BPM based ERP implementation

Koen Huijsman
kllghuij@cs.uu.nl

Paul Noordveld
ptfnoord@cs.uu.nl

ABSTRACT

In this research paper we take a look at Enterprise Resource Planning systems implementation from a Business Process Management point of view. It attempts to improve ERP implementations, which are often unsuccessful, with insight provided through the BPM Paradigm. This is done by looking at the critical success factors of both methods, resulting in a new, combined, framework based on critical success factors, for the implementation of ERP systems. We hope this framework will improve the overall success of ERP implementations.

INTRODUCTION

Enterprise resource planning (ERP) systems are enterprise wide, comprehensive software packages that integrate processes and functions needed to run a company (Klaus, Rosemann, Gable, 2000). Businesses started to recognize the need for such ERP systems in the early 1990's, and these systems are now the most important use of corporate information systems. The use of an ERP system is nowadays seen as a 'commodity', and most companies have implemented some sort of ERP. However, ninety percent of all ERP implementations still end up late, over budget or both; and half of all implementations failed to achieve the desired results (Jarrar, Al-Mudimigh, Zairi, 2000). These failures can be attributed to the extensive, complex, and integrated structure of ERP systems and the lack of management and employees to conform to several critical success factors (CSF) during the implementation (Idorn, 2008).

Earlier research looked at critical success factors, such as in Corbett and Finney (2007) and Jarrar, Al-Mudimigh and Zairi (2000). Gulledge and Summer (2007) specifically looked at how existing enterprise systems are aligned with business process management and view Business Process Management (BPM) as a critical success factor for ERP implementations. Today, there is much interest in BPM, an approach which primarily focuses on business processes. BPM systems (BPMS) are systems that are based on BPM and allow modeling, execution, monitoring and representation of business processes and rules. ERP has influenced BPM Systems as they are currently used, but at the same time ERP may possibly benefit from BPMS project experiences.

In this research we want to compare BPMS implementations with ERP implementations. Taking CSFs from both ERP implementations and BPMS implementation, we will look at how they differ and what CSFs from BPMS implementations can be used in ERP implementations. Thus, creating a more successful ERP implementation method based on CSFs of BPM. Taking the foregoing into account and further taking the research of Gulledge and Summer (2007) this paper focuses on answering the following research question:

 "How can the use of a business process management based strategy for implementing enterprise resource planning systems, improve the chances of a successful implementation?"

The practical contribution of this paper lies in the lessons that can be learned from earlier ERP implementations that made the business processes less flexible than expected. Using BPM for ERP implementation, enables an organization to better react to changes in the business environment that affect the main business processes. Organizations should realize the influence of an ERP system on their main business processes and by researching this approach of implementing an ERP system, we provide a strategy for successful implementation.

The scientific contribution of this paper lies in filling the gap between ERP implementation and BPM. The literature focuses mainly on ERP implementations, without approaching it from a BPM point of view. The concept of BPM is mainly viewed aside from ERP and a combination of these two viewpoints has yet to be made. Gulledge & Summer (2007) however, mentioned the need for a focus on BPM in ERP implementation. This paper focuses on combining ERP implementations with BPM principles.

This paper starts with describing a literature study. Here we identify the CSFs used in both ERP and BPMS implementations. From this we create a combined CSF model, showing how ERP can be implemented using a BPM point of view. We will validate the combined model through a case study. The case study consists of studying the documentation concerning the implementation followed by explorative interviews with experts. Through the case study we will be able to determine the successes and failures of using conventional ERP implementation methods. These failures and successes will be mapped on CSFs of ERP implementation. This will result in an adjusted ERP implementation by adding BPM CSFs or re-defining CSFs so they are aligned with BPM. By doing so we hope to create a new framework that enables a more successful ERP implementation method. The method will then be further validated through an interview with an expert in this area.

We end with a short discussion of the research topic and the conclusions of this research, which also states the answer to the research question.

