

Paving the way for ERP Implementation in Higher Education Institutions - A Review of Critical Success Factors

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Abstract

The number of Enterprise Resource Planning (ERP) implementations in higher education has increased significantly over the past decade. Research shows that the failure rate in this sector is higher than in other business sectors. This can be attributed to many factors, more specifically critical success factors (CSF). According to previous research, considering these factors can help to successfully implement ERP in higher education. The objective of this paper is to identify the Critical Success Factors of ERP implementations in Higher Education Institutions (HEI) by conducting a rigorous literature review. The findings are then compared with Information Systems' CSFs and ERP CSFs in organisations of different sectors and discussed against the background of the unique organisation form of HEI. The Findings will help prevent future projects in higher education from failure.

Keywords: ERP, Higher Education Institutions, Critical Success Factors, Enterprise Systems, Systematic Literature Review

1. Introduction

Research indicates that ERP systems improve the operational efficiency of enterprises and give them a competitive edge (Soliman and Karia, 2016). However, organisations take great investment risks when implementing an ERP System (Gabryelczyk and Roztocki, 2017). An ERP adoption is a time-consuming and costly process and often fails to achieve the defined goals. Up to 75% of ERP implementations fail due to several factors (Rizkiana et al., 2021).

In order to prevent failure and to lead the project to success, it is of great importance to consider

so-called Critical Success Factors (CSFs) (Pinto and Slevin, 1987). A CSF is characterised by its ability to be influenced, unlike environmental influences that cannot be influenced (Rockart, 1979). Rosacker and Olson (2008) define CSFs as "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization".

The concept of CSFs has found widespread application in the area of information systems (IS) implementation (Pinto and Slevin, 1987). Research ranges from literature analyses to case studies dealing with IS implementations in different business sectors (Karlsen et al., 2006), of which some report on experiences with their deployment, while others make attempts to develop guidelines and directives for a successful implementation. Numerous manuscripts deal with the applicability of a specific critical success factor in practice in commercial organizations (Al-Nafjan and Al-Mudimigh, 2011). In contrast, research focusing on higher education institutions seems to be relatively limited. Among the known difficulties, implementation in higher education is a relatively new and complex area. Rosacker and Olson (2008) and Gabryelczyk and Roztocki (2017) emphasize the compelling need for practical guidance for researchers and practitioners regarding ERP implementations. They suggest focussing on expert interviews of academics and practitioners for receiving better insights into the topic.

This paper takes a central interest in the increased diffusion of ERP systems in HE and the lack of scientific papers dealing with this topic, going into the unique structures and specificities of HEIs. It is driven by the following Research questions:

- Which Critical Success Factors for ERP Implementations in HEIs are discussed in

the literature?

- How do the Critical Success Factors for ERP Implementations found in literature differ from CSFs in other industries?
- How do the Critical Success Factors for ERP Implementations found in literature differ from IS CSFs?

After explaining the special characteristics of HEIs, a systematic literature review with focus on case studies and surveys is conducted, to identify all CSFs for ERP implementations at HEIs from previous research articles. In the second step, the identified CSFs will be compared with ERP implementations in other sectors and to CSFs for IS Implementation (from representative literature reviews). This will enclose the ones significant for HEI, which need to be considered throughout the whole ERP adoption process, to ensure the success of ERP adoptions in this sector.

2. Background

HEIs differ from other organisations. This section outlines the unique characteristics of HEIs and the benefits expected of an ERP implementation.

2.1. The unique character of Higher Education Institutions

According to Pollock and Cornford (2004), higher education institutions must be viewed as unique organizations that differ from other organization forms. They are characterized by different structures and forms of authority. Lockwood and Davies (1985) explain this by the complexity of objectives and the limited measurability of outcomes in HEIs. Their traditional organizational form, as well as their dependence on a broader society, are typical of public institutions, and must be taken into account when planning major changes and interventions in existing structures (Abu Madi et al., 2022).

Weick (1976) describes HEIs as loosely coupled systems with events acting in a coupled manner with each other while retaining their own identity despite the coupling. The organization as a loose coupling of actors, incentives and technologies, is characterized by the lack of coordination and regulations. Weick (1976) emphasizes the problem of overall organizational control, due to the lack of connections between organizational parts and common variables. The term "organized anarchy" was developed in the 1970s. It can be applied to HEIs, Cohen et al. (1972) argue. An organized anarchy is characterized by *a lack of*

common and consistent goals, unclear technology, and fluid participation in decision making. Decision making is difficult to perform in a standardized manner.

