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Identifying Critical Factors for Successful Project Implementation: Case Study at PT PLN

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Abstract

There are several critical success factors (CSFs) that affect the successful of project implementation. This research is to gain empirical results from the perception of CSF in the implementation of AP2T system at PLN by conducting semi-structured interviews with project manager, analyzing project documents, and conducting a survey of respondents who have been involved in AP2T projects. Survey respondents include system users, development teams, implementation teams, business process owners, IT owners, and senior managers. The survey questionnaire included a list and brief description of 14 CSF ES/IS/ERP/CRM implementations synthesized from three previous studies. Respondents' perceptions of the criticality of these 14 CSFs were examined using frequency analysis. All 14 CSFs were identified as significant factors towards the successful implementation of AP2T at PLN. This research indicates that 'Top Management Support, User Training, Application Analysis, Testing and Troubleshooting, Communication, and Project Management' are the top five important factors for the successful implementation of the AP2T system at PT PLN. The results of this studies have been important for PT PLN to adopt the CSF that has been found for the successful implementation of other systems at PT PLN.

Keywords
critical success factors; CSF; ES implementation; ERP; CRM; IS; enterprise system; AP2T; CIS

I. Introduction

PT Perusahaan Listrik Negara (PLN) is the only company that provides electricity for the benefit of the Indonesian people. PLN continues to transform in improving the quality of customer service, supporting revenue protection, and striving to become a world-class electricity company that is cost competitive.

One of the initiatives undertaken to achieve this mission is to implement Aplikasi Pelayanan Pelanggan Terpusat (AP2T). AP2T is a centralized application system that is built based on the PLN Service Administration which is the standard for PLN customer service throughout Indonesia. AP2T is a centralized, integrated, and scalable customer information system in order to apply the basic principles of GCG, transparency, accountability, responsibility, fairness to PLN's stakeholders. This system accommodates three main business processes in PLN services, namely: Customer Service, Meter Reading and Billing, and Collection. The description of the three services can be seen in Figure 1 as follows.

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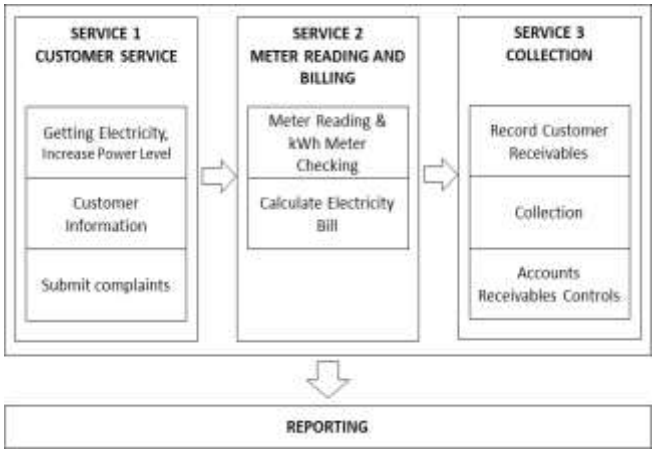

Figure 1. *PT PLN Customer Service Process Guidelines*

The implementation of AP2T at PLN was successful in 22 Regional/Distribution Parent Units (UIW/UID), 173 offices of the Customer Service Implementation Units (UP3), and 856 offices of the Customer Service Units (ULP) spread across Indonesia from Aceh to Papua. AP2T implementation was carried out for 2 years from 2010 to 2012.

The development and implementation of AP2T is carried out by one of the subsidiaries of PT PLN, namely PT ICON+ by involving all stakeholders of PT PLN which includes the STI Division (Information Systems and Technology), Finance, Commerce, Risk Management, Accounting, Marketing, Planning, and Customer Service, starting from the Head Office, UIW/UID, UP3, to the smallest unit, namely ULP. Created a project management team and project champion at each UIW/UID to facilitate the implementation process to the smallest PLN unit.