ERP AND BPM

ERP-systems are a key element in companies that offer business solutions for large companies, but more small and medium sized companies are starting to use ERP systems as well (Klaus, Rosemann, Gable, 2000). They can be used in different industries and offer a wide variety of functionalities to for instance financial departments, HR, O&L, Sales, Marketing and more (Umble, Haft, Umble, 2003). ERP-systems are developed and implemented according to functions within a company. Klaus, Rosemann & Gable (2000) suggest that this is one of the causes of ERP implementation failures, because the view of functions is too limited. They suggest that a broader view must be used when implementing ERP.

A BPM approach could provide this broader view on ERP implementation. As mentioned before, BPM is a series of methods, techniques and tools to analyze, design and improve processes that take place in a company (Lee & Dale, 1998). BPM resolves around processes and implementation of IT-systems around these processes. Lee & Dale (1998) suggest that multiple paths have to be taken when implementing IT-systems, a method that can handle the implementation of IT-systems in every situation is impossible. The same goes for implementing ERP systems, no single method will suffice for all implementations. Thus, as stated by Klaus, Rosemann & Gable (2000), the re-use of the same implementation method may well result in failure when implementing other systems or in other situations. Reconsidering the CSFs that are used for implementing ERP systems, by broadening the view more towards BPM, can create a starting point for a more successful ERP implementation.

Critical success factors of ERP
Critical success factors can be created to compare and improve implementation methods. For this research we have also compared the CSFs of ERP and BPM implementations.

Multiple studies have identified different CSFs for ERP implementations. One of these studies by Somers & Nelson (2001), identified 22 CSFs. Their list was compiled from a meta-study of over 110 cases of ERP implementations. This list was used by Akkermans & van Helden (2002) who let 52 managers rate these CSFs and compiled a ranked list of the 22 CSFs. In our study we will use this ranked list to compare it with our list of BPMS CSFs.

shows the list of ERP CSFs. This list, with descriptions, can also be found in appendix A, Table 4.

1.	Top management support	8.	Project champion	15.	Education on new business processes
2.	Project team competence	9.	Vendor support	16.	BPR
3.	Interdepartmental co-operation	10.	Careful package selection	17.	Minimal customization
4.	Clear goals and objectives	11.	Data analysis and conversion	18.	Architecture choices
5.	Project management	12.	Dedicated resources	19.	Change management
6.	Interdepartmental communication	13.	Steering committee	20.	Vendor partnership
7.	Management of expectations	14.	User training	21.	Vendor's tools

Table 1: Summery of ERP Critical success factors

In this ranked list, one can see that there is little focus on the effect of ERP systems on the business processes in the organization. From a BPM point of view this would seem remarkable, since ERP systems have influence on these processes. 'Education on new business processes' and 'BPR' are the only CSFs directly related to BPM. The next section discusses the critical success factors often used in BPMS implementations.

Critical success factors of BPMS

Through literature research of scientific papers we have searched for keywords like CSF BPM, CSF BPMS implementation, critical success factors of business process management and critical success factors of business process management implementation. We used different forms of plurality on each of the terms and we have used different combinations of capitals. We found a list of CSFs concerning BPMS implementations. These CSFs originated from different BPMS methods like Cordys@work, BPMS implementation method, Goal driven BPM, and Nine-step approach. For a complete overview of different BPM related implementation methods we refer to Ravesteyn & Versendaal (2009).
From their list of CSFs we determined which factors are process-orientated. We aim for process-oriented CSFs to constrain the scope of this research, and to keep to the core of BPM, which are processes. Also, other CSFs are more function-orientated, meaning the use of these CSFs will not broaden the view of ERP implementations. The result of the literature study is a list of process-orientated CSFs of BPM implementations, which can be found in appendix B,
Table 5. The CSFs are extracted from the research of Ravesteyn & Versendaal (2009).
The following critical success factors of BPM implementations have been found:

1.	Understanding the processes of the company.	6.	Know-how and experience with Project Management.	11.	Well organized maintenance and (quality) control of the process models.
2.	Understanding how processes and data are linked together.	7.	Experience with Change Management.	12.	Having a set of key performance indicators and measuring the change (improvement).
3.	Understanding the	8.	A well organized design	13.	Understanding how to use

	Business Process Management concept.		phase (modeling).		web services.
4.	Ensuring that the BPM project is part of a continuous optimization effort.	9.	Using the 'best' modeling standards and techniques.	14.	Involving the right people in the project.
5.	Proper information systems integration.	10.	Understanding interdependencies and integration of data sources.	15.	Creating a culture of attention to quality within the organization.