Mintzberg (1983) describes HEI as a bureaucracy without centralization, which operates in a stable environment and with a high degree of complexity. Direct internal bureaucratic forms of control are minimal, and the organization relies on its trust in the abilities and willingness of "professionals" to act in the organization's best interests. Attempts to influence such organizational structures by introducing other coordination mechanisms, direct control or standardization of tasks, fail.

2.2. HEI Expectations of an ERP adoption

Gabryelczyk and Roztocki (2017) argue, that private organisations differ strongly from public and government controlled ones and explain that by the nature of public policy and legal practices. They point that business organizations' main motivation when implementing an ERP system is to increase productivity, to improve data dissemination and to increase quality of communication within the company. Whereas public organisation's aim to replace or integrate their legacy systems with the aim of increasing systems performance or for achieving cost reduction, efficiency and stability of administration (Soliman and Karia, 2016; Gabryelczyk and Roztocki, 2017).

According to Soliman and Karia (2016) HEIs main motivation for adopting an ERP system is driven by government and stakeholder demands. Due to several factors like the internationally observable reforms of HEIs since the early 1980s and the Bologna Declaration, educational institutions have been confronted with heightened expectations from various groups of people. So in order to meet the evolving needs and expectations and to increase competitiveness, they started to undergo digital transformation processes. They turned to information systems like Enterprise Resource Planning (ERP) Systems to support administrative processes (Alt and Auth, 2010).

Lyytinen and Hirschheim (1987) point out, that success is dependent on the expectations and satisfaction of the management and enduser and the expected benefit to be gained from the ERP system. The stakeholders represent one elemental factor, which differentiates HEIs from other organisations. Their diversity in terms of background, culture and expectation concerning the new system plays a major role in indicating the success or failure of the implementation (Abugabah and Sanzogni, 2010).

3. Method

In this paper, a systematic literature review is conducted to identify the critical success factors for ERP implementation in higher education institutions. The method is used to systematically identify and analyze thematically relevant sources. The review is conducted according to predefined steps and a previously developed protocol.

The systematic literature review conducted in this thesis is based on the methodology of Fink (2014). Figure 1 depicts this process, which is explained below.

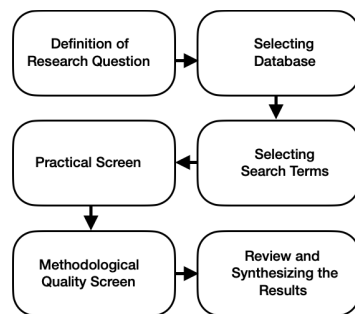


Figure 1. Process of Literature Review adopted from Fink (2014).

3.1. Research Question

A systematic literature review starts by formulating the research question and objective. This step provides the basics for defining the requirements for scientifically relevant research contributions. The literature analysis within the scope of this thesis aims at identifying relevant research articles from which insights into success factors for the implementation of ERP systems at HEIs can be gained.

The research question for the literature analysis preceding the case study is therefore:

"Which Critical Success Factors are significant for ERP Implementations in HEIs?"

3.2. Selecting Database

After defining the objective and the research question, suitable databases for the search are identified. The literature drawn from are journal articles, conference proceedings, book chapters, and dissertations identified through a computer search of a number of databases, including Emerald, ScienceDirect, Web of Science, Proquest, ProquestComputing, IEEE/Xplore, Springer-Link, ACM Digital Library,

ResearchGate, Google Scholar, and Google Academia. These databases include research articles that can be attributed to the field of business/IS. Among them are well-known conferences and journals.

3.3. Definition of Search Terms

The terms which were used for the systematic literature analysis search are listed below. The truncation character "*" was used as a placeholder for the additional inclusion of words of the same root: ("ERP" OR "Enterprise Resource Planning")

AND ("Success Factors" OR "Success Indicators" OR "Critical Success Factors" OR "CSF" OR "Challenges" OR "Erfolgsfaktoren" OR "Herausforderungen")

AND ("Higher Education Sector" OR "HES" OR "Higher Education Institution" OR "HEI" OR "Universit*" OR "Hochschul*")

3.4. Practical Screening

The search is based exclusively on hits in the title, abstract and keywords. Most of the searches were performed using the advanced search with the advantage of extending the regular text search with special characters and commands (extended operators) and to more strongly limit search results for complex search queries. The keywords used in the search were identified on the basis of previous publications relevant to this field. In addition, both English and German related terms were used as search terms. After importing the hits into the literature management system Citavi, they were imported into StArt (a tool which supports the SLR process) for further analysis using quality criteria.

