

Analysis of Critical Success Factors (CSF) in the Quality Assurance Project of PT. SVM

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ABSTRACT

A development project of quality assurance is always planned to achieve a successful and satisfactory final project result. Many factors affect a quality assurance project's ability to achieve a successful final project result, called the Critical Success Factors. Conducting critical success factor analysis requires the company appropriate for the research, PT. SVM was selected as the subject of research. This research analyzes the Critical Success Factors (CSF) at PT. SVM in handling university quality assurance development projects in various cities in Indonesia. The research stages are the initial interview, literature review, data analysis and verification, and determining the result. The results of the CSF analysis in the literature matched with the verification results of CSF-related interviews. Based on 25 CSFs analyzed from the literature review, 23 CSFs were used in PT. SVM, and 2 CSFs were not obtained from the verification process at PT. SVM. Twenty-three factors are considered to determine the success of the quality assurance project at PT. SVM. This factor will be able to handle failures that occur by maximizing the success factors that have been analyzed. PT. SVM always carries out the organization of the people involved in the project. Project team skills and knowledge are essential not to burden other teams and to build effective direct communication. A project completed on time indicates success, teamwork, and the clear goal of the project, and teamwork is carried out directly, admonishing each other between the PIC and the project team. The PIC, or project manager, has an important role in PT.SVM in organizing the project and maximizing the 23 CSFs that have been analyzed.

Keyword: *critical success factor (CSF), quality assurance, IT project*

1. Introduction

The big problems for ICT projects are cost overruns, late deliveries, and projects being canceled before they're finished (1). The success of an IT project is still a topic of debate. But IT projects always have the chance of failing, and research (2) shows that most IT projects fail. Apart from failure, many components lead to the success of an IT project. In a successful IT project, the client is so concerned about the project objectives that they participate in the project management process and agree to the final system (3). There are a lot of things that affect the success of IT projects, and it's important to figure out which ones are the most important. Due to the complexity and uncertainty of IT projects, critical success factors (CSFs) need to be looked at from different perspectives (2). In 1967, Rubin and Sealing wrote the first article about project success factors (4), and in 1988, (5) made a list of CSFs that is widely known and used.

Critical success factors (CSFs) are a part of project management that can contribute directly or indirectly to the success of a project. (6). CSFs for project management dramatically improve the probability that a project will succeed. (7). Researchers from different countries have come up with several CSF to improve the success rate of ICT projects. Even though these factors have more than one cause and more than one dimension, it is possible to categorize the factors that already have similar definitions into so-called CSF (1).

According to (3), the factors that make a project successful are project participation, project communication, collaboration, mechanisms for sharing information, and project management processes. Also, many studies on project success have in the past focused on meeting cost, quality, and time goals. Recent studies (8,9) suggest that a new set of measures is needed to measure project success. These studies identified four success criteria: efficiency, effectiveness, meeting business needs, and stakeholder satisfaction. These criteria serve as a guide for making project dimensions that measure the relationship between the level of success and the level of project success factors. Many organizations around the world are worried about the success of software development projects (10). Another study on the success factors in IT projects, with a case study of the financial industry, resulted in five factors and eighteen sub-factors obtained by systematic literature review and expert judgment. The five success factors are: organizational, project, project manager, project team, and external environment (11).

This study selected a company engaged in the development of IT projects. The company is one of the software developers in Indonesia responsible for quality assurance initiatives in higher education. Quality assurance is one of the IT initiatives that require a success factor analysis. The quality assurance application was chosen because most of the research discusses CSFs for IT projects or software in general (10,12–19), information system (20,21), IS/IT project management (3,6,7,22), financial dan others. Quality assurance, often known as SPM Dikti, is a university-wide IT initiative. In accordance with Law No. 12 of 2012 pertaining to Higher Education, SPM Dikti has two systems: the Internal Quality Assurance System (SPMI) and the External Quality Assurance System (SPME), generally known as Accreditation. Accreditation is one of the modules included in a university-wide IT project (23).