Table 2: Summery of Critical Success Factors of Business Process Implementations

In the next chapter, we will combine the BPM CSFs with the original ERP CSFs in order to create an optimized list for ERP implementations. We also provide insight into the rationale of the changes made.

THE NEW FRAMEWORK

In this chapter we will compare the CSFs of ERP implementations with our list of BPM CSFs. This comparison was made to check which BPM CSFs were already in the ERP CSFs list and which CSFs were contradicting or had a different form but are in essence the same. When comparing the two lists of CSFs we came across some similarities and differences. These differences could prove to be an addition to the original list and were therefore added for validation. Other CSFs were already in the original list and partially overlapped. This led to the adjustment of some CSFs. The combined list is a combination of original ERP CSFs, updated ERP CSFs so they are aligned to BPM and new CSFs from the BPM list. The CSFs added to the optimized list were:

- 'Understanding the processes of the company'
- 'Understanding how processes and data are linked together'
- 'Understanding the ERP concept'
- 'Ensuring that the ERP project is part of a continuous optimization effort'
- 'Proper information systems integration'
- 'Understanding interdependencies and integration of data sources'
- 'Having a set of key performance indicators and measuring the change (improvement)'
- 'Using the 'best' modeling standards and techniques'
- 'Quality Control'
- 'Use of consultants'

These CSFs all add something substantially new to the original ERP CSFs, with emphasis on the business processes. Finally, there were also some BPM CSFs that had some overlap with the original ERP CSFs or could improve the original CSF. These CSFs redefined original ERP CSFs, they include:

- 'Know-how and experience with Project Management'
- 'Experience with Change Management'
- 'A well organized design phase (modeling)'
- 'Understanding how to use web services'
- 'Involving the right people in the project'
- 'Creating a culture of attention to quality within the organization'

The new optimized ERP CSF list, including descriptions, can be found in appendix C, Table 6. When a new CSF is added or an existing one is changed, the description explains the modification.

RESEARCH METHOD

The framework has been validated through an interview at a Dutch company undergoing an ERP implementation project. The company is an importer and exporter for various products, focusing on chain stores, mail order companies, gas stations, wholesalers and retail companies. They have an assortment of well over 15.000 articles, which are sold all over Europe.

Through a documentation review and an interview we have tried to research whether or not the new framework could improve the implementation of an ERP system. Two experts have looked at the list of ERP CSFs, BPM CSFs and the new framework. One expert is the IT-manager at the aforementioned company. The other expert is a consultant who has worked on different ERP projects and currently involved in the aforementioned company. Both experts have answered several pre-defined questions. These questions were aimed at the new framework as a whole, prioritization of the CSFs in the new framework, as well as the added CSFs from the BPM paradigm and the revised CSFs.

Both experts had to give their answers to the pre-defined questions during an interview. This interview was recorded so we could review the interview later on, possibly providing additional tacit knowledge. The most important results from the interview are:

- Changed the prioritization of the CSFs in the new framework.
- CSF #26 'Proper information systems integration' was removed
- CSF #29 'Using the best modeling standards and techniques' was removed for various reasons. First, employees implementing the ERP system might be familiar with an older version and are thus working better with that version. Second, differences between versions are generally small.
- CSF #28 'Having a set of key operating indicators and measuring change' is changed, because KPIs are hard to use in an ERP system.
- CSF # 2 'Project team competence' is changed, because the emphasis of the mix of people in the project team should me more on the business-side and not on the technical side.
- CSF #21 'Vendor's tools' was removed, because this was seen as obligatory factor that did not directly contribute to the success of an implementation.
- CSF # 25 'Understanding the ERP concept' is changed because not all people have to understand the concept. This concept is now depends on the function of an employee.

The prioritization was established by letting the experts rank each CSF on its contribution to the success of an ERP implementation. This ranking was done on a 7 point scale.

The next step was a free commenting session, which was also recorded. Both experts could comment freely on all three lists but it was mainly aimed at the new framework. This comment session was added to check if small issues had been missed out on. The comment session led to some ambiguities which were then resolved by an open-question session. The most important results from the free commenting session are:

- Emphasis of the overall framework should be on the business-side of ERP implementations.
- A CSF for speed of the project as well should be included in the framework. However, this was not done due to lack of evidence supporting this claim.
- Always implement by using small increments.