3.5. Methodological Quality Screening

The next step before starting with the review is to develop inclusion and exclusion criteria for setting the boundaries and restricting the content of suitable research articles. The selected inclusion and exclusion criteria are listed below:

"Inclusion Criteria": Review, Guide, Framework or Process Model for successful ERP implementation, Case study, Exploratory study, Model/framework, Evaluations of ERP systems, Best practices.

"Exclusion criteria": Not in English or German, ERP systems as a course at HEI, Using ERP systems at HEI.

The systematic literature search has identified a total

of 85 articles within the defined research area that meet the search criteria. Applying Filter options (e. g. time period 2011-2023) and reading the abstract and full text left 48 articles. Merging the hits from different data bases resulted in 41 Papers.

3.6. Review and Synthesizing the Results

The distribution of the papers per year range can be seen in Table 1. The number of research articles decreases over time. The majority of papers analyzed are case studies or surveys.

The focus of the paper is on case studies. This research design is characterized by its great practical relevance. Most of the articles deal with different ERP adoption aspects and phases. Some focus on analysing one specific success factor (e g. change management, stakeholder involvement, business process reengineering), while some others provide frameworks or guidelines for implementing ERP systems in HEIs.

Table 1. Number of Papers per Time Period

Time Period	Paper No.
2011 - 2015	19
2016 - 2020	18
2020 - 2023	4

4. Findings

The identified CSFs are categorized into four groups according to the categorization proposed by Rizkiana et al. (2021) and one additional category: Management specific (functions supporting the decision making process), Strategy specific (activities with long term effect on the implementation project and the company), Social/Sociocultural (social and cultural aspects), Operational (daily activities involving human resources) and additionally Technical specific. The 15 most frequently mentioned success factors are listed in Table 2, which provides a detailed overview of the identified CSFs with category and description. Table 3 lists the number of CSF with the number of citations in different sources per success factor (n).

The results after categorization provide evidence that management, strategic, operational and social/sociocultural specific factors such as "Top Management Support", "Business Process (Re)engineering" and an "Effective Communication" have a stronger impact on the success or failure of an ERP project at a HEI than technical factors such as "technological infrastructure" (Karlsen et al., 2006 or testing the system. This can be attributed to the

complex decentralized organization structure and high number of employees of HEIs, which require a higher degree of organisation, coordination and intensive communication efforts, which have a huge impact on the degree to which the ERP system meets the stakeholders expectations in the Post-Implementation phase (Abugabah and Sanzogni, 2010).

5. Comparison and Discussion

The findings reveal, that there are some CSFs, which are mentioned in almost every ERP implementation environment, like Top Management Support and Project team (the asterisk marks the CSFs that occur in at least 6 of 8 rows in table 4). The top ten CSFs for HEIs are of managerial, strategic, operational and social/sociocultural nature. In contrast, the CSFs of previous studies rank technical CSFs like technological infrastructure among the top ten impacts for ERP implementation success. The top 10 CSFs are described below and compared to the other results:

(1) *Top Management Support*: This is the most frequently mentioned CSF in each ERP implementation environment, regardless of the sector (Table 4). The top management level of a HEI is represented by the president/chancellor. The full support and backing of top management/decision-making level is indispensable for the success of an ERP project (Karlsen et al., 2006). The administrative structures of HEIs are inflexible and employees tend to resist the idea of change. The top management has a significant role for motivating the employees (Seo, 2013). Leyh et al. (2017) recommend the deployment of a higher-level decision making body in form of a steering committee, who works under the direct authority of the president. It should be responsible for planning and approving the objectives, timetable and project costs and major changes to the project scope (Leyh et al., 2017).

(2) *Business Process Reengineering*: HEIs are exposed to extreme external pressure (standards, rankings, ..), forcing them to rethink their existing processes (Santos et al., 2018). The complex administration processes set by the administrative law in public organisations (Ziemba and Oblak, 2013) and the decentralised character of HEIs makes it a challenge to implement holistic administrative processes. Ziemba and Oblak (2013) go deeper into the nature of public sector organisations and highlight the importance of "Factors related to government processes management" like Government process reengineering.