There are several CSFs that affect the successful of implementing project. The framework of Reitsma and Hilleofth (2018) states that there are 13 CSFs that are used to identify the success factors of enterprise system implementation. This research was to gain empirical results from the perception of CSF in the implementation of the AP2T system at PLN. Furthermore, this CSF can be used to support the implementation of other enterprise systems at PT PLN such as generation, transmission and distribution systems. This paper consists of several parts, namely a literature review, the methodology used, the results and further implications.

II. Review of Literature

2.1 Enterprise System

Companies have needs to support and run their business. Along with the times, these needs can be met with the existence of a computing-based system or known as an Enterprise System which was developed jointly between the organization in the company and the parties who can be involved to make this system well implemented. Systems that are developed and customized in massive lengthy-term initiatives, once in a while lasting decades, in which a network of parties such as purchaser groups, developers, subcontractors, and specialists work collectively to deliver a successful system. The collaboration is complex, the community and running surroundings is usually changing, which creates conflicts and difficult conditions. Collaboration and ways of running evolve via diverse crises, inner and outside incidents, and task phases which means that mission

management practices, communication styles, contracts, and in the long run personal relationships are changing.

The entry of Indonesia into industry 4.0 makes PT PLN should use an enterprise system that can be implemented in the company centrally. Enterprise System performs a completely role in Industry 4.0. Inside the corporate context, records systems commonly encompass many programs to cope with the wishes of a selected organization and the important thing additives for planning, organizing, running, and controlling their commercial enterprise tactics.

2.2 Critical Success Factors

One way for an organization or company to find references to make the parameters of a project well implemented is to use CSFs or Critical Success Factors. Alternatively, CSF is a method that concentrates on figuring out the elements that have an essential position for the fulfillment of the enterprise. Due to the fact the absence of these elements can lead to failure. Figuring out success elements is an essential activity that allows organizations to direct their sources whilst enforcing their systems to achieve these fulfillment elements.

The implementation of an Enterprise System is very important for companies in an effort to improve and facilitate business processes. However, the system has a high level of complexity, complexity, and risk. CSF can play a role in identifying factors that play an important role so that Enterprise System implementation does not fail.

CSF in the context of CRM is a key ingredient of an important part of any successful CRM. If these factors are met, it can guarantee the success of CRM so as to ensure the competitive performance of an organization.

The CSF research framework by Reitsma and Hilletofth (2018) provides 13 factors that will be used for interviews and surveys of system users [4]. Farhan M.S., et al. found 30 factors in the order of how many of them were discussed in a case study. Some of the factors that are often discussed are the support and commitment from top management, integration and management of IT systems, as well as trained and motivated staff.

Pettersson and Desalegn (2018) in their research use the framework of Reitsma and Hilletofth with 13 CSFs. Then the importance of these 13 factors will be sought in 3 phases of the ERP life cycle, namely pre-implementation, implementation, and post-implementation.

From 3 previous studies that examined the CSFs for the successful project implementation of ES/IS/ERP, this research summarized 14 CSFs that used as the basis for our analysis, and validated CSFs for AP2T implementation at PT PLN.

Top Management Support: Top management must strengthen the dedication of all employees inside the organization and create guidelines that outline and approve the organizational structure, roles, tasks, and responsibilities.

Project Management: Project managers have to encompass a clear definition of targets and development of both work planning and useful resource planning, and focus on figuring out what's required to perform the project.

User Training: Adequate user training requires investment and must be done to users from the very beginning of the system implementation.

Change Management: Implementing a new information system (IS) brings radical changes in the organization. Changing the IS environment and the company's business processes as a whole, which can cause resistance from organizational members. Thus, Change Management is very important, in operating a successful system implementation, to cope with organizational changes after system implementation.

Vendor Support: Companies often use external specialists or consultants to procure software program and to leverage the capabilities and knowledges of the representative system. Experts may additionally have revel in and information in a selected system module and might guide companies in their efforts to put into implement a new system. Moreover, the need for vendor support in a new system implementation is stronger due to the fact that a new system implementation initiatives require various technical implementation competencies and knowledge.