After the expert interview we could improve the framework. The degree of improvement has now been taken into account. Meaning, the CSFs that would have reduced the success of the ERP implementation have been removed. The CSFs with a high improvement degree are stated at the top of the framework, the CSFs with a low perceived degree of improvement are stated at the bottom of the framework. Also, three CSFs were changed. The revised version of the framework can be found below.

Number:	Name:	Changes
1.	Interdepartmental communication	Increased Rank.
2.	User training	Increased Rank.
3.	Education on new business processes	Increased Rank.
4.	Ensuring that the ERP project is part of a continuous optimization effort	Increased Rank.
5.	Data analysis and conversion	Increased Rank.
6.	Change management	Increased Rank.
7.	Understanding the processes of the company	Increased Rank.
8.	Quality Control	Increased Rank.
9.	Top management support	Decreased Rank.
10.	Project management	Decreased Rank.
11.	Dedicated resources	Increased Rank.
12.	BPR	Increased Rank.
13.	Clear goals and objectives	Decreased Rank.
14.	Understanding how processes and data are linked together	Decreased Rank.
15.	Understanding interdependencies and integration of data sources	Decreased Rank.
16.	Project team competence	Changed: The project team should consist of the right mix of people. The mix has to include people with technical competences but the emphasis should be on people with business competences. Decreased Rank.
17.	Understanding the ERP concept	Changed: The understanding of the ERP concepts is function dependant. Higher management and middle management should know the ERP concept. This is not necessary for the workforce. Increased Rank.
18.	Architecture choices	Unchanged
19.	Vendor partnership	Increased Rank.
20.	Careful package selection	Decreased Rank.
21.	Minimal customization	Decreased Rank.
22.	Project champion	Decreased Rank.
23.	Steering committee	Decreased Rank.
24.	Vendor support	Decreased Rank.
25.	Interdepartmental co-operation	Decreased Rank.
26.	Performance	Changed: It is difficult implement and use key performance

		indicators in an ERP system. Therefore we suggest doing a zero measurement and sending in a performance team. The experts in this team should provide an indication of the performance of the system. Decreased Rank.
	indication.	
27.	Management of expectations	Decreased Rank.

Table 3: Revised Framework

CONCLUSIONS AND FURTHER RESEARCH

This paper researched how an ERP implementation could be improved by using a BPM based strategy. The following research question was asked: *"How can the use of a business process management based strategy for implementing enterprise resource planning systems, improve the chances of a successful implementation?"*

To answer this question, a combined framework of ERP and BPM CSFs was first created. This framework was then validated by experts, leading to a revised framework of ERP CSFs.

The larger part of the BPM CSFs was found to be crucial during an ERP implementation as well and was therefore kept in our framework. On the other hand, some BPM CSFs weren't found to be critical in an ERP implementation and were therefore removed from the framework. To provide more insight between the differences in importance between the CSFs, the experts also rated the CSFs on importance, leading to our final prioritized framework.

By creating this framework, we have provided a starting point for a more successful method for implementing an ERP system. Taking a BPM point of view on ERP implementations and their CSFs has proven to be useful to improve these implementations. This new framework of ERP CSFs can prove to be a guideline in future ERP implementations, hopefully leading to a higher success rate.

Discussion

In the revised version of the framework some CSFs have been removed. But this is based on a single case study. Therefore, it should be validated whether they actually reduce the success of an ERP implementation or if this is case specific. Also, the framework might not be complete. It is possible that more CSFs exist in BPM that are not used in ERP implementations or that other ERP CSFs exist that could be aligned more towards the BPM paradigm. In short, future research could extend the framework and validate it in different case studies in different domains.

