HOW PMBOK ADDRESSES CRITICAL SUCCESS FACTORS FOR IT PROJECTS?

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Abstract

Critical success factors (CSFs) are criteria that ensure the success of a project for a manager or an organization, and increase the success possibility of a project. CSFs differ from project to project, industry to industry. Another significant factor in project success is project management methodology. In this domain there are some well-known project management frameworks such as PMBOK, PRINCE2 and APMBOK. The aim of this study is to evaluate how Project Management Body of Knowledge (PMBOK) addresses the critical success factors (CSFs) for the IT projects and to identify strengths and weaknesses of this project management framework from the perspective of responding CSFs. Firstly, a CSFs set is determined via literature review. Then PMBOK is reviewed to find out at what level it addresses the determined critical success factors for software projects. In addition to general CSFs for IT projects, CSFs for IT projects in some specific areas e.g. agile software projects, ERP implementation projects, data warehouse and business intelligence systems projects, data mining projects, offshore software development projects. PMBOK's response to such type projects are also reviewed.

Keywords: IT Project, Project management, PMBOK, Critical Success Factors

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PMBOK BILIŞIM TEKNOLOJILERI PROJELERININ KRITIK BAŞARI FAKTÖRLERINI NASIL ELE ALIR?

Öz

Kritik başarı faktörleri (KBFler) bir projenin başarısını yönetici ya da kurum açısından temin eden ve projenin başarı olasılığını yükselten ölçütlerdir. KBFler projeden projeye ya da sektörden sektöre farklılık gösterirler. Proje başarısında bir diğer önemli etken de proje yönetim yaklaşımıdır. Bu alanda PMBOK, PRINCE2 ve APMBOK gibi bir takım iyi bilinen tanımlanmış proje yönetim çerçeveleri vardır. Bu çalışmanın amacı, Proje Yönetim Bilgi Tabanı (PMBOK) çerçevesini KBFleri nasıl kapsadığı açısından değerlendirmek ve bu proje yönetim çerçevesinin güçlü ve zayıf yanlarını KBFleri karşılaması bakımından belirlemektir. Öncelikle kaynak taramasına dayalı bir kritik başarı faktörleri kümesi belirlenecektir. Daha sonra, PMBOK çerçevesinin bu belirlenen KBFleri BT (bilişim teknolojileri) projeleri açısından hangi düzeyde karşıladığı değerlendirilecektir. BT projelerindeki genel KBFlerin yanı sıra çevik yazılım projeleri, ERP geliştirme projeleri, veri ambarı ve iş istihbaratı projeleri, veri madenciliği projeleri, sınır ötesi yazılım geliştirme olarak adlandırılan özel BT projelerine yönelik proje KBFleri ele alınacaktır. Ayrıca PMBOK çerçevesinin bunları nasıl karşıladığı da incelenecektir.

Anahtar Kelimeler: BT Projesi, Proje Yönetimi, PMBOK, Kritik Başarı Faktörleri

INTRODUCTION

Developing software that meets all requirements within specified limits is a challenge for the software developers. According to the Standish Group Report released in 2012, 61% of the IT projects either completely failed or were not able to meet requirements such as time, budget or performance. As stated in the same report, for the large projects (having more than $10 million budget) there is a twice a risk of not being able to meet project constraints such as time, budget and technical requirements. In order to cope with this problem, some frameworks and guidelines have been developed.

PMBOK, developed by Project Management Institute (PMI), is a worldwide recognized project management framework. According to Chin and Spowage (2010) PMBOK is classified in "Best Practices" Project management methodologies together with PRojects IN Controlled Environment Version 2 (PRINCE2) and Association for Project Managers Body of Knowledge (APMBOK). Best practices can be applied to any type of project at any industry and organization. In this study, PMBOK is focused on to understand how it addresses the CSFs for IT projects.

"The PMBOK contains the globally recognized standard and guide for project management profession" (PMBOK, p.1). It has 10 knowledge areas, 5 process groups and 47 processes. Knowledge areas are integration, scope, time, cost, quality, human resource, communications, risk, procurement and stakeholder management. Process groups are initiating, planning, executing, monitoring and

controlling and closing. They are set of activities for specific areas and include several sub processes. PMBOK can be applied to any type and size of projects at all sectors.

I. Critical Success Factors for IT Projects

There are several studies in the literature about CSFs and about identifying CSFs for projects. Boynlon and Zmud, (1984) defines critical success factors as "few things that must go well to ensure success for a manager or an organization". According to Charvat (2003) "CSFs set out the culture, behavior and actions for management to take to achieve its objectives" (p.37). This implies that CSFs are essential to identify for each organizations. From project management perspective, Pinto and Rouhiainen (2001, as cited in Nasir and Shamsul, 2011) defines CSFs as "factors that, if addressed appropriately, will significantly improve the chances of project success". According to Baker (1983, as cited in Meredith and Mantel, 2012) CSFs are different for different industries. For this reason instead of looking general CSFs we concentrate on CSFs for IT projects.