User Involvement: Customer and user involvement have an effective impact at the effectiveness of implementing a new system if the user is directly concerned in the use of the new system. Customer and user will recognize their needs of the new system. If the customer and user have opportunity to participate within the development of the new system, the user will feel that this new system is his responsibility, so it's far predicted that the performance of the system will increase.

Business Plan, Vision, and Strategic Decision Making: Providing a clear vision in design and implementation is the most important factor in business plans and visions. In fact, providing a clear vision in the system implementation business plan in the office is necessary. In Strategic Decision Making, the strategic decisions of members of the management team not only affect the implementation of future strategies but also the survival and development of the company in the future. Therefore, understanding among team members in terms of their perceptions, risk assessment and control methods, and feelings is an important factor influencing decision making.

Organizational Culture: To implement a new system, the organization must have a comprehensive change procedure, and Organizational Culture must support the change. In addition, organizations must create an appropriate Organizational Culture for the changing of technological, decision-making, and social environment. It will increase the probability of successful system implementation and desired outcomes.

Team Composition and Competence: Enterprise system implementation involves all departments in an organization, requiring collaboration between technical experts, business experts, and users. Project team members should be empowered to make prompt decisions regarding the implementation project. The project team must be technically competent, understand the organization and its business, be fully involved in the project, be highly valued and committed, and come from the departments affected by the ERP implementation.

Consultant Support: Lack of human resources, experience, and expertise to implement ERP results in the need for organizations to seek support from outside parties. Therefore assistance from consultants is important and crucial for the implementation process .

Application Analysis, Testing, and Troubleshooting: ERP application testing is needed in an effort to ensure that the ERP system operates as planned. This process is needed to ensure that the business process configuration of the ERP is realistic, the ERP system runs technically, whether the ERP is in accordance with the business processes of the organization.

Communication: Organization has to established an effective communication at every degree in organization. The communication process should also address the communication plan of the project, project teams, and the progress of the project itself. Prospective users need to know what are the future plans for the implementation and benefits of the enterprise system.

Business Process Alignment: Implementation of an enterprise system should fulfill the business needs of the organization rather than to replicate the usability of an existing

system (legacy system). The implementation of the new system will require a slight change in business processes, but efforts must be made so that users do not feel objections to these changes.

Performance Measurement: Organizations need to measure performance, manage user expectations, record all events during implementation, and measure target achievement. Performance measurement can help organizations identify deficiencies in the organization and will increase the successful implementation of a project.

III. Research Method

The methodology used in this study can be seen in Figure 2 as follows.

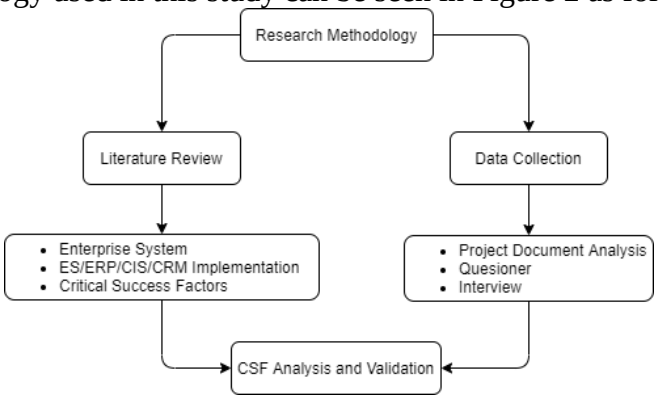

Figure 2. *Research Methodology*

Systematic literature review is used to synthesize CSFs that affect the success of ES implementation. The keywords used to find relevant articles are Enterprise System, ES/IS/ERP/CRM implementation, Critical Success Factors, and a combination of them.

To identify influential CSFs, data was collected by reviewing project documents, conducting surveys through questionnaires, and conducting interviews with resource persons who are key personnel of AP2T implementation at PT PLN.