Universities in Indonesia need quality assurance projects to improve their Accreditation. Its implementation requires the role of the company in assisting its development. One of these companies is PT. SVM. An information technology consulting and development company founded in 2004 focused on the education sector. It currently has an office location in Surabaya, supported by competent, innovative, and professional young experts who are experienced in their fields. PT. SVM has several missions, one of which is to develop integrated solutions for educational institutions by applying appropriate and practical information and communication technologies. To provide solutions for educational institutions, they must pay attention to project implementation, especially project success criteria. This research analyzes the Critical Success Factors (CSF) at PT. SVM in handling university quality assurance development projects in various cities in Indonesia. This research was conducted by an initial interview with one of the resource persons from the project team at the selected company, namely PT. SVM. Interviews were conducted to find out the problems that exist in the quality assurance project in the company. This issue is a potential failure since there has been insufficient analysis of the success criteria. Several journals that study Critical Success Factors (CSFs) in IT projects provide information for analyzing project success factors. To analyze the relationship between the existing project success variables, this research was compiled via literature reviews and interviews with respondent. This research consists of four stages: 1. initial interview; 2. literature review; 3. Data analysis and verification; and 4. determining the result. Based on the background that has been mentioned, several problems can be formulated in this paper, including 1) What are the critical success factors in a quality assurance project in an IT project? 2) What are the critical success factors in the quality assurance project at PT.SVM?

2. Research Method

The methodology describes the stages of the research, including the initial interview, literature review, data analysis and verification, and determining the result. Figure 1 shows the research process.



Figure 1. The Research Processes of This Study

2.1 The initial interview

The initial stage of this research is to conduct an initial interview at a software house developer in Surabaya. Initial interviews were conducted with one of the members of the quality assurance project-managing teams. This phase generates a topic that will be explored in this study. After selecting a topic, the next step is to conduct a literature review.

2.2 Literatur Review

This literature study was conducted to find journals that support the topics discussed in this paper. The literature study stage is divided into several more specific stages, namely journal search, journal elimination, and journal analysis. In the first step, the journal search process is carried out on online journal databases, namely "ScienceDirect", "Emerald", "IEEE", and "Google Scholar". The journal search process uses specific keywords that match the topic of this research. The journal search process is categorized by year of publication to see statistics on its development. The journals obtained are certainly not specific and follow the topic in this research, so the journal elimination stage is carried out. The second step is journal elimination. This elimination process is done by reading the abstract from the journal to determine the suitability of the topic being discussed. The third step is to analyze journals that are in accordance with the topic and explain the critical success factors in the IT project.

2.3 Data Analysis and verification

Stages of analysis are carried out to obtain journals with discussions almost the same as the topic of this research. The journal is then mapped to get the critical success factor in an IT project. The CSFs are ranked to know which factors are most frequently discussed in the literature. The results of this analysis are then verified with the results obtained from the selected company. Verification is done using open-ended interview questions based on the critical success factors that have been analyzed. The interview was conducted with one respondent who has a vital role in the quality assurance project. This stage will produce a critical success factor for the quality assurance project in the analyzed company.

2.4 Determining the result

The stage of determining the results is the final stage of this research. The results of all the previous steps will be analyzed at this stage. The critical success factors not mentioned in the interview were then analyzed based on previous research that discussed the importance of these factors. Then discuss the conclusions of this study.

3. Result and Analysis

Results and Analysis discuss the results of critical success factors in a quality assurance project at PT. SVM was compared with critical success factors in the literature review. Then, at this stage, a discussion of which factors are not found in PT. SVM.

