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# ANALYSIS OF CRITICAL SUCCESS FACTORS RELEVANCE ALONG SAP IMPLEMENTATION PHASES

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## Abstract

*This paper seeks to analyze the relevance of critical success factors along SAP implementation phases. The ASAP implementation methodology is used as the SAP implementation reference model. Applying a process quality management method and the grounded theory method, we derive a matrix of critical success factors versus ASAP processes. Then, we evaluate the relevance of critical success factors along the five phases of ASAP, specifically of those ones related with organizational perspective. These findings will help managers to develop better strategies for supervising and controlling SAP implementation projects.*

**Keywords:** Enterprise resource planning, critical success factors, ASAP, process quality management method, SAP implementations

## Introduction

Despite the benefits that can be achieved from a successful ERP system implementation, there is already evidence of failure in projects related with ERP implementations (Davenport 1998). Too often, project managers focus on the technical and financial aspects of a project and neglect to take into account the no technical issues. To solve this problem, some researchers are using a critical success factors (CSFs) approach to study ERP implementations and more specifically, SAP implementations.

The management of CSFs in SAP implementations is a thorny issue in SAP research. There is the practical evidence that CSFs do not have the same importance along the various phases of a SAP implementation project. Thus, we attempt to develop a theoretical framework that describes this distribution along the SAP project processes. Several academic studies have been published related to CSFs identification but there is no evidence of studies related with operationalization and management of these CSFs. We agree with Ward (1990, p. 120) in that CSFs are not, in themselves, directly manageable. Rather than the CSFs, it is the processes that define what a management team 'Do', processes that can be owned, defined, measured and managed. It is therefore necessary to relate the CSFs to the SAP project implementation processes to provide an overall view of the importance of each process to the management of the CSFs in SAP implementations.

This paper describes the results of a research project that seeks to contribute to understanding the success of SAP implementation projects. Here, our goal is to relate CSFs of ERP implementations and the processes of the ASAP methodology and develop a scheme of CSFs relevance along the ASAP phases.

This paper is organized as follows. First, we present the unified model of CSFs that we use in our research and a brief description of the ASAP methodology. Next, we briefly describe the research framework followed. Then, we describe the findings, presenting the matrix of CSFs relevance. Finally, some conclusions and further work are included.

## Unified Model of CSFs for SAP Implementations

Rockart (1979) was the first author that applied the CSF approach in the information systems area. He proposed the CSF method to help CEOs specify their own information needs about issues that were critical to their organizations, so that information systems could be developed to meet those needs. According to his account, CSFs are "...the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization". They have been applied to many aspects and tasks of information systems, and more recently to ERP systems implementations (ex. Bancroft et al., 1996; Clemons, 1998; Dolmetsch et al., 1998; Holland et al., 1999; Kale, 2000; Parr et al, 1999; Stefanou, 1999; Sumner, 1999). Based in a set of studies published by several authors, containing commented lists of CSFs in ERP implementations, Esteves and Pastor (2000) unified these lists and created a CSFs unified model (see Fig. 1). The advantage of this model is that it unifies a set of studies related with lists CSFs identified by other authors; the CSFs are categorized in different perspectives and, each CSF is identified and defined.

	Strategic	Tactical
Organizational	<ul style="list-style-type: none"> <li>• Sustained management support</li> <li>• Effective organizational change management</li> <li>• Adequate project team composition</li> <li>• Good project scope management</li> <li>• Comprehensive business re-engineering</li> <li>• Adequate project champion role</li> <li>• Trust between partners</li> <li>• User involvement and participation</li> </ul>	<ul style="list-style-type: none"> <li>• Dedicated staff and consultants</li> <li>• Appropriate usage of consultants</li> <li>• Empowered decision makers</li> <li>• Adequate training program</li> <li>• Strong communication inwards and outwards</li> <li>• Formalized project plan/schedule</li> <li>• Reduce trouble shooting</li> </ul>
Technological	<ul style="list-style-type: none"> <li>• Avoid customization</li> <li>• Adequate ERP implementation strategy</li> <li>• Adequate ERP version</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate software configuration</li> <li>• Adequate legacy systems knowledge</li> </ul>

Figure 1. Unified Critical Success Factors Model

## The ASAP Implementation Methodology

In 1996, SAP introduced the Accelerated SAP (ASAP) implementation methodology with the goal of speeding up SAP implementation projects. ASAP was advocated to enable new customers to utilize the experience and expertise gleaned from thousands of implementations worldwide.