Furthermore, CSF analysis and validation were carried out from the results of the literature review based on themes that could be drawn from the identified topic areas from the data to validate the influential CSFs.

AP2T implementation project documents were collected to look for factors that influence the project's success. The project documents analyzed include the Project Charter, Project Management Plan, workshop documents, system testing documents, user training documents, go live documentation, SOP socialization documents, business process documents, project progress report documents, and stakeholder engagement documents.

Surveys and interviews were conducted to assess respondents' perceptions of the CSFs for the successful implementation of AP2T and which CSFs were considered critical factors. Fourteen (14) CSFs used in the questionnaire were adapted from 3 previous studies taken from the literature review. Each CSF is assigned a five-point scale ranging from “Highly Influential” on successful implementation to “Not Influential” critical or critical to the success of AP2T implementation. This scale is used to determine the importance of each CSF. Research respondents for distributing the questionnaire were all users of the AP2T system from operational managers, functional, PLN units, implementation teams, development teams, project teams, business process owners, and IT owners from PT PLN and PT ICON+. These respondents were chosen because they are among the most knowledgeable informants about the AP2T implementation project at PT PLN. Fifty-four (54) questionnaires were successfully collected and data analysis will be carried out.

Interview is one method to obtain detailed information from informants.The resource person we interviewed was the project manager for the AP2T implementation.

The next step is to analyze the data collected from the project documents, the results of the questionnaires from the respondents, and the results of interviews with the informants by evaluating the content and completeness. Then a grouping and summary of themes can be drawn from the topic areas identified from the data to validate the influential CSFs.

IV. Result and Discussion

4.1 Data Analysis

The characteristics of the respondents which are illustrated in Table (1) are the profiles of the respondents which illustrate that the respondents are fully involved in the implementation of the AP2T project. From the characteristics of the respondents, it can be seen that the respondents are very experienced and highly educated. In addition, respondents are familiar with the company's business processes and are system users, development teams, and project implementations. So that the respondent is the most appropriate person to answer the survey.

Table 1. Characteristics of the Respondents

Measure	Categoris	Percent (%)
Role	Users	37%
	Development Teams	18,5%
	Implementation Teams	13%
	Business Process Owner	9,3%
	IT Owner	5,6%
	Other project teams	16,7%
Education	Associate	11,2%
	Bachelor	79,6%
	Master	9,2%
Involvement	Fully Involved	55,6%
	Partially Involved	44,4%

Table (2) shows the descriptive of the respondents and ranks the CSFs from 1 to 14 based on the mean value of the frequency analysis of each CSF. The range values of questionnaires are from 5 (Very critical or important) to 1 (Not critical or important) on a five-point Likert scale.

Table (2) shows the relative importance of CSF for all users of the AP2T system starting from operational managers, functional, AP2T users in PLN units, implementation teams, development teams, project teams, business process owners, and IT owners. As can be seen, the top five (5) factors namely 'Top Management Support, User Training, Application Analysis, Testing and Troubleshooting, Communication, and Project Management' were recognized by respondents as very critical and important factors for the successful implementation of AP2T (average value above 4.7).

In addition, ten (10) other important factors namely 'Team Composition and Competency, Business Process Alignment, Business Plan, Vision, and Strategic Decision Making, Change Management, Performance Measurement, User Involvement, Vendor Support, Organizational Culture, and Consultant Support' were identified as important factors for successful implementation of AP2T at PT PLN, but not critical.

Table 2. CSF Ranking of AP2T Implementation from Respondents

Ranking	CSFs	Mean
1	Top Management Support	4,83
2	User Training and Education	4,76
3	Application Analysis, Testing, and Troubleshooting	4,76
4	Communication	4,74
5	Project Management	4,72
6	Team Composition and Competency	4,70
7	Business Process Alignment	4,70
8	Business Plan, Vision, and Strategic Decision Making	4,59
9	Change Management	4,57
10	Performance Measurement	4,56
11	User Involvement	4,54
12	Vendor Support	4,46
13	Organizational Culture	4,24
14	Consultant Support	4,15

4.2 CSF Validation

Based on the results of a survey of 54 respondents who are users, development teams, implementation teams and project teams, as well as expert opinion interviews, it was found that the top five (5) CSFs were identified as factors for the successful implementation of AP2T at PT PLN. Analysis of project documents was carried out at the beginning of the study to see the process of implementing the AP2T project and to obtain relevant evidence targeted by this research.