3.1 The result of initial interview

The initial interview was conducted at one of the software house developers in Surabaya, PT. SVM. In extracting information, an initial interview was conducted with one of the resource persons from the team, namely the PIC (Person In Charge). The team used as the object of this research explicitly handles quality assurance projects with 8-9 members. A PIC or generally referred to as the project manager in the project. The PIC has responsibility for project control from start to finish, so it is necessary to know what makes the project fail and succeed. Based on the interviews, the results obtained about the description of the quality assurance project, as well as the factors causing the failure and success of the project. The topic to be researched is critical success factors (CSFs) in the quality assurance project developed by PT. SVM. This topic was chosen because failures often occur in an IT project, and an analysis of the determinants of success is needed to achieve the project's success, so that failures do not continue to be repeated and can be anticipated.

3.2 The result of Literature Review

In this step of the research, a comprehensive literature review of resources such as journals, and conference proceedings from 2008 to 2018 was conducted. The literature review aims to find critical success factors in IT projects in previous studies. The search process is carried out on online journal databases, namely "ScienceDirect", "Emerald", "IEEE", and "Google Scholar". In the search process, "*critical success factor*" in "IT project" is the keyword. The results are shown in Table 1.

Table 1. Journal Search Results Through Online Journal Database

Tahun	Science Direct	Emerald	IEEE	Scholar
2008	150	48	16	116
2009	163	90	14	110
2010	159	72	25	140
2011	167	73	13	124
2012	233	63	20	138
2013	267	62	15	173
2014	317	77	8	132
2015	345	68	15	172
2016	346	89	9	166
2017	321	109	13	153
2018	178	61	1	165

The literature review results are based on the specified keywords; not all journals from the search results can be used as reference journals in this research. At this stage, 40 journals were obtained that could be used as literature. This journal was selected based on the selection of titles and keywords used. Only journals with the title and keywords “critical success factor” and “IT Project” can be selected. A comprehensive literature analysis found a set of success factors affecting project success. Using frequency and content analysis, success factors discussed in the selected articles were identified, recorded, and categorized. A list of critical success factors was compiled using frequency and technique analyses. The journal is eliminated to get a journal that fits the discussed topic. The elimination process is done by reading each journal's abstracts, results, and conclusions. The elimination phase looks at journals that discuss CSFs in IT projects, not just focusing on one or two CSFs. The elimination stage selects 20 studies that describe the types of critical success factors that determine the success of IT projects. The research consisted of journals and conference proceedings.

3.3 Data Analysis and Verification

Rockart introduced the term "critical success factor" to the context of projects in 1980, defining it as "the factors which predict project success." (24). The success criteria for a project are on-time completion, within-budget expenses, client satisfaction, and efficient team management (25). Following a detailed analysis of the literature on IT project success factors, Cleary identified the CSFs as Project Scope, Skilled and Competent Project Team, and the Project Manager's Leadership Qualities. The Leadership Qualities of the Project Manager had no effect on the Skilled and Competent Members of the Project Team. Moreover, it was determined that the clear and well-defined Project Scope from the beginning of the project had an impact on the conclusion and contributed to the success of the IT Project. (17). There is research that outlines hierarchical and multidimensional models have been developed on the significance of project performance from four viewpoints of strategic management, including project-related, people-related, and process-related features (16). People's aspects include good customer interactions, cohesive, self-organizing collaboration, a motivated team, supervisors with a light touch or a flexible management style, and team members with a high level of experience and competence (26). Process factors such as project management processes, and project definition processes (27). Project nature, Project type, project plan, project time, and project cost are the component of project factor in IT project (27). Technical factors such as the use of Agile software techniques, and delivery strategy (27). To reach the technical factor, a team must have the knowledge and skills necessary to complete all project tasks (15,17). High risk is linked with ICT projects with hybrid requirements. To adjust and adapt the project promptly, stakeholders must communicate quickly and maintain close ties (1).

In an IT project, there are several critical success factors (CSFs) that can be used as critical success factors in the project. The results of the 20 journals that have been analyzed show that each journal has a group of critical success factors (CSFs) that vary. The results of the CSF grouping analysis for each journal can be seen in Table 2.