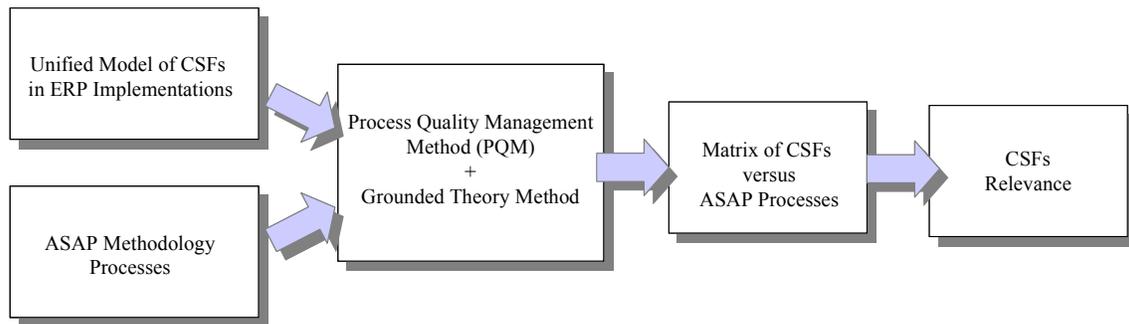
The accelerated SAP (ASAP) implementation methodology is a structured implementation approach that can help managers achieve a faster implementation with quicker user acceptance, well-defined roadmaps, and efficient documentation at various stages. This is specifically targeted for small and medium enterprises adopting SAP. The key phases of the ASAP methodology, also known as the ASAP roadmap, are: project preparation, business blueprint, realization, final preparation, go live & support. The structure of each phase is the following: each phase is composed of a group of work packages. These work packages are structured in activities, and each activity is composed of a group of tasks. For each task, a definition, a set of procedures, results and roles are provided in the ASAP roadmap documentation. According to a survey of Input company (Input 1999) organizations have been more satisfied with SAP tools and methodologies than with those of implementation partners. Implementations where ASAP or Powered by SAP methodologies were used averaged only 8 months, compared to 15 months for standard implementations.

## Research Framework for Evaluating CSFs Relevance

We have used the Process Quality Management (PQM) method (Ward, 1990) to relate the CSFs and ASAP processes. The PQM method developed by IBM is "designed to assist the management team reach consensus on the most critical business activities, i.e. those whose performance will have the biggest impact on the success or failure of the enterprise" (Ward, 1990). PQM uses the concept of CSFs (Rockart, 1979) to encourage management teams to focus their attention on the critical issues of the business,

and then to base the IT strategy on these. Next, we describe the following steps of the PQM method, as we have applied them in our research case (see Fig. n°. 2):

- First step: define the mission. We define the following mission: "To implement the SAP system, according to the organization's business and organizational needs" and then "to show that the SAP implementation will add value through the satisfaction of the organization requirements previously defined". This mission reflects the intention of the whole group of people involved in a SAP implementation;
- Second step: define CSFs. We will use the CSFs unified model proposed by Esteves and Pastor (2000);
- Third step: define the processes. In our case, the processes are those defined in the ASAP methodology;
- Fourth step: establish the relationship of CSFs versus ASAP processes. This is done through the creation of the matrix presented in Fig. 3. For creating this matrix, we have used 'open coding' from grounded theory (Glaser and Strauss, 1967) to analyze ASAP documents. The choice of this method ties in with the commitment to the process of developing emergent theory.



**Figure 2. Research Framework.**

According to Hardaker and Ward (1987), "the object is to single out the processes that have a primary impact on this particular CSF". What we are looking for are those essential activities and not all of them.

The matrix in Fig. n°. 3 has been built in the following way. We focused on each CSF and asked this question: Which ASAP processes must be performed especially well for us to be confident of achieving this CSF? Then, we looked at all the processes and decided which ones were important for that CSF. Then, a second process was used to validate and to get more reliability in the research. We used 'open coding' from grounded theory method to analyze the ASAP methodology documentation.

Grounded theory is a general methodology for developing theory that is grounded in data systematically gathered and analyzed. The methodology was presented initially by (Glaser and Strauss, 1967). Grounded theory method is composed of three phases(or steps): open, axial and selective coding. Specifically, in this study we used the first step of grounded theory, named 'open coding'. This step consists on grouping and classifying concepts into categories, and defining the attributes or characteristics pertaining to each category. In our case, we chose as categories the CSFs and the concepts were drawn from the ASAP processes defined by the ASAP methodology documentation. Open coding is presented as "the first basic analytical step" from which everything else follows (Dey 1999, p. 97). Briefly, axial coding can be summarized as the step of connecting categories and selective coding focusing on a core category.