(3) *Training and Education*: Training and Education is an often cited CSF for ERP, regardless of the sector

Table 2. Critical Success Factors for ERP Implementation HEI from SLR
(Factors marked with an asterisk are of particular importance because cited in at least 6 of 8 columns)

No.	CSF	Category	Description	n
1.	Top Management Support	Management	Support of the head of the HEI (e. g. steering committee)	31
2.	Business Process (Re)engineering	Strategic	Redesign and optimization of processes	31
3.	Training and Education	Management	The end users, and experts of the IT department should be fully trained in the whole system	30
4.	Cross-departmental Communication and Cooperation	Operational	Effective Communication between project members	26
5.	Change Management	Operational	Planning and Implementing the process of change	24
6.	Organisational Culture	Social/Sociocultural	Organizational dynamics, beliefs, attitudes, politics, environment and other behaviour patterns. Guidelines outlining the goals, conditions, framework of the project and ongoing assessment and monitoring	25
7.	Project Management	Management	Services like Consulting and successful partnership	23
8.	Vendor and Consultancy support and partnership	Management	Budget, Time and Resource Allocation Plan	22
9.	Project vision/plan	Strategic	Individuals from across the entire organization	22
10.	ERP Project team composition and competence	Operational	Opportunity to actively shape the project and affect the outcome	16
11.	User Involvement	Operational	Decision Using the right ERP System and Technology Selection Methodology	14
12.	ERP Selection	Strategic	User Attitude (positive/negative) towards the end product	7
13.	User Acceptance/Resistance	Social/Sociocultural	Existing Expertise and Knowledge of the methods or techniques of using an ERP system	8
14.	ERP System Know-How	Social/Sociocultural	Connecting the ERP system with other applications	6
15.	ERP Integration	Technical		6

