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CRITICAL SUCCESS FACTORS FOR ADOPTION OF INTEGRATED INFORMATION SYSTEMS IN HIGHER EDUCATION INSTITUTIONS – A META-ANALYSIS

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ABSTRACT

Integrated information systems continuously develop into a strategic instrument for higher education institutions. In contrast to private companies, specific characteristics of higher education institutions in regards to their organizational structure as well as their management and operations require a tailored project management approach. There is need for thorough research and practical recommendations for implementation of integrated information systems in higher education institutions. This paper provides a systematic meta-analysis and a state of the art overview of critical success factors for selection and implementation of integrated information systems based on the characteristic of the higher education sector. A qualitative content analysis is applied to receive a comprehensive list of critical success factors for higher education institutions. The mostly named critical success factors are stakeholder participation, business process reengineering and communication which align well with the peculiarities of the higher education sector.

Keywords

Project management, critical success factors, CSF, state of the art analysis, higher education institutions, university, ERP systems, campus management system, CMS, integrated information system

INTRODUCTION

Challenges such as an increase in the number of students, intensified competition between institutions, and government pressure to improve operational efficiency (Allen et al., 2002; Rabaa'i, 2009) forces higher education institutions (HEIs) to adapt their strategy and their internal business processes. Thus, integrated information systems (IIS) continue to develop into a strategic instrument for higher education institutions (Haneke, 2001), as clear structures and process integration become their immediate focus. Integrated information systems in the higher education sector include functionalities of Enterprise Resource Planning (ERP) and Campus Management Systems (CMS). The latter are defined as cross-functional, modularized standard software which is designed to widely support administrative and service processes in HEIs (Alt and Auth, 2010) covering the entire academic cycle from student data and credit management through course and lecture room management (Jannek et al., 2009; Sprenger et al., 2010). In the following, this type of systems will be referred to as IIS for HEIs and will be compared to private sector ERP systems.

HEIs are generally more resistant to change than private companies due to the loosely coupled and independently operating academic and administrative units (Gates, 2004) as well as a scattered authority structure (Rabaa'i, 2009). This peculiarity makes it even more complicated for technological advancements to find their way into the daily business of higher education service provision. The fragmented organizational and technical landscape with the decentralized faculties and institutes leads to individual agendas, processes and information systems. Heiskanen et al. (2000) argue that HEIs can be differentiated from

private companies due to their unique decision-making processes. Each executive faculty member is capable of independent decision-making and behavior. This characteristic can have a negative influence on communication processes during selection and implementation of IIS due to fragmented responsibility and contradicting interests (Sprenger et al., 2010). Although HEIs are bound by economic principles, their protagonists value academic freedom and autonomy. Both can be contradictory to standardization (Nielsen, 2002). Sprenger et al. (2010) present a number of inefficiencies stemming from organizational, structural and technical shortcomings of HEIs, among these lack of communication between institutes, faculties and administrative units as well as lacking transparency of responsibilities and business processes.

Fundamental research and theory building in the area of selection and implementation of IIS in HEIs is still in its inception and findings from private sector ERP systems need to be combined and narrowed down to the peculiarities of HEIs (Alt and Auth, 2010). In order to identify the road to a successful selection and implementation of an integrated system for the specific case of the higher education sector, certain indispensable factors need to be considered and managed efficiently (Holland and Light, 1999). The concept of Critical Success Factors (CSFs) is a well-established approach in ERP systems research (Davis and Huang, 2007) and selection and implementation of IIS in HEIs can be regarded as a specific case of CSFs research already conducted for the private sector ERP (Allen et al., 2002; Bologna et al., 2009). The aforementioned characteristics of HEI and the necessary coverage of additional functionalities of the academic cycle underlie the assumption that CSFs for selection and implementation of IIS in this specific context need adjustment.

In this paper, a comprehensive qualitative analysis of CSFs identified for the specific cases of IIS selection and implementation in HEIs is presented. It is attempted to show a comprehensive picture of the state of the art in this research field by addressing the following research questions:

- What is the state of the art in research on CSFs for selection and implementation of IIS in HEIs?
- How do these CSFs relate to specific characteristics of the higher education sector?

A qualitative content analysis of CSFs for selection and implementation of IIS in HEIs helps synthesizing the existing literature. Findings are subsequently summarized into the Unified CSFs Model by Esteves and Pastor (2001).

RESEARCH METHODOLOGY

A comprehensive literature review provides the basis to select and methodologically analyze and synthesize research literature on CSFs for IIS selection and implementation in HEIs. Categories of CSFs have been deductively derived applying the methodology of qualitative content analysis (Mayring 2002).

