IT systems. The importance of this factor can be seen from the following findings in the study.

- i. Of the eight unsuccessful projects studied, six were not considered urgent by the top management and didn't pay due attention to the project thus leading to its failure.
- ii. In four of the failed projects top management did not understand the details of the projects and also withheld approvals.
- iii. Another one of the failed projects was poorly supported and poorly understood by top management, the progress was halted mid-way due to poor interim results.
- iv. Top management supported and approved global and local projects.
- v. Top management should support middle level managers.
- vi. Top management support and understanding is more important for global projects than for small local projects.

As per [4], top management support is a factor that can be affected by the general state of the economy; a lack of this factor can lead to project failure. In their research it was found that in the successful project the Project Board (i.e. the Top Management) supported the project managers actively and held weekly meetings. However, in the failed project there was no evidence of the top management supporting the lower management. Top Management Support is one of the most important factors for success of IT/IS projects. This factor is important for ensuring a long-term business vision, top-level interaction among users, and IS departments to facilitate successful implementation. It was found out that greater the top management support, greater is the chance of success for the project [5]-[8]. According to [9], goal of top management is to support Information System through their authority and influence. From their investigation they found out that Top Management Support is the third most important critical success factor for IT projects. According to [10] also Top Management Support is one of the most important critical success factors.

B. Leadership

The study in [3] indicated that the lack of leadership resulted in the implementation phase taking more time than planned. In study [4] conducted on two IS projects, it was found out that for success of the project it is vital that the Project Manager is charismatic. The study [10], done on 36 Australian organizations found leadership effectiveness of the project manager as one of the critical success factors for the success of IT projects. As per the study of [7], leaders should have strong technical and relational skills. Leaders should use their charisma and influence to mold the working

environment. The importance of good leadership in IT projects was also studied successfully in [6].

C. Team Work

Reference [3] mentions about cross-functional team and cooperation between members of team and describes it as a critical success factor for IT projects. Studies [10], [7], [6] also listed teamwork as an important critical success factor of IT project.

D. Clear goals

Clear and well-defined goals are important critical success factors for a successful IT project [3], [7], [8]. According to [4], clear and realistic objective is very important for the success of a project and it is among the three most cited critical success factors. The comparative study on two projects revealed that the successful project had clear and realistic objectives, the realism of the objectives were proven by the success of the project. The failed project also had clear goals but only at the senior level and since the project failed the realism of the goals could not be validated successfully. The research work in [10] mentioned clear project among the top five critical success factors for IT project. In a successful IT project customer are very much concerned about the goals and there is a sense of responsibility about the goals from the whole team [6]. The goals are set in accordance with the requirements of the customer [11].

E. Team Capability

In accordance with the study of [4], the importance of a well-qualified team was established. In one project the team had a similar previous experience as that of the ongoing project and hence the project was successful. In the other project the team as well as its manager didn't have any prior experience, only one member of the team had IT qualification, as expected this project was a failure. As per [3], international scope of IT projects makes team capability an important critical success factor. According to [9], IS staff or team must have multi-dimensional capabilities. The team must be composed of technical staff and staff who have knowledge of the functioning of the company. This multidimensional aspect of the IS team is regarded as one of the most important factors of success. In the work of [10], [6], [8], Team Capability is mentioned as one of the key factors of IT project success. The capability of the team can influence the development process of the project [7].

F. Budget/Financial Support

IT projects require significant financial resources that affect firm operations [3]. In their work they also mentioned that for global information systems strong financial backing is required. Financial support is dependent on another critical success factor 'Top Management Support' as the senior executives approve the budget. In study [9], the importance of this factor was proved by a comparative study on two projects. The point to be noted in their research is that the successful project had more financial support than the failed project. The

importance of financial support as a critical success factor was also shown in the study of [10].

G. Effective Communication

Effective communication is regarded as an important factor for the success of IT projects, especially global IT projects. Lack of cross-functional and inter-departmental communication results in only moderate success. Effective communication helps stakeholders to understand the objectives and makes them more responsible towards their work [3], [7], [6], [11]. In study [4], it was revealed that the successful project had a solid communication system between the project board and the project managers and also between project managers and their teams. As for the failed project communication and feedback was sparse, they were very few meetings and most of the communication was through e-mail. According to [10], communication is determined as one of the critical success factors. Some properties of good communication mentioned in the research are:

- i. Communication should be clear and well defined
- ii. It should be as direct as possible; loops should be avoided.
- iii. Adequate communication channels should be used.