Table 3. References

CSF	References
1,2	Ahmad et al., 2011, Débrosse-Bruno, 2017, Qian, 2017, Thompson et al., 2018, Fadelmoula, 2018, Taghavi et al., 2019, Prokuptez, 2019, Bradford, 2011, Aldayel et al., 2011, Singhal et al., 2011, Stoyanoff, 2012, Seo, 2013, Karande and Ghatule, 2014, Nizamani et al., 2013, Olugbara et al., 2014, Thelen, 2015, Al-Sabaawi, 2015, Soliman and Karia, 2016, Arthur, 2016, Loan, 2016, Shatat and Dana, 2016, Al-Hadi and Al-Shaibany, 2017, AlQashami and Heba, 2015, Elmoniem et al., 2017, Abu Madi et al., 2022, Albarghouthi et al., 2020, Epizitone and Olugbara, 2020, Rizkiana et al., 2021, Aggrey et al., 2021, Widjaja, 2018, Santos et al., 2018
3	Bradford, 2011, Elmoniem et al., 2017, Singhal et al., 2011, Nirmala et al., 2013, Seo, 2013, Nizamani et al., 2013, Olugbara et al., 2014, Al-Sabaawi, 2015, Thelen, 2015, Soliman and Karia, 2016, Loan, 2016, Shatat and Dana, 2016, Leyh et al., 2017, Al-Hadi and Al-Shaibany, 2017, Débrosse-Bruno, 2017, Qian, 2017, Thompson et al., 2018, Fadelmoula, 2018, Taghavi et al., 2019, Abu Madi et al., 2022, Kumar et al., 2021, Albarghouthi et al., 2020, Epizitone and Olugbara, 2020, Sowon et al., 2017, Rizkiana et al., 2021, Aggrey et al., 2021, Widjaja, 2018, Santos et al., 2018
4	Ahmad et al., 2011, Elmoniem et al., 2017, Oevel and Toschlager, 2011, Lechtchinskaia et al., 2011, Bradford, 2011, Ahmad et al., 2011, Stoyanoff, 2012, Seo, 2013, Karande and Ghatule, 2014, Auth, 2014, Olugbara et al., 2014, Al-Sabaawi, 2015, AlQashami and Heba, 2015, Soliman and Karia, 2016, Thelen, 2015, Arthur, 2016, Loan, 2016, Shatat and Dana, 2016, Leyh et al., 2017, Al-Hadi and Al-Shaibany, 2017, Débrosse-Bruno, 2017, Prokuptez, 2019, Epizitone and Olugbara, 2020, Rizkiana et al., 2021, Widjaja, 2018, Santos et al., 2018
6,5	Lechtchinskaia et al., 2011, Bradford, 2011, Ahmad et al., 2011, Al-Nafjan and Al-Mudimigh, 2011, Singhal et al., 2011, Seo, 2013, Elmoniem et al., 2017, Karande and Ghatule, 2014, Nizamani et al., 2013, AlQashami and Heba, 2015, Soliman and Karia, 2016, Arthur, 2016, Shatat and Dana, 2016, Loan, 2016, Rabaa'i and Gammack, 2016, Leyh et al., 2017, Al-Hadi and Al-Shaibany, 2017, Thompson et al., 2018, Taghavi et al., 2019, Abu Madi et al., 2022, Epizitone and Olugbara, 2020, Rizkiana et al., 2021, Widjaja, 2018, Al-Sabaawi, 2015, Santos et al., 2018
7	Seo, 2013, AlQashami and Heba, 2015 Lechtchinskaia et al., 2011, Ahmad et al., 2011, Oevel and Toschlager, 2011, Seo, 2013, Aldayel et al., 2011, Singhal et al., 2011, Al-Sabaawi, 2015, Soliman and Karia, 2016, Loan, 2016, Shatat and Dana, 2016, Al-Hadi and Al-Shaibany, 2017, Thompson et al., 2018, Fadelmoula, 2018, Oevel and Toschlager, 2011, Rizkiana et al., 2021, Elmoniem et al., 2017, Abu Madi et al., 2022, Epizitone and Olugbara, 2020, Rizkiana et al., 2021, Widjaja, 2018, Santos et al., 2018
8	Seo, 2013, AlQashami and Heba, 2015 Lechtchinskaia et al., 2011, Ahmad et al., 2011, Oevel and Toschlager, 2011, Seo, 2013, Aldayel et al., 2011, Singhal et al., 2011, Al-Sabaawi, 2015, Soliman and Karia, 2016, Loan, 2016, Shatat and Dana, 2016, Al-Hadi and Al-Shaibany, 2017, Thompson et al., 2018, Fadelmoula, 2018, Oevel and Toschlager, 2011, Rizkiana et al., 2021, Elmoniem et al., 2017, Abu Madi et al., 2022, Epizitone and Olugbara, 2020, Rizkiana et al., 2021, Widjaja, 2018, Santos et al., 2018
9	Stoyanoff, 2012; Seo, 2013; Al-Sabaawi, 2015; Shatat and Dana, 2016; Karande and Ghatule, 2014; Prokuptez, 2019; Thelen, 2015; Loan, 2016; Al-Hadi and Al-Shaibany, 2017; Thompson et al., 2018; Prokuptez, 2019; Taghavi et al., 2019; Abu Madi et al., 2022; Kumar et al., 2021; Epizitone and Olugbara, 2020; Rizkiana et al., 2021; Aggrey et al., 2021; Widjaja, 2018; Bradford, 2011; Nirmala et al., 2013; Abu Madi et al., 2022; Santos et al., 2018
10	Aldayel et al., 2011; Abu Madi et al., 2022; Elmoniem et al., 2017; Seo, 2013; Olugbara et al., 2014; AlQashami and Heba, 2015; Thelen, 2015; Rabaa'i and Gammack, 2016; Rabaa'i and Gammack, 2016; Soliman and Karia, 2016; Shatat and Dana, 2016; Thompson et al., 2018; Taghavi et al., 2019; Epizitone and Olugbara, 2020; Rizkiana et al., 2021; Santos et al., 2018
11	Lechtchinskaia et al., 2011, Aldayel et al., 2011, Singhal et al., 2011, Karande and Ghatule, 2014, Olugbara et al., 2014, Al-Sabaawi, 2015, Shatat and Dana, 2016, Débrosse-Bruno, 2017, Thompson et al., 2018, Prokuptez, 2019, Grechenig et al., 2012, Auth, 2014, Rizkiana et al., 2021, Aggrey et al., 2021
12	Aldayel et al., 2011, Elmoniem et al., 2017, Singhal et al., 2011, AlQashami and Heba, 2015, Qian, 2017, Abu Madi et al., 2022, Rizkiana et al., 2021, Widjaja, 2018, Santos et al., 2018
13	Stoyanoff, 2012, Nirmala et al., 2013, Auth, 2014, Olugbara et al., 2014, Qian, 2017, Rizkiana et al., 2021, Aggrey et al., 2021
14	Bradford, 2011, Débrosse-Bruno, 2017, Qian, 2017, Fadelmoula, 2018, Taghavi et al., 2019, Prokuptez
15	Ahmad et al., 2011, Aldayel et al., 2011, Seo, 2013, AlQashami and Heba, 2015, Rabaa'i and Gammack, 2016, Qian, 2017

(Karlsen et al., 2006, Rizkiana et al., 2021, Qian, 2017), whereas the ranking may differ (see Table 4). Sustainable qualification measures increase the competence and motivation of employees. Key users play a major role in this context. With their function as knowledge sharing unit within their field of responsibility, are key success factors (Leyh et al., 2017, Fadelelmoula, 2018).