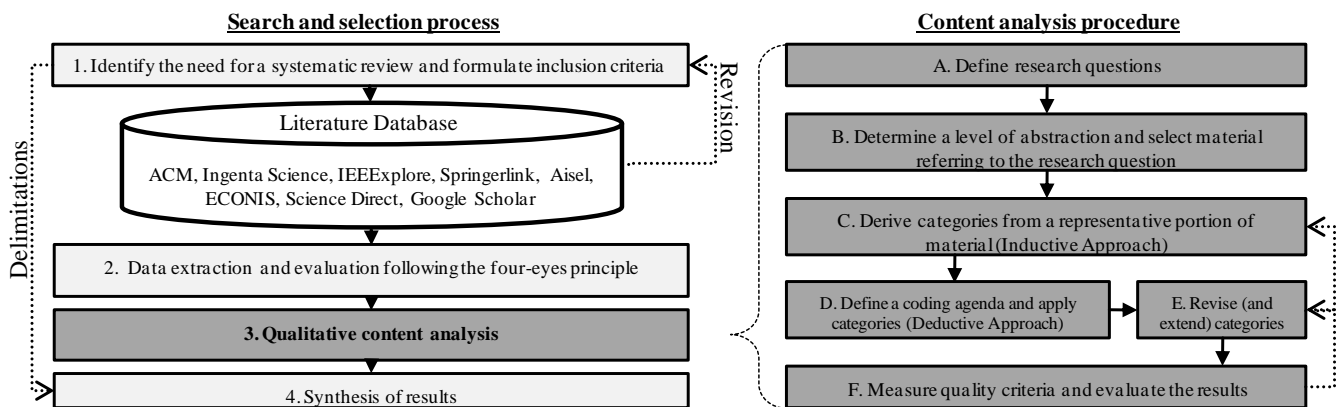


Figure 1. Research process – literature search and qualitative content analysis

To ensure a high coverage, the inclusion criteria encompassed all papers that focus selection and implementation of IIS in HEIs. In total, 107 papers were identified. During the selection process (Figure 1), the authors analyzed the abstracts of assigned publications. By classifying these publications, the authors excluded the ones that do not address critical success factors in project management of IIS in HEIs. If papers could not be selected or excluded by reading the abstract, the authors read the full articles. The qualitative content analysis was conducted for the 21 selected papers (see Table 2) which cover the research area of CSFs for HEIs.

The right half of Figure 1 summarizes the process of qualitative content analysis which “is a research technique for making replicable and valid inferences from texts to the contexts of their use” (Krippendorf, 2004). The content analysis process

encompasses inductive code generation followed by deductive code application. Feedback loops ensure that revision and extension of the coding agenda and research quality measures are considered in an iterative process. During the process of the qualitative content analysis the following accredited research quality criteria have been measured (Mayring 2002):

Objectivity	The inter-coder reliability between author 1 and author 2 with Cohen's Kappa of 0.82 is well above the acceptance level.
Reliability	The intra-coder reliability results in a Cohen's Kappa of 0.91 for author 1 and 0.89 for author 2. Both values indicate an acceptable reliability of the qualitative content analysis.
Validity	To ensure validity of our qualitative content analysis, we inductively developed a system of codes and consolidated them into 20 sub-categories which in turn are grouped into six main categories.

Table 1. Quality criteria of the content analysis

Our inductively developed coding scheme is designed to account for categories that have not been explicitly named as such (Silverman, 2000). This open-ended approach has proven useful for synthesizing and consolidating the identified publications.

RESULT OF THE QUALITATIVE CONTENT ANALYSIS

The following main categories of CSFs for HEIs have been identified: Effective Project Management, Project Team, Integration, Change Management and Organizational Culture, Vendor profile and Customization. These categories were deducted from 22 sub-categories (Table 2) and will be synthesized into the following subsections. The varying levels of detail between the subsections indicate depth and frequency of mentioned issues in the source publications.

Effective Project Management

Project Organization: Project responsibility and decision-making authority should remain in the hands of the HEI (Gates, 2004; Frye et al., 2007; Rabaa'i and Gammack, 2008; Rabaa'i et al. 2009, Rabaa'i, 2009). In general, project managers in HEIs have little control over budgets and are unable to adjust them to the project schedule (Frye et al., 2007) as governmental and third-party funds are usually restricted and time bound. Consent exists between different researchers to not install external partners in key positions of the project. Project managers oversee the whole project. They need to execute process control in the form of solution architecture responsibility (Frye et al., 2007; Gates, 2004) which is also the basis for later monitoring and testing. The project structure needs to resemble the HEI's organization, which tends to be much more fragmented than in private sector enterprises (Frye et al., 2007). Especially the steering group should be linked closely to the HEI's head of administration (Kuper and Göcks, 2007) which ensures strategic integration (Bologa et al., 2009). In contrast, the project management's authority cannot resemble the fragmented decision structures of an HEI (Degenhardt et al., 2009; Frye et al., 2007; Nielsen, 2002). Moreover, key project positions should remain stable and be occupied by one person throughout the project (Frye et al., 2007; Infinedo, 2005) while in HEIs executive positions usually rotate periodically, e.g. deans, university officers.