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Appendices

Appendix A: Critical success factors concerning Enterprise Resource Planning Systems Implementations. Descriptions based on Akkermans & van Helden (2002)

Table 4: Original ERP CSFs with description

Number:	Name:	Description:
1	Top management support	Top management should actively participate in the ERP implementation phase, for better chances of succeeding. Top management plays a big role in this, especially in the beginning phases of the implementation. Middle management is also important but plays a different role. Top management shouldn't just delegate their responsibilities to technicians, because this will probably lead to failure.
2	Project team competence	Competence of the different members of the project team involved in the ERP implementation. This CSF seems quite obvious, but that may be one of the reasons why a thoroughly project team selection isn't always taken into account.
3	Interdepartmental co-operation	Different business functions are closely integrated by an ERP system. Before using ERP systems, different departments were collaborating in a specific way. This collaboration needs to continue in the same manner without fundamentally changing this process. Therefore it is important that they co-operate during the implementation phase.
4	Clear goals and objectives	The first phase of any project should start with defining clear goals and objectives. The same goes for ERP implementations. The goals and objectives give the possibility to keep track of the progress and provide ways to steer towards accomplishing specific goals and objectives.
5	Project management	Implementing an ERP system is a project that has a large influence on different parts of the organization. This gives the project a huge amount of complexity. Project management is needed to overcome this complexity and to maintain a clear overview of the progress. This is also related to the previous CSF. Planning the different tasks within a certain timeframe is needed within project management.
6	Interdepartmental communication	Relating to CSF 3, the integration of different business functions means that departments need to communicate thoroughly for successful implementation. ERP implementation crosses the borders of business functions and therefore needs clear communications across those borders.
7	Management of expectations	Often, there can be a misalignment between expectations. ERP systems are complex and this can cause discrepancies between the expectations of the supplier and the customer. It can also be that the vendor oversells the system. During the whole project, these expectations should be adjusted where needed.
8	Project champion	This is the presence of someone, usually from senior management level, who has the authority of making substantial organizational changes happen. This is in order to make transformations needed for the implementation happen. At the same time this is the person who does the marketing of the system to the users. A CIO is the most obvious person to look for.
9	Vendor support	Organizations often don´t have the technical and transformational skills needed to undertake such a major project on their own. Vendor support is therefore regarded very important. Fit and compatibility with the IT vendors concerned with the ERP system is important.
10	Careful package	Some packages are more suited for larger organizations and

	selection	others are more suitable for smaller organizations. There is also difference in standards used and organizations should therefore carefully select the right package. This also affects the vendor support as stated in CSF 9.
11	Data analysis and conversion	Data in the organization has to be compatible with the standards used in the ERP system. Therefore, analysis of the current used data structure and possible conversion of this data is necessary.
12	Dedicating resources	Sufficient resources are critical to successfully implement the ERP system. The required resources and allocation of them should be determined early in the project.
13	Steering committee	A committee consisting of senior management, project management and ERP end users to ensure appropriate involvement
14	User training	Training of the user group to ensure a good transition to the new system and improve the chance of acceptance of the new system
15	Education on new business processes	The introduction of ERP systems often implies the change or introduction of new business processes. Education on these new business processes is important to guarantee a smooth transition.
16	BPR	Some business processes have to be redesigned for the ERP system to be implemented. The organization has to be aware what processes are affected by the system.
17	Minimal customization	Customization is usually associated with increased IS costs, longer implementation time and not being able to benefit from vendor software maintenance and upgrades. Minimal customization therefore, increases the chances of successful implementation
18	Architecture choices	Key architectural choices are particularly important during initiation. They revolve around additional software, such as data warehouses.
19	Change management	ERP systems introduce large changes that can cause resistance, confusion, redundancies, and errors. Managing change is therefore important.
20	Vendor partnership	A good fit between the software vendor and the organization is positively associated with packaged software implementation success and organizations should maintain this partnership, especially during the early phases.
21	Vendor's tools	The tools used by the software vendor influence the time and money spend on deploying the system.

Appendix B: Critical success factors concerning Business Process Management Systems Implementations. Descriptions based on Ravesteyn & Versendaal (2009).