Jones (2004), by analyzing large software projects between 1985 and 2004, identifies six major factors for success: Effective project planning, cost estimating, project measurements, milestone tracking, project change management and quality control. He also stresses that performing these factors inadequately results projects to fail. Based on the literature study and expert opinions Brandon (2006) classifies CSFs for IT projects into two groups according to completion and satisfaction criteria. In completion criteria group, he identifies ability to perform, commitment to perform, methodology, verification, technology and project management as CSFs. According to satisfaction criteria he identifies business justification, validation, workflow and content, standards, maintainability and support, adaptability and trust, and security as CSFs. Nasir and Shamsul (2011), by reviewing previous studies for different project sizes and multiple countries, identifies 5 CSFs that are crucial for the successful complementation of the software projects: clear requirements and specifications, clear objectives and goals, realistic schedule, effective project management skills/ methodologies and support from top management. According to survey results, The Standish Group 2012 CHAOS Manifesto identifies 10 success factors for IT projects as follows: Executive management support, user involvement, clear business objectives, emotional maturity, optimization, agile process, project management expertise, skilled resources, execution, tools and infrastructure. The first five of these CSFs have relatively higher ratings than the last five. According to same group's 2013 Manifesto, CSFs are the same also for the small size IT projects (having less than $1 million budget), although prioritization differs.

The reasons for project failures can also help us to identify CSFs. According to a survey carried out at 1,450 public and private sector organizations in Canada in 1997, 3 common reasons for IT Project failures was: poor project planning, a weak business case and lack of top management involvement and support (Whittaker, 1999). Kappelman, McKeeman and Zhang (2006), identify the following 12 IT project risks according to 19 experts and 55 IT project managers as early warnings of project failure: Lack of top management support, weak project manager, lack of stakeholder involvement and/or participation, weak commitment of project team, team members lacking requisite knowledge and/or skills, subject matter experts' being overscheduled, lack of documented requirements and/or success criteria, lack of change control process (change management), ineffective schedule planning and/or management, communication breakdown among stakeholders, resources assigned to a higher priority project, and lack of business case for the project.

The CSFs for IT projects in specific areas can be different. Sim (2003) consolidates possible CSFs for data mining projects into 7 set: communications, high quality dataset, output, business mission, consultation, business environment and action. Among these CSFs sets he identifies high quality dataset, as a significant factor for data mining projects. According to Wong and Tein (2003) top 10 critical success factors for ERP (Enterprise Resource Planning) projects identified by literature study are: Top management commitment and support, business process reengineering, use of project management to manage implementation, change management culture and program, clear goals, focus and scope, selecting the right team, avoidance customization, project champion, user training and education, and effective communication. Chow T. and Cao D (2008), identify 6 CSFs for agile software projects according to the survey results of 109 agile projects from 25 countries: A correct delivery strategy, a proper practice of agile software engineering techniques, a high-caliber team, a good agile project management process, an agile-friendly team environment and a strong customer involvement. Arnot (2008) identifies ten CSFs for data warehouse and business intelligence systems by literature study: Committed and informed executive sponsor, widespread management support, appropriate team skills, appropriate technology, effective data management, clear link with business objectives, well-defined information and systems requirements, evolutionary development, management of project scope. Remus and Wiener (2009) identify 7 CSFs for offshore software development projects: Definition of clear project goals, continuous controlling of project results, ensuring a continuous communication flow, high quality of offshore employees, good language abilities of the offshore employees, composition of appropriate project team, and preparation of detailed project specification.

II. Critical Success Factors and PMBOK

By analyzing and consolidating CSFs identified above, 20 common CSFs without repetition are determined. How and at what level PMBOK address those CSFs is mentioned in this part of the study.

A. Clear Requirements and Specifications

'Requirements management plan', which is a part of project management plan, explains how to deal with requirements. Also 'collect requirements' process involves tools and techniques for identifying requirements. PMBOK stresses the importance of stakeholder involvement to identify requirements and specifications.

B. Realistic Schedule and Timing

This CSF is covered by 'Project Time Management' knowledge area. Schedule is monitored and updated by utilizing 'control schedule' process, which is related with 'project time management' knowledge area and a part of 'monitoring and controlling process group'. Also there are many techniques explained by PMBOK for dealing with time management activities such as precedence diagramming method, bottom-up estimating, critical path method, etc. Estimating

activity durations are critical for having realistic schedules, and PMBOK mentions the importance of expert judgement and historical information in addition to analytical techniques.

C. Support from Top Management

PMBOK has a separate knowledge management area 'project stakeholder management' for identifying and managing stakeholders. Also stakeholder satisfaction is one of the key objectives of the project. Additionally, Project Charter is approved by sponsoring entity and PM is authorized to plan and execute the project. However, PMBOK does not stress enough the senior management support.

D. User Involvement

PMBOK is focused on customer requirements (Singh and Lano, 2014). User involvement is strongly covered by PMBOK especially by 'stakeholder management' knowledge area.

E. Emotional Maturity

This factor is also mentioned as Emotional State of the Project Environment. PMBOK stresses the importance of interpersonal skills of the project manager such as team building, coaching and motivation. Also enterprise environmental factors are inputs for several processes of PMBOK and they directly affect project success. However, PMBOK does not address clearly about emotional maturity of the project environment.