Table 2. Critical Success Factor based on Literature Review

No	Critical Success Factor	Referensi	Frekuensi
1.	People	(3,6,10,16,20,26,28–34)	13
2.	Project team skills and knowledge	(2,15,16,20,26–28,32,35)	9
3.	Process	(2,7,16,26,27,30,31,33,35)	9
4.	Communication	(2,3,10,15,26,31,32,36)	8
5.	Project Manager	(6,10,15,20,26,30,37)	7
6.	Project time	(2,15,16,26–28,31)	7
7.	Project Management	(7,10,16,20,29,30,37)	7
8.	Collaboration/Team work	(2,3,10,26,31,34,35)	7
9.	Project Plan	(2,16,28,30–32)	6
10.	Clear goal	(2,15,16,26,31,32)	6
11.	Client knowledge and engagement	(2,7,30–32,37)	6
12.	Project Cost	(2,16,26,28,31)	5
13.	Technical	(6,10,15,27,32)	5
14.	Product/Project	(10,20,27)	3
15.	Agreement (Management contract/ commitment)	(7,15,27,36,37)	5
16.	Top management	(2,16,31,32,37)	5
17.	Risk management	(2,15,30,35,36)	5
18.	Training	(2,26,30,31)	4
19.	Project Monitoring and control	(2,15,31,32)	4
20.	Information exchange mechanism	(3,31,32)	3
21.	Eksternal factors	(6,29,37)	3
22.	Team manager leadership	(2,30,32)	3
23.	Roles in the team	(2,36)	2
24.	Institution (Company)	(35,37)	2
25.	Project policy	(29)	1

As indicated in Table 2, a set of twenty-five important success variables have been identified and ranked according to their relative importance based on their frequency of occurrence in the literature. Based on the ranking of the 25 critical success factors analyzed, the people factor ranks at the top. The results of the literature review were verified on the research object. Verification results are displayed excerpts from interviews conducted. The verification results can be seen in Table 3.

Table 3. CSFs Verification Results from Interviews and Literature Review

No	Critical Success Factor	Interview Result	Reference	Verification
1.	People	"The success factor, for example, is a PIC from a proactive client and and the people involved in the team" "The category of failure is when the project in our opinion is one of them because the project can't be used, the person doesn't want to use it"	(3,6,10,16,20,26,28–34)	Yes
2.	Project team skills and knowledge	"In this team initially, there were nine members, then one person came out, so it needed one more person as a programmer to replace the ones that came out. Newly entered programmers can't get to work right away, can't help right away. For 1-2 months, it is still a burden the team, burden on the team because they have to teach, teach not coding but introduce the company's framework and introduce the process flow that is in this project. So 1-2 months is their training period; they haven't been able to help the team. That's why knowledge from the team is important so as not to burden other teams"	(2,15,16,20,26–28,32,35)	Yes
3.	Process	"When there is a project, marketing will make prospects. If the prospect meets a point of agreement, the marketing will contact the technical team to survey the contract. After that, come to the client to process the contract. The contract is bridged by marketing, then reviewed by the administration because there is a need for the signature of the leader, etc., the contract period, legal, etc. This is reviewed first. Then the draft is brought to the client for signature. Then when the deal. Marketing will bring project information related to scope, etc."	(2,7,16,26,27,30,31,33,35)	Yes
4.	Communication	"Direct communication is more effective. So usually, the handling can be direct so that it is easier. Can carry out discussions and open the application directly at the same time. But if the client is outside Surabaya, the communication is by email; usually, after we get an email, we check first." "Because in the same room, it's straightforward. If you want to communicate, you can do it directly; you can reprimand each other" "After the UAT process, etc., from the point of view of PIC X, there was an error, namely that he was dishonest. Not being open with his team, even though they have been asked, the answer is always yes, even though it has not been done yet."	(2,3,10,15,26,31,32,36)	Yes
5.	Project Manager	"Because the conditions in each project have a different PIC "	(6,10,15,20,26,30,37)	Yes
6.	Project time	"Project completed on time is an indication of success"	(2,15,16,26–28,31)	Yes
7.	Project Management	"Internally critical success factors, for example, we get a project that we have worked on before. So we have the prototype, we have the business process, and we have base practice. So that we can easily and not waste time, do not design from scratch but can use existing ones."	(7,10,16,20,29,30,37)	Yes
8.	Collaboration/Team work	" Teamwork is carried out directly, admonishing each other between the PIC and the project team."	(2,3,10,26,31,34,35)	Yes
9.	Project Plan	"A project is divided into sprints or modules. Each module has its own processing time"	(2,16,28,30–32)	Yes
10.	Clear goal	" The goal of the company in addition to cost and time by what is planned, another goal is so that the quality assurance project can provide value to the customer."	(2,15,16,26,31,32)	Yes
11.	Client knowledge and engagement	"For example, the PIC of the customer team is a person who has a position so that he can apply	(2,7,30–32,37)	Yes