Next, we present part of the full matrix of CSFs versus ASAP processes built for the first phase of ASAP methodology, the project preparation phase. In the project preparation phase we can evidence the importance of CSFs related to organizational aspects and aspects related to project management establishment such as project plan/schedule formalization, effective organizational change management and project management scope. Adequate project champion role or sustained management support are CSFs important in all the processes, but this matrix should focus only the core relationships.

CSFs in ERP implementations	ASAP Processes																				
	Sustained management support	Effective organizational change	Good proj. scope management	Adequate proj. team composition	Meaningful business reengineering	User involvement and participation	Adequate Proj. champion role	Trust between partners	Dedicated staff and consultants	Strong communication	Formalized Proj. Plan/schedule	Adequate training program	Preventive trouble shooting	Usage of appropriate consultants	Empowered decision makers	Adequate ERP implementation	Avoid customization	Adequate ERP version	Adequate software configuration	Adequate legacy systems knowledge	
Create and issue proj. charter	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Review and refine impl. strategy	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Establish proj. team working env.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Determine proj. organization	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
...	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Quality check proj. preparation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Number of CSFs occurrences	20	11	9	6	4	10	42	9	7	18	26	6	4	7	0	7	2	1	9	0	

Figure 3. Example of the Matrix CSFs Versus ASAP Processes for Project Preparation Phase

### CSFs Relevance

The table of Fig. n°. 4 represents the CSFs relevance for each CSF in each phase. The values were calculated in the following way. We built a matrix of CSFs versus ASAP processes for each implementation phase, and for each CSF we sum the number of occurrences of that CSF (for instance, the sum of 20 in sustained management support CSF means that we defined 20 relationships between this CSF and 20 ASAP processes). Then we converted the number of occurrences (raw scores) in a normative scale of ten scores. In a scale of this kind, results from 1-3 are considered no relevant, from 4-7 normal relevance, and 8-10 they are considered of high relevance. In our case, we see that almost all the factors are higher than 4. Thus, their relevance is normal or high in some cases. We do not pretend to say that a CSF with a summation not high it is not important, what we say is that it is less relevant in that period of the project. CSFs have all the same importance, therefore, all them should be carefully respect and analyzed. The analysis of the table shows that:

- In phase 1 (Project Preparation), the most relevant CSFs are sustained management support, project champion role and formalized project plan/schedule. We are at the beginning of the implementation project and it is very important to identify and plan the primary focus areas to be considered. This will help to establish a solid foundation for a successful R/3 implementation.
- In phase 2 (Business Blueprint), the most relevant CSFs are project champion role, effective organizational change management and user involvement. The goal of this model is to create the Business Blueprint that is a visual model of the business' future state after which organizations have crossed the R/3 finish line. It will allow the implementation project team to clearly define their scope, and only focus on the R/3 processes needed to run the organization business.
- In phase 3 (Realization), the most relevant CSFs are adequate software configuration, project champion role, and user involvement. In this phase the configuration of SAP system begins, that is why the adequate ERP configuration factor is so important as well as the involvement of users. They help in the system parameterization.
- In phase 4 (Final Preparation), the most relevant CSFs are project champion role and preventive troubleshooting and it is time to convert data and to test the system.
- In phase 5 (Go & Live Support), the most relevant CSFs are project champion role, sustained management support and strong communication inwards and outwards.

			Phase1	Phase2	Phase3	Phase4	Phase5
Organizational  Perspective	Strategic	Sustained Management Support	8	5	5	6	8
		Effective Organizational Change	6	9	6	5	6
		Good Proj. Scope Management	5	4	4	5	5
		Adequate Proj. Team Composition	5	4	4	4	4
		Meaningful Business Process Reengineering	4	7	4	4	5
		User Involvement and Participation	5	8	10	7	5
		Proj. Champion Role	10	10	9	10	10
		Trust Between Partners	5	4	4	5	5
	Tactical	Dedicated Staff and Consultants	5	5	4	5	6
		Strong Communication Inwards and Outwards	7	7	5	6	8
		Formalized Proj. Plan/Schedule	9	7	7	7	5
		Adequate Training Program	5	5	5	7	4
		Preventive Trouble Shooting	4	4	7	9	7
		Usage of Appropriate Consultants	5	4	4	4	4
		Empowered Decision Makers	3	5	5	5	4
Technological  Perspective	Strategic	Adequate ERP Implementation Strategy	5	4	4	4	4
		Avoid Customization	4	4	4	4	4
	Tactical	Adequate ERP Version	4	4	4	4	4
		Adequate Software Configuration	5	6	10	6	6
		Adequate Legacy Systems Knowledge	3	4	4	4	4

**Figure 4. CSFs Relevance Along the ASAP Implementation Phases**

Next, we describe each CSF along the ASAP phases, classified by organizational and technological perspective.