Table 5: Original BPMS CSFs with description

Number:	Name:	Description:
1	Understanding the processes of the company.	For a BPM implementation to be successful all people involved in the implementation need to understand the processes. This promotes a better design of the implementation process, commitment to the project, more effective work and errors are recognized faster.
2	Understanding how processes and data	If all people involved understand the connections between the data and the processes the total picture will be understood better.

		are linked together.	This results in the same advantages as CSF#1 except for commitment to the project.
3		Understanding the Business Process Management concept.	One has to understand BPM. Other one cannot work with its tools, techniques and methods which would most likely result in failure.
4		Ensuring that the BPM project is part of a continuous optimization effort.	BPM is based on processes, in contrast to ERP which is implemented project-wise (incremental). But BPM itself is also a process and has to be treated as such to keep al advantages of using BPM.
5		Proper information systems integration.	This CSF seems straightforward but this is where ERP implementations often go wrong. For BPM this is less of an issue because it is centered around processes, which often are already integrated, but it still has to be taken into account when implementing BPM.
6		Know-how and experience with Project Management.	Project management is a complex and sensitive issue. Because of the complexity and the difference between the people involved problems will arise. People have to know how to solve the problems and errors, as quickly as possible, as good as possible while keeping all people involved aligned to the same goals.
7		Experience with Change Management.	A lot of errors arise while changing IT and IT-infrastructure. So the more is known about change management, the fewer mistakes are being made.
8		A well organized design phase (modeling).	Before one starts with the BPM implementation a plan has to be set out. This plan entails how the implementation will take place and takes in account the roles and responsibilities of people. It might take into account specific timetables.
9		Using the 'best' modeling standards and techniques.	By using the best, the newest or the most up-to-date standards and techniques one brings implicit knowledge to the project. Common made errors made in the past are most likely removed in a more up-to-date standard and is therefore less likely to be made in the future because the newer standard is set to this.
10		Understanding interdependencies and integration of data sources.	Processes need data, which might come from different source. For BPM to be successful, the people involved have to know the impact of the different data sources might have on the different processes.
11		Well organized maintenance and (quality) control of the process models.	A plan has to be set out to ensure the quality of the processes. This plan must consist of how quality controls are to be performed and how maintenance on the supply chain is performed.
12		Having a set of key performance indicators and measuring the change (improvement).	A plan has to be set out to measure the performance of the local processes, as well as the working together of multiple processes and the performance of the all processes involved in a supply chain. These measurements have to be defined. The definition requires an indication of what to measure, why and how to measure it. When these measures are known one can localize the weaknesses of the supply chain and improve them.
13		Understanding how to use web services.	One of the keys in BPM is web services. They are used to transfer information, mostly in the form of messages, to other processes. This information is needed for other processes to be executed with success. So for a BPM implementation to be successful, the people involved need to understand how web services work.
14		Involving the right	For the implementation of BPM the right set of people has to be

	people in the project.	attracted. This set of people need to have a diversified background in project management, BPM, change management, system architects, programmers and so on.
15	Creating a culture of attention to quality within the organization.	BPM is aimed at improving the supply chain in numerous ways. But all people in an organization have to agree with this goal. If no one understands the need for improved the implementation will probably go wrong due to lack of commitment by the people involved.

Appendix C: Optimized list of ERP CSFs (before validation)

Table 6: Optimized list of ERP CSFs with description

Number:	Name:	Changes:
1	Top management support	Top management should actively participate in the ERP implementation phase, for better chances of succeeding. Top management plays a big role in this, especially in the beginning phases of the implementation. Middle management is also important but plays a different role. Top management shouldn't just delegate their responsibilities to technicians, because this will probably lead to failure. **Changed**: Top management should also create a culture of attention to quality within the organization
2	Project team competence	Competence of the different members of the project team involved in the ERP implementation. This CSF seems quite obvious, but that may be one of the reasons why a thoroughly project team selection isn't always taken into account. **Changed**: Focus on a project team with a good mix of people, so that the focus is not only on technical people but also business process oriented people.
3	Interdepartmental co-operation	Different business functions are closely integrated by an ERP system. Before using ERP systems, different departments were collaborating in a specific way. This collaboration needs to continue in the same manner without fundamentally changing this process. Therefore it is important that they co-operate during the implementation phase.
4	Clear goals and objectives	The first phase of any project should start with defining clear goals and objectives. The same goes for ERP implementations. The goals and objectives give the possibility to keep track of the progress and provide ways to steer towards accomplishing specific goals and objectives.
5	Project management	Implementing an ERP system is a project that has a large influence on different parts of the organization. This gives the project a huge amount of complexity. Project management is needed to overcome this complexity and to maintain a clear