No	Critical Success Factor	Interview Result	Reference	Verification
		pressure. It is a success because we are easy to determine policy.”		
12.	Project Cost	“Successful projects of course the costs incurred do not exceed what has been budgeted”	(2,16,26,28,31)	Yes
13.	Technical	“Critical success factor, namely doing PMA (Post Mortem Analysis) after all processes are complete. So after BAST, it is recommended to do PMA.”	(6,10,15,27,32)	Yes
14.	Product/Project	“But from the other side, because we don't only see the success of the project from the incoming funds but also from how the application is used ”	(10,20,27)	Yes
15.	Agreement (Management contract/ commitment)	“The contract is an important thing that must be agreed by both parties, which is done at the beginning.” “The contract cannot be changed; what has changed is from FR. Well, the way FR is, they propose, there is a sign from the leadership who submitted it, from us, it means that it is ready to be carried out. In the FR document, there is a duration of the processing, the standard rate, and the price; it cannot be shared.”	(7,15,27,36,37)	Yes
16.	Top management		(2,16,31,32,37)	No
17.	Risk management		(2,15,30,35,36)	No
18.	Training	“For a new team, it takes 1-2 months to teach, not coding but introducing the company's framework, introducing the process flow in this project.”	(2,26,30,31)	Yes
19.	Project Monitoring and control	“The meeting in the morning is only aimed at seeing an outline of the obstacles; then after the meeting, it is continued with more focused meetings, small meetings so that you can control.”	(2,15,31,32)	Yes
20.	Information exchange mechanism	“We have means of communication, namely email, hangouts, and so on. But the most active area in the WhatsApp group. In the WhatsApp group, analysts, implementers, and sometimes programmers are also included.”	(3,31,32)	Yes
21.	External factors	“The most important thing in the success of a project is how customers can feel the project's benefits, and create a sense of trust to work with the company again.”	(6,29,37)	Yes
22.	Team manager leadership	“Because the number of people in the team is not much and the team manager understands all the work that team members do. So when something has not been completed, the team manager can ask what the problem is, then discuss a team that is only involved in the project.”	(2,30,32)	Yes
23.	Roles in the team	“Because it uses scrum, and scrum theory says that the ideal team size is between 8-9 people, if it's more than that, maintenance will be more difficult, communication will also be a bit disrupted, etc.”	(2,36)	Yes
24.	Institution (Company)	During maintenance, there are changes or interference from the client. Usually, maintenance is one year, but the company can still serve customer reports by providing FR (Form Request). FR there are paid and free. It's free if there are only bugs and can be done immediately. If it is delivered, it cannot be done immediately; see the level of importance of the FR submission. The company can refuse FR.”	(35,37)	Yes
25.	Project policy		(29)	Yes

Table 3 was verified by conducting interviews with PT.SVM selected respondents. The interview instrument is an open-ended question adjusted to the results of the critical success factor based on the literature review. In the PT.SVM quality assurance project, the verification results indicate that 23 CSFs match the literature review and interview results, whereas 2 CSFs are not explained by respondents as project success factors.