F. Optimization

Project optimization is achieved especially by scope management and integration management knowledge areas. Moreover, most of the processes use tools and techniques to provide optimization in the specific areas.

G. Effective Milestone Tracking

Project milestones, which identifies start or completion of major deliverables, are integrated into Project schedule. Project deliverables are accepted by 'validate scope' process and activities of a phase are finalized by the 'close project or phase' process.

H. Strong Business Case

Business case is input for the 'Develop Project Charter' process. However, there is no strong emphasis for business case throughout PMBOK knowledge areas and processes.

I. Effective Project Management Skills/Methodologies (Project Manager)

PMBOK itself is the project management framework. It also covers interpersonal skills that are important for project managers.

J. Commitment of Project Team

This CSF is covered by human resource management knowledge area and Appendix X3 in PMBOK (Interpersonal Skills of Project Manager). Remaining 10 Critical Success Factors for IT project development are shown in Table 1.

Table 1. CSFs for IT Projects and PMBOK

CSFs	HOW PMBOK addresses
11. Clear Objectives and Goals	Comprehensively covered by 'Develop Project Charter' process.
12. Effective Project Planning	Comprehensively covered by planning process group.
13. Effective Cost Estimating	Comprehensively covered by cost management knowledge area.
14. Effective Project Measurements	Covered by 'plan quality management' process.
15. Effective Quality Control	Comprehensively covered by quality management knowledge area.
16. Effective Change Management	Covered by 'Perform Integrated Change Control' process.
17. Strong Communication Between Stakeholders	Comprehensively covered by communications management knowledge area.
18. Ability Of Project Team	Covered by 'Human Resource Management' knowledge area.
19. Appropriate Technology	Verified by 'Develop Project Charter' Process.
20. Continuous Monitoring And Controlling	Covered by 'Monitoring And Controlling Process Group'

III. CSFs for Specific IT Projects and PMBOK

When we analyze CSFs for IT projects in specific areas, we identify that most of the CSFs are the same with above mentioned 20 CSFs. In other words, it is important to note that those 20 CSFs are expected for general IT projects. In addition to those, there are some other CSFs for specific IT projects such as ERP, decision support systems, business intelligence development projects. In this part of the study, project type and CSFs are criticized in terms of how PMBOK addresses.

A. Agile Software Projects

For such projects type, "A correct delivery strategy" is one of the additional CSF. This is covered by scope, time, cost and quality management knowledge areas. "A proper practice of agile software engineering techniques" is another critical

success factors for such projects type which is covered by PMBOK since it is related with the software process models.

B. ERP Implementation Projects

In this type of projects, three specific CSFs can be mentioned. The first one is "Business process reengineering". This factor can be addressed by scope management knowledge area. Second, for ERP projects, project sponsor is also crucial factor and named as "project champion". This factor also covered by stake holder management knowledge area in PMBOK. Third CSF for ERP project is ""avoidance customization" which is not covered by PMBOK knowledge areas.

C. Data Warehouse and Business Intelligence Systems Projects

For such projects "Committed and Executive Sponsor" is an important CSF which is addressed by project stakeholder management knowledge area. On the other hand "Effective data management" and "Evolutionary development" CSFs are not covered by PMBOK.

D. Data Mining Projects

In addition to general CSFs, "High Quality Dataset" is also critical factor since data mining projects are highly data driven and dependent. However, PMBOK does not cover this factor. On the other hand, software process models focuses such factors.

4.4. Offshore Software Development Projects

This type of project, "Good language abilities of the offshore employees" is a critical success factor. This is covered by Human Resource Management knowledge area. Depending on the location, German and English language is more taken in to account.

CONCLUSION

With the above considerations, PMBOK sufficiently addresses most of the CSFs related with software projects, except three CSFs:

- Support from top management

- Emotional state of the project environment

- Strong Business Case

In order to improve chance of success for IT projects, project managers need to review CSFs continually and ensure that they are addressed throughout the project. PMBOK can be improved by addressing above CSFs inside relevant knowledge areas and processes. Also CSFs can be integrated as a set inside monitor and controlling process group. Another approach may be to comment CSFs as enterprise environmental factors and thus integrate with several processes.

In addition to general CSFs for IT projects, we also reviewed CSFs for IT project in some specific areas. We observe that many of the CSFs for special areas are the same with CSF's identified for general IT projects. However, there are also

different CSF's for specific IT projects. We also identify that project management framework is not able to address all CSFs alone. Some CSFs needs to be covered by software process models or capability maturity models.

In this study we combined together most important CSFs identified from several studies carried out in different countries, using different data set and different research methods. The advantage of this approach is that we use a set of CSFs obtained from several studies, to represent different approaches. We also notice that several CSFs identified at different studies are the same. For the future work, the CSFs sets obtained from different works can be tested and ranked by a new survey. Additionally, other project management frameworks such as PRINCE2 can also be evaluated by using the same CSFs. It is also possible to identify CSFs for IT projects at several different areas. Moreover it can also be useful to evaluate how capability maturity model and software process models address the identified CSFs.

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