H. Process Quality

Quality should be monitored from the start of the project and excellent quality standards and expectations should be established [12]. The rationale for this is that a process cannot be reversed to add quality. When it is realized that there is a quality issue, it is perhaps too late to amend it. Hence it is a critical success factor for IT projects. The study [10], also mentions the importance of quality control and defines it as a critical success factor for IT projects.

I. Training

Staff training or user training has been defined as a critical success factor by some researchers. In the study carried out in [4], it was found that in the successful project adequate training was conducted, whereas in the failed project training was inadequate and the help manuals were also incomplete. As per [3], training should be conducted for managers, staff and end-users for the success of the IT project. The work of [7] shows the importance of user training especially for the long-term success of the project. It was also found that by training users gain more confidence in the IT system and hence it affects their attitudes towards the system. User training early in the development phase of the project can also help in building a better system.

J. Project Progress Schedule

As unlike in other projects where we can see the product being developed physically, software don't have physical manifestation therefore keeping track of the development schedule is very important. This lack of physical dimensions of a software product also makes it tough to monitor and track [12]. In the research conducted by [10], taking more time than the scheduled time is one of the main reasons for loss in IT projects. It has also been mentioned that meeting project

success is synonymous with meeting project schedule; this highlights the importance of this critical success factor. The project schedule should be realistic enough to be met and completed on time.

K. Customer/User Involvement

Successful projects take care of user's needs while developing the system [4]. Though there was no direct interaction with the end users they had a say in the development process. However in the failed project the needs of the users were ignored. In the initial hypotheses of [5], user involvement is directly related to the successful implementation of IT/IS projects however after conducting their survey they found that it is not a significant determinant of IT project success. This finding seems to be at odd with other studies though. As per [9], customer/user involvement in application design is necessary and the lack of it can result in IS project failure. Many IS projects fail due to their inability to meet user expectations. Customer interaction helps in better understanding of the systems and also helps in improving acceptance from users as they get to know the systems capabilities more clearly. [10], [6]-[8] in their research have highlighted the importance of customer involvement as a critical success factor for successful IT projects.

L. Risk Management

In successful projects risk analysis was done at the start of the project and risks that arose were handled successfully, whereas in the failed project no risk analysis was done [4]. As per [11], risks arise because stakeholders of the project do not take their responsibilities seriously. Active risk management can reduce risks and can also help in avoiding risks. According to [6], IT risk management can be done from different perspectives like application, organization, people and procedure.

M. Effective Monitoring and Control

Adequate monitoring and control is important for the quality of the project. Successful projects always have some mechanism for this [4]. Effective control can help in reducing the planned time and can also help in reducing ambiguity [11]. According to [6], project controlling and monitoring should be done on all stages of the project. Monitoring and control should be proactive, i.e. must be used to prevent incidents and provide regular feedback. Study [10] also defined this as one the critical success factors.

N. Adequate Requirement

Getting clear requirements is an important design issue; a tough but important task [8]. According to [9], adequate requirements is an important critical success factor. This factor though difficult to gather is very important for the success of the system; inadequate requirements usually lead to a failed project. Requirements should be collected systematically and clearly from every stakeholder [11]. Requirements should be defined clearly at the start of the project and according to the characteristic of the IT project [6]. Getting requirements involve developing a shared understanding of the future

system in sync with the users and then using it to develop the actual system in as much likeness as possible [7].

O. Select right team

Building the right team means getting suitable people in the team and it is one of the critical success factors for IT projects [12]. The study [10], also listed right team as a CSF of IT project. According to the work of [6], the project team is responsible for the stability of the project and it is important to get a suitable mix of experts in the team.

Table I enlists the critical success factors (F) and their corresponding studies (S). It also represents the total occurrences (T) of each of the critical success factors. From their frequency of occurrence we can observe that Top Management Support is the most studied critical success factor and possibly the most important of them all in determining the success of IT projects. Project Quality and Project Process Schedule are the least studied factors and probably have minimum effect in success of IT.