3.4 Result

The most essential factor of a project is that its participants successfully execute process management and ensure the project's ultimate success (3). Based on the analysis carried out on 20 papers, it is found that there are various success factors for IT projects. The literature review resulted in 25 CSFs on IT projects. The results of this literature review are then verified on the PIC of the quality assurance project team at PT. SVM. The verification process resulted that 23 CFS being validated and 2 CFS not. These two factors are essential,

but they are not the main ones in the research case study. So, the next discussion is to discuss the importance of risk management and top management in IT projects.

1) Risk management

There are risks to the project, partly due to stakeholders not carrying out their responsibilities. Effective risk management can reduce the amount of risk, eliminate, or avoid it (36). This risk management can be caused by stakeholders, while stakeholders are included in the success factor, namely human, so risk management is not discussed here. IT project risk evaluations are likely to be influenced by project managers' perceptions of their abilities to control project risk factors. Project-based perspective for project managers to better identify crucial success/failure determinants and project risk variables (38). As IT is connected with risk and value potential, any organization requires a comprehensive, high-level system to mitigate the risks and maximize the value. (18). Risk management is an essential instrument for preventing risk and enhancing the operational quality of projects (1). There have been numerous discussions regarding the contributions of risk management approaches to project performance (39).

2) Top management

Top management on the results of this verification is only the party who gives approval, or signs for the project contract. If top management fails to delegate sufficient responsibility and power to the project manager or to support the project manager's recommendations, the overall project results will be negatively impacted (22). Research (12) analyzed the ICT project's critical success factors; ten CSFs were analyzed using AHP to establish their ranking. The value weight of Top Management Support is 33.1 percent. To achieve the project's objectives, the commitment of top management is important. It was determined that top management support did not play a crucial role in the IT project's success. The Skilled and Competent Project Team Members were recognized as the most influential factor in the success of IT projects, followed by the Project Manager's Leadership Qualities, tested, and determined to be the second most significant factor in the success of IT projects (17). However, the project manager plays an important role in PT. SVM's critical success factors. In a profitable IT project, the project manager should pursue "people-oriented" thinking, honestly consider the needs of clients, and engage with the project team and business sector. These kinds of effective communications are maintained from the beginning to the end of every project phase. The communication channel outlet includes daily communication, project meetings, project reports, and project documentation (3)

The critical success factors of a project, according to (6), are variables that can have a significant impact in providing measurable improvements to the success of a project. Meanwhile, according to the case study, the most critical determinant of success is conducting the PMA (Post Mortem Analysis) meeting process. Because in the meeting, we will discuss what factors determine the success and failure of the project. The meeting results show us the success factors that can be used in the next project. Each project in the company has different critical success factors. So, the implementation of PMA after the project is done is very important.

4. Conclusion

This study aims to analyze the success factors of the project from a case study point of view, namely the software house developer PT. SVM and a literature review of journals on critical success factors (CFS) on IT projects. The analysis of project success factors was carried out on 20 journals resulting from a literature review. Each journal has its point of view regarding the factors that determine project success, but some factors still have something in common so that they can be mapped. These journals can be grouped into 25 critical success factors further verified based on interview results. The results show that from the interviews conducted, many factors of success are mentioned implicitly but have almost the same meaning as the factor of success in the literature review results. Thus, from the 25 CSFs, there were 23 factors that the respondents verified, and two factors were not found. Not finding factors does not mean they are unnecessary, but they have not been a determining factor for the project's success. Twenty-three factors are considered to determine the success of the quality assurance project at PT. SVM. With this research, it is hoped that related companies will be able to handle failures that occur by maximizing the success factors that have been analyzed so that IT projects, especially quality assurance projects, can be completed by the planned objectives.

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