(4) *Communication/Cooperation*: Soliman and Karia (2016) identify "Priority conflicts between user departments" and "Conflicts of Priorities" as challenging, regarding ERP implementations in large, complex HE organizations with numerous departments. Both challenges can be overcome with an effective cross-departmental communication and cooperation (Débrosse-Bruno, 2017). An effective communication plays a major role in connecting staff at all participating levels and departments of the organization (Denolf et al., 2015). Although this CSF was mentioned in almost every ERP CSF list, it seems to be significant for large organisations with complex intra-organizational management systems, which integrate multiple (globally) diffused departments and branches, as it was also ranked high for supply chain information system implementation (Denolf et al., 2015).

(5) *Change Management*: The findings indicate, that the change management has a profound effect on implementation success. HEIs need an appropriate change management structure and method by which the process of adaptation to new or changed processes are fully supported. In contrast, this CSF isn't listed in Table 4 among the top ten CSF for IS in general. This can be explained by the complex organisational structure of HEIs, where a change management unit is indispensable (section 2.1).

(6) *Organisational Culture*: An organisational culture, where employees have the same goals and values and where employees are open to change, reduces resistance and confusion and leads to higher user acceptance (Somers and Nelson, 2004). This CSF can't be found among the top ten CSFs for ERP/IS in other sectors and therefore can be attributed to the unique structure of HEI organisation (Aldayel et al., 2011).

(7) *Project Management*: The project management is one of the most important CSFs in general (see Table 4 and 5). With regard to the HEI sector, particular value is attached to the bureaucracy challenge (Santos et al., 2018). The term describes the issue of long decision making paths and a lot of authorisation procedures and delays. The top management is responsible for providing the support and required resources with sufficient spectrum for the project manager to meet the challenges of managing all risks leading to project

Table 4. Comparison of the top factors

CSF for ERP at HEI (Present Review)	CSF for IS (Karlsen et al., 2006)
Top Mgmt Support	Project Mission
Business Process Reeng.	Top Mgmt Support
Training and Education	User Involvement
Communication/Coop.	Clear Project Goal
Change Management	Communication
Organisational Culture	Clear Responsibilities
Project Management	Project Management
Vendor/Consultancy	Technological Infra.
Project Vision/Plan	Planning
Project Team	Trouble Shooting

delays (Rabaa'i et al., 2009).

(8) *Vendor/Consultancy*: The selection and relationship to the vendor and consultants have a tremendous impact on the implementation success. Consultants can be involved in all phases of the implementation, starting from conducting the requirements analysis, to actually implementing the project and conducting training. This CSF is cited in almost every study regardless of the sector and isn't unique to HE (as seen in Table 4).

(9) *Project Vision/Plan*: The project plan is usually discussed in the planning phase and includes timelines, priorities, resources and activities, as well as the type and sources of information needed. New developments and implementations at large organisations, such as higher education institutions, like an ERP implementation, affect numerous administrative processes and have to be considered and communicated from the beginning from an end-to-end perspective. This CSF isn't unique to HE (see Table 4).

(10) *Project Team*: The success of ERP upgrade projects depends heavily on the composition of the project team. The ERP project team should consist of a well-selected mix of people with technical, process and business expertise. This enables the solving of business-related issues without consulting the relevant departments (Seo, 2013). Collaboration within the project team is described as "the core process to project progress" (Akkermans and van Helden, 2002). This CSF isn't unique to HEI context (as seen in Table 4).

The findings after comparison and discussion:

- The top ten HEI CSFs, which were identified in the present review, are applicable to almost any ERP implementation regardless of the sector. So the CSFs aren't unique to HE.