		overview of the progress. This is also related to the previous CSF. Planning the different tasks within a certain timeframe is needed within project management. **Changed**: extra focus on know-how and define phase of the implementation in project management
6	Interdepartmental communication	**Changed**: The view on interdepartmental communication should be based on the identified processes and how they are linked together. See CSF 22 and 23
7	Management of expectations	Often, there can be a misalignment between expectations. ERP systems are complex and this can cause discrepancies between the expectations of the supplier and the customer. It can also be that the vendor oversells the system. During the whole project, these expectations should be adjusted where needed.
8	Project champion	This is the presence of someone, usually from senior management level, who has the authority of making substantial organizational changes happen. This is in order to make transformations needed for the implementation happen. At the same time this is the person who does the marketing of the system to the users. A CIO is the most obvious person to look for.
9	Vendor support	Organizations often don't have the technical and transformational skills needed to undertake such a major project on their own. Vendor support is therefore regarded very important. Fit and compatibility with the IT vendors concerned with the ERP system is important.
10	Careful package selection	Some packages are more suited for larger organizations and other are more suitable for smaller organizations. There is also difference in standards used and organizations should therefore carefully select the right package. This also affects the vendor support as stated in CSF 9.
11	Data analysis and conversion	Data in the organization has to be compatible with the standards used in the ERP system. Therefore, analysis of the current used data structure and possible conversion of this data is necessary.
12	Dedicated resources	Sufficient resources are critical to successfully implement the ERP system. The required resources and allocation of them should be determined early in the project.
13	Steering committee	A committee consisting of senior management, project management and ERP end users to ensure appropriate involvement
14	User training	Training of the user group to ensure a good transition to the new system and improve the chance of acceptance of the new system
15	Education on new business processes	The introduction of ERP systems often implies the change or introduction of new business processes. Education on these new business processes is important to guarantee a smooth transition. **Changed**: It is not only important to look at the new business processes, but also at existing ones, which relates to CSF 22
16	BPR	Some business processes have to be redesigned for the ERP system to be implemented. The organization has to be aware what processes are affected by the system. Changed: Before you reengineer any of your processes, you need to understand how the current processes run through the organization and how they relate to each other, see CSF 22 & 23
17	Minimal customization	Customization is usually associated with increased IS costs, longer implementation time and not being able to benefit from

		vendor software maintenance and upgrades. Minimal customization therefore, increases the chances of successful implementation
18	Architecture choices	Key architectural choices are particularly important during initiation. They revolve around additional software, such as data warehouses.
19	Change management	ERP systems introduce large changes that can cause resistance, confusion, redundancies, and errors. Managing change is therefore important.
20	Vendor partnership	A good fit between the software vendor and the organization is positively associated with packaged software implementation success and organizations should maintain this partnership, especially during the early phases.
21	Vendor's tools	The tools used by the software vendor influence the time and money spend on deploying the system.
22	Understanding the processes of the company	For implementing the ERP system, a good understanding of the processes of the company and the influence of the ERP on them, is needed.
23	Understanding how processes and data are linked together	For implementing the ERP system, a good understanding of the processes and how they are linked, is needed as well.
24	Understanding the ERP concept	All people involved in the project should have some basic knowledge about the influences of ERP. This ensures that everyone knows what they can expect.
25	Ensuring that the ERP project is part of a continuous optimization effort.	In ERP implementation projects and particularly when these are big projects, continuous optimization and maintenance form an important factor for success.
26	Proper information systems integration	Is regarded as a weak point in ERP implementations and should therefore be taken into account.
27	Understanding interdependencies and integration of data sources	Different processes also have different data streams and these interdependencies should also be taken into account.
28	Having a set of key performance indicators and measuring the change (improvement)	Key performance indicators can be used to measure the performance of the change and can help steer the project team towards a successful implementation.
29	Using the 'best' modeling standards and techniques	New standards and techniques are more efficient and can thereby be more effective and improve the chances of success.
30	Quality Control	Quality control during the implementation phase can prevent the project team of losing time and money and is therefore a good addition to the list.