## Organizational Perspective

Sustained management support is more relevant at the beginning and at the end of the implementation. The reason is that at the beginning senior management should help in the rollout of the project, analyze the business benefits, define the mission and scope of the project and provide the resources needed for the project. At the end, there is the need to encourage the system usage and help in the commitment of user involvement.

Good project scope management is relevant at the beginning when managers define the scope and in the last two phases because the scope is usually revised and changed.

Effective organizational change management and business process reengineering are more relevant in the second phase. In this phase the business blueprint is defined, and the business processes are documented. There is the need to understand how the organization intends to run its business within the SAP system and the changes in the organization.

Project team composition is more relevant in the first phase because it is when the project team is established although it can be re-structured along the implementation phases and according to the implementation needs.

User involvement and satisfaction is relevant in the phases where their know-how is important to achieve a good customization of the system to organizational needs. They participate in the definition of business requirements, help in the analysis of the SAP configuration and in conversion of data and the testing of the system.

Project champion role is relevant in all phases. It is less relevant in the third phase than in with the others because this phase is dedicated to configuration tasks and here the role of the champion is to guarantee that everything goes according to the plan.

Trust between partners is relevant at the beginning when all the stakeholders involved in the project should share their goals and knowledge and at the end when they have to analyze and again share their knowledge to finish the project with success.

Strong communication inwards and outwards is more relevant at the first two phases where there is strong need of communication between senior management and the project team in the definition of project plan and scope, and in the final phase where there is the need of a strong communication with the whole organization to start the go & live of the SAP system.

Formalized plan and schedule relevance decreases during the implementation project. The reason is that at beginning it is important starting planning as early as possible. A good project plan will ensure a better monitorization and coordination of activities during the whole implementation.

Adequate training program is more relevant in phase 4 because it is when the training program of end users starts, but in the previous phases there are also training concerns related with project team training and to prepare end user training.

Preventive troubleshooting is more relevant in the last phases, especially in the fourth phase during which issues arise when the system is being tested.

Usage of appropriate consultants is relevant especially in the first phase where managers have to decide the how, when and the numbers of consultants that they will incorporate in the project team.

Empowered decision makers is more relevant in the middle phases because there is the need to quickly decide things and thus accomplish project plan/schedule on time.

Adequate ERP implementation strategy is more relevant at the first phase because is in this phase that the SAP implementation strategy should be decided.

## Technological Perspective

Avoid customization has the same relevance along all the phases. This should always be taking into account when managers are making decisions.

Adequate ERP version has the same relevance along all the phases. From the beginning until the end of the project implementation, SAP recommends that the project team follows the upgrade of SAP releases and should consider the adoption of new ones.

Adequate software configuration is more relevant in phase 3, when the SAP system is configured and more than 8.000 tables must be parameterized. The software configuration should follow the business requirements defined in the previous phase.

Adequate legacy systems knowledge is less relevant at the first phase because this phase is related with the preparation of project implementation. In the next phases the need of knowledge of legacy systems is more relevant in order to minimize the effort of configuration and help in conversion of data and the creation of interfaces.

## Conclusions and Further Work

This study provides a schema of CSFs along the phases of ASAP methodology together with an evaluation of their relevance. This schema was developed through the application of PQM and open coding from the grounded theory method and based on a unified model of CSFs and the ASAP methodology documentation. The proposed relationships and relevances are useful because:

- We know which ASAP processes are important to manage each CSF;
- We have an orientation of the relevance of each CSF in each stage of the SAP implementation project;
- With this knowledge, we can better control and monitor the success of SAP implementations.

We would like to emphasize that this study represents the relevance of CSFs along the ASAP implementation phases. When finished, the matrix will be a valuable document for the management of CSFs because managers will know the things that must be done to achieve these CSFs. This CSFs relevance schema provides guidance to practitioners in planning and monitoring a SAP implementation project.

Further research will try to validate the found results using case study method and interviews with people of various roles involved in SAP implementation projects. To complete our application of the PQM method only one step remains - identifying the most critical processes. However, we think that this step should be done with information provided by case studies, and not only based in theoretical assumptions. Finally, we intend to formalize CSFs relevance analysis and develop a general framework to analyze CSFs relevance in other ERP systems different from SAP.

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