Project Planning: The definition of project structures and responsibilities is the basis for planning (Degenhardt et al., 2009). The project plan itself is a decisive instrument for project member orientation and motivation as unrealistic deadlines and scope creep jeopardize successful implementation (Lee and Lee, 2001; Infinedo, 2005; Hurbean, 2008; Kuper and Göcks, 2007; Jannek et al., 2009; Klug, 2009; Rabaa'i, 2009). An excessively slack project plan in the HEI context, however, is not supportive of timely decision-making and focused attention of the team members (Gates, 2004). Due to their bureaucratic structure with contradictory interests HEIs are prone to tedious consensus decision making processes which can hinder adequate project planning. Nevertheless, a certain amount of flexibility in the project schedule is absolutely necessary (Lee and Lee, 2001). In HEIs, it is of major importance that the academic calendar is considered in the project plan, as key dates and deadlines, especially the cut-over planning (Gates, 2004), have to fit into the implementation phases (Nielsen, 2002).

Definition of Project Objectives: As part of effective project management, there is need for clearly defined and documented project objectives (Kuper and Göcks, 2007; Klug, 2009).

Authors	Effective Project Management							Project Team				Integration	Change Management and Organizational Culture						Selection/ Vendor profile			Customization	CSF frequency per publication
	Project Organization	Project Planning	Definition of Project Objectives	Requirement Analysis	Resource Management	Project Performance Measurement	Project Communication	Project Leadership and Top Management Support	Project Authority (Decision and Budget)	Interdisciplinary Team Structure	Project Team Member Skills (Hard and Soft)		Change of Organizational Structures and Responsibilities	Business Process Reengineering	Stakeholder Participation	Past Implementation Experiences	User Training	Internal and External Communication	Stability of Software Vendor	Consultancy expertise	Software enhancements		
Allen et al., 2002	+												+		+		+						4
Bologa et al., 2009	+							+		+				+		+			+			6	
Davis and Huang, 2007							+	+		+				+							+	5	
Degenhardt et al., 2009	+	+			+	+	+	+		+				+		+						12	
Degkwitz and Schirmbacher, 2009											+											3	
Fischer and Hartau, 2009					+											+						5	
Fisher, 2006							+									+						2	
Frye et al., 2007	+				+	+	+	+	+	+	+			+		+				+		14	
Gates, 2004	+	+			+		+			+				+		+	+					8	
Haneke, 2001													+	+	+							3	
Hurbean, 2008		+					+	+		+				+	+							8	
Infinedo, 2005	+		+					+		+				+		+	+					7	
Jannek et al., 2009		+			+		+							+	+	+						7	
Klug, 2009		+	+		+	+		+						+	+	+						10	
Kuper and Göcks, 2007	+	+	+				+	+		+				+		+						9	
Lee and Lee, 2001		+			+									+	+	+		+	+	+		8	
Nielsen, 2002	+	+						+		+				+	+		+	+	+	+		13	
Oliver and Romm, 2000					+													+		+	+	4	
Rabaa'i et al., 2009	+				+		+		+		+					+		+	+	+		10	
Rabaa'i, 2009		+			+		+	+	+	+	+			+	+	+		+	+	+		16	
Rabaa'i and Gammack, 2008	+				+	+		+	+	+	+			+	+	+	+		+			15	
CSF frequency across analyzed publications	10	10	3	6	8	5	10	11	4	7	9	5	6	12	16	2	8	15	5	7	4	7	

Table 2. CSFs for HEI as identified through qualitative content analysis

Requirement Analysis: It is of major importance that a detailed requirements analysis is conducted for system selection (Rabaa'i et al, 2009), identification of weak spots in business processes (Degenhardt et al., 2009) and a thorough gap-fit analysis (Degenhardt et al., 2009; Frye et al., 2007; Rabaa'i and Gammack, 2008). This also ensures a strategic fit with the HEI's overall business processes (Rabaa'i, 2009; Rabaa'i and Gammack, 2008). System specifications have to be derived by and agreed upon by the stakeholder groups (Degenhardt et al., 2009; Gates, 2004). This is significantly more time-consuming in HEIs (Frye et al., 2007). Furthermore, requirements have to be professionally documented (Rabaa'i and Gammack, 2008), ideally in a solution architecture (Frye et al., 2007) which serves as a guideline for the implementation project. It is argued that any changes to the software conducted during the customization phase can be pushed bottom-up to the software vendor through a higher education industry interest group. This can either happen before individual customization (Gates, 2004) or after changes have been realized in order to preserve system updatability (Rabaa'i and Gammack, 2008).

Resource Management: Particularly HEIs often lack a financial case for IT investments (Oliver and Romm, 2000). Especially, the precise estimation and provision of a sufficient budget is an issue in HEIs (Frye et al., 2007; Lee and Lee