Top Management Support was considered as the most critical factor for the successful implementation of AP2T at PT PLN. System implementation is not only a matter of changing the system, but also transforming business practices into best business practices. Top management support plays an important role in resolving disputes and in providing clear directions. Top management in the organization must be willing to be involved and allocate valuable resources for system implementation efforts. In the implementation of AP2T at PLN, there is a Steering Committee or Steering Committee which represents and delegates the Board of Directors in project implementation. Its duties are to determine the strategic direction and objectives of the team, to approve the scope of the team's program, to provide an adequate environment and management support for the effective implementation of the program, and to approve the funds and resources needed by the team.

User Training and Education is the second most important factor in the successful implementation of AP2T at PLN. User training and education factors are very important to develop an understanding of the system and its processes so that users can identify errors and correct them immediately so that users become more confident in operating the system [5]. In the implementation of AP2T, ToT (Training Of Trainer) is conducted, namely training intended for champions of each PLN Region/Distribution. This Champion then becomes a trainer and is able to teach the training materials to End Users (end users) in each PLN Region/Distribution. After the End User Training (EUT) assistance was also carried out by the ICON+ team for each PLN region/distribution to see whether the user has been using the system smoothly or still has problems.

Application Analysis, Testing, and Troubleshooting are the third most important factors in the successful implementation of AP2T. AP2T integration with other systems, such as SAP and EAM used by PLN is managed and tested appropriately. Testing (testing)

and troubleshooting (troubleshooting) software is needed to ensure that the application operates according to plan [6]. Software validation and testing is very important to ensure the application is in accordance with PLN's business processes. In the implementation of AP2T, unit testing, integration testing, system testing, database testing, user acceptance testing, performance tests, and security testing are carried out. The tester team designs and creates test scenarios and test scripts to verify that the system requirements have been implemented and the software is running correctly. Every failed test will be recorded in a bug tracking system. Any problems identified will be corrected and given back to the tester team for re-testing until it passes the test. All changes and retesting are tracked through a bug tracking system available to the team of programmers and testers. Applications are not allowed to be released until all problems identified with the Critical, Blocker, Major, and Normal categories have been fixed.

Communication is the fourth most important factor in the successful implementation of AP2T. Communication in the implementation of AP2T is regulated in a communication plan (communication plan) which describes the type and timing of communication needed to support the delivery of information to all stakeholders and support decision-making objectives. The plan describes the purpose, content, target recipients, delivery mechanism, and frequency of each type of communication. Communication includes status reports, management summaries, and staff briefings. Project communication is carried out through weekly media meetings to convey project developments and issues that occur, coordination meetings, and electronic mail,

Project Management is the fifth most important factor in the implementation of AP2T at PLN. The project manager and PMO (Project Management Office) dedicate significant time prior to implementation to developing a project planning document (Project Management Plan). Project planning documents are used to guide project implementation, document planning assumptions, facilitate communication between project team members, and determine key management or stakeholder reviews to resolve issues that occur so that the project can be completed within the specified scope, schedule, and cost.

Team Composition and Competency is the sixth factor in the successful implementation of AP2T. The composition of the AP2T project team includes the steering committee (steering committee) which represents and delegates the Board of Directors (Board of Director) of PT PLN and ICON+ who sets the strategic direction and objectives of the project, the counterpart team that works together to complete the project and provides data and access to required in project implementation, engagement partner in charge of setting the direction of the consultant team's goals, QA partner in charge of setting the direction and objectives of QA, project director responsible for providing strategic direction to ensure overall project success, subject matter resources providing technical input to project managers and team members, project managers who are fully responsible for the implementation of project management and the outputs produced by each stream, project management offices that assist project managers in monitoring projects and coordinating between project team members, infrastructure teams, business processes, change where gement, a development system that carries out work in accordance with the objectives and scope of each stream.