Table 5. CSFs and Ranking for ERP implementation in organizations of different sizes & sectors
The asterisks mark the CSFs which are mentioned in at least 6 of 8 columns

CSF	Present Paper	Shaul and Tauber, 2013	Gavali and Halder, 2020	Denolf, 2015	Garg and Garg, 2014	Leyh, 2014	Delgir and Pourjab 2018	Ziemba, 2013
Organisation Type/Size	HEI	General	Const. Ind.	Supply Chain	Retail Ind. India ERP consult size unknown	SMEs Germany different industry sectors	Finance Sector Iran (Large Iranian bank with over 30.000 employees)	Public Sector Large Govt. Agency (number employees unknown Poland)
Research Type	SLR Present Paper	SLR	SLR	SLR	Survey	CS	CS	CS
Implementation Strategy	-	1	-	-	7	9	-	-
Project Management*	7	2	7	10	-	16	6	2
Top Management Support*	1	3	2	4	2	6	3	9
Enterprise System	-	4	-	-	-	3	-	-
Project team*	10	5	4	3	14	7/8	-	5
Education and Training*	3	6	6	12	11	1	2	-
Change Management*	5	7	9	-	12	19	-	10
Vendor*	8	8	8	8	5	14	-	-
ERP Selection*	12	9	1	8	4	-	1	-
Data Management	-	10	3	11	10	21	-	-
User Acceptance	13	11	-	-	-	17	5	-
User involvement	11	12	-	-	13	9	-	12
Environment	-	13	-	-	-	-	-	-
Software maintenance	-	14	-	-	-	-	-	-
Organizational Experience	-	15	-	-	-	-	-	-
Customization/Config.	-	-	-	-	9	5	-	-
Project Champion*	-	-	11	-	-	26	-	-
BPR*	2	-	10	9	3	14	4	4
Bureaucracy	26	-	-	-	-	-	-	-
Expectation Mgmt.	-	-	-	-	15	-	-	-
Communication/Coop.*	4	-	13	1	16	9	7	13
Organisational Culture	6	-	-	-	-	27	8	-
Project Vision (Clear Goals)*	9	-	5	5	1	4	-	3
Change Government*	27	-	-	-	-	-	-	-
Use of Consultants	-	-	-	-	5	12	-	6
Testing the system	16	-	1	-	17	2	-	-
Legacy Systems	20	-	-	7	-	19	-	-
Technological Infrastructure	17	-	12	-	8	-	-	-
Relationship Mgmt.	-	-	-	2	-	-	-	-
Risk Sharing (SC partners)	-	-	-	6	-	-	-	-
Performance Monitoring	-	-	-	13	-	24	-	14
Knowledge Mgmt*	19	-	-	-	-	24	-	-
Use of a steering committee*	-	-	-	-	-	30	-	-
Requirements Specification*	18	-	-	-	-	30	-	1
Coop. w. Research Centers	-	-	-	-	-	-	-	7
Expertise in IT	14	-	-	-	-	-	-	8
Risk Management	-	-	-	-	-	-	-	11
ERP Integration	15	-	-	-	-	-	-	-

- The top IS CSFs are very similar to HEI CSFs, whereby the order of importance differs and some very significant factors in HE context (e. g. Business Process (Re)engineering, Organisational Culture) can't be found among the top ten IS CSFs. In contrast, some technical CSFs are highly ranked among the top ten IS CSFs and ERP CSFs in general.

In conclusion, it can be emphasized, that organisational CSFs are crucial to the implementation success in HEIs. Every stakeholder reacts differently to change. The project lead, project management and change management are responsible for taking into account the different expectations of the stakeholders, and for reacting to them, while the stakeholders need to show general willingness to communicate, cooperate, to extend their knowledge and to change. Furthermore, the stakeholders should be qualified and have the expertise needed to lead the project to success.

6. Conclusion and Limitations

This paper provides an extensive systematic literature review for ERP success factors in HEI context. Furthermore the CSFs are compared with representative empirical literature of CSFs from IS implementations in general, and with empirical data from ERP implementations in commercial business organisations of various sectors. From a researchers point of view, this paper contributes to ERP CSF research by providing an overview of the CSFs relevant to the HEI sector. From practitioners point of view, this paper offers different comparisons supporting managers and end user of ERP projects in focussing on the CSFs relevant for their organisation type.

A limitation of the paper is the fact, that the comparison relies on representative papers for IS CSFs and CSF for ERP in various sectors, implying that the compared empirical data isn't exhaustive and there is a need for more data from practice. Future research could evaluate the effects of specific critical success factors on the success of ERP system implementation by interviewing experts.

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