TABLE I
STUDIES AND FACTORS

F \ S	[10]	[7]	[6]	[11]	[3]	[5]	[4]	[9]	[8]	[12]	T
TMS	✓	✓	✓		✓	✓	✓	✓	✓		8
LD	✓	✓	✓		✓		✓				5
TM	✓	✓	✓		✓						4
CG	✓	✓	✓	✓	✓		✓		✓		7
TC	✓	✓	✓		✓		✓	✓	✓		7
BS	✓				✓		✓				3
EC	✓	✓	✓	✓	✓		✓				6
PQ	✓									✓	2
TR		✓			✓		✓				3
PPS	✓									✓	2
C/UI	✓	✓	✓			✓	✓	✓	✓		7
RM			✓	✓			✓				3
EMC	✓		✓	✓			✓				4
AR		✓	✓	✓				✓	✓		5
SRT	✓		✓							✓	3

Top Management Support(TMS), Leadership(LD), Team Work(TM), Clear Goals(CG), Team Capability(TC), Budget/Financial Support(BS), Effective Communication(EC), Process Quality(PQ), Training(TR), Project Progress Schedule(PPS), Customer /User Involvement(C/UI), Risk Management(RM), Effective Monitoring and control(EMC), Adequate Requirement(AR), Select right Team(SRT)

From our analysis we deduced the following hypotheses to predict the causal effect of the above discussed factors on the success of IT projects. In Fig. 2 the hypothesis model is depicted.

- H1. TMS strongly affects the success of IT projects.
- H2. LD strongly affects the success of IT projects.
- H3. TM has a medium effect in determining the success of IT projects.
- H4. CG strongly affects the success of IT projects.
- H5. TC strongly affects the success of IT projects.
- H6. BS has a medium effect in determining the success of IT projects.
- H7. EC strongly affects the success of IT projects.
- H8. PQ weakly effects the success of IT projects.
- H9. TR has a medium effect in determining the success of IT projects.
- H10. PPS weakly effects the success of IT projects.
- H11. C/UI strongly affects the success of IT projects.
- H12. RM has a medium effect in determining the success of IT projects.
- H13. EMC has a medium effect in determining the success of IT projects.
- H14. AR strongly affects the success of IT projects.
- H15. SRT has a medium effect in determining the success of IT projects.

IV. CONCLUSION AND FUTURE STUDY

In this study we have listed down and discussed 15 factors that are critical success factors for IT projects. The uniqueness of this study is that we have tried to come up with umbrella list of factors that can be related with all IT projects and not specifically to software projects, executive-information systems etc. The implications of such a study are many; it can be used by actual practitioners wanting to improve their projects success or by fellow researchers studying factors promoting success in IT/IS projects.

We deduced hypotheses but proving them empirically was beyond the scope of this paper. Researchers can statistically validate the hypotheses to confirm their soundness and also find new CSFs. We believe that some of the factors could have a more important effect in determining success of IT projects than that suggested by our work, but could not be determined in previous studies due to various reasons.

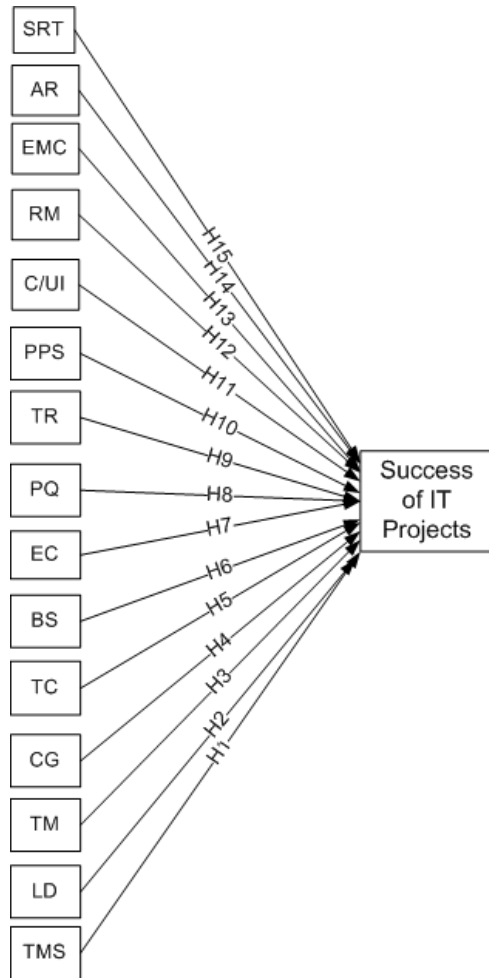


Fig. 2 Hypothesis

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