Business Process Alignment is the seventh factor in the successful implementation of AP2T. The implementation of AP2T aligns business processes across all PLN units regulated by PLN Central. All PLN units must adapt to changes in their business processes that were previously regulated by each region to become a centralized business process.

AP2T implementation requires reengineering of PLN's business processes and the organization cannot improve its performance without changing its business

In addition to the seven most important and critical CSFs above, there are other factors that are also considered important by respondents, namely Business Plan, Vision, and Strategic Decision Making, Change Management, Performance Measurement, User Involvement, Vendor Support, Organizational Culture, and Consultant Support.

Business needs planning is carried out by inviting relevant stakeholders to explore the needs of the required system and referring to the PT PLN Customer Service Process Guidelines (P4) document. There is a very clear vision in the implementation of this AP2T, namely so that PT PLN's revenue can be maintained (revenue assurance and protection). Decision making is determined by the steering committee or the board of directors of PT PLN.

Change management in the implementation of AP2T is carried out by a special team consisting of members of the ICON+ team, EY consultants, and the PLN team itself. Change management starts from participating in sharing sessions, identifying stakeholders who will be affected by the change, identifying existing communication channels and media, conducting a change readiness assessment (Change Readiness Assessment), making action and communication plans, and implementing action plans and communication plans that have been prepared. Approved. The training was conducted to ensure that the target adopters could understand and use the new system well. The AP2T conversion style system uses direct conversion or big bang where the new system will directly replace the old system. Users will immediately use the new system, while the old system will be turned off. Conversion Location i.e. the conversion location refers to the part of the organization that was converted when the conversion occurred. The AP2T implementation uses a pilot conversion by taking the East Java Distribution as the pilot test location. After the implementation in East Java is successful, then the system will be implemented throughout the distribution and area of PT PLN. The AP2T implementation uses a whole-system conversion where all modules will be installed at one time. This method was chosen because each module in the AP2T system is integrated with each other. The benefits obtained after the implementation of AP2T are that the business processes of PLN's customer service are simpler, standardized, and centralized, there is operational cost efficiency because the system is managed centrally, supports revenue protection, accelerates the process of making sales reports, gains access to information from business units. in real time, PLN is more focused on services in the electricity sector because its IT system is managed by ICON+, and business process supervision is getting better,

Consultant Support is the last factor that supports the successful implementation of AP2T. AP2T implementation is supported by consultant Ernst & Young (EY) to provide consultation in the areas of SOP preparation, project management support, business process documentation, business case preparation, and change management support.

V. Conclusion

This study presents several findings. First, 14 CSFs are significant CSFs for ES/IS/ERP/CRM implementation taken from several previous studies. Second, the results of the ratings from respondents and interviews with project managers regarding the critical success factors of AP2T implementation at PLN are mostly consistent with previous research. Third, the findings of this study indicate that ‘Top Management Support, User Training and Education, Application Analysis, Testing, and Troubleshooting, Communication, and Project Management’ are the top five important factors for the

successful implementation of the AP2T system at PT PLN. The results of this study have several important implications for PT PLN to adopt the CSFs that have been found for the successful implementation of other systems at PT PLN. On the academic side, this research tries to conclude the gap within the literatures on CSF for system implementation at PT PLN. On the organization side, this research improves organizational understanding of the critical factors that have to carefully taken into consideration to make sure a successful IT system implementation.

This research considers 14 CSFs but not categorizing them based on the phases of project implementation. Complementary research can be carried out by considering the CSF in each phase or stages of system implementation, such as pre-implementation, implementation, and post-implementation. This research is focused on implementation factors. We think that post-implementation activities, such as software or system upgrades and maintenance are also important factors to be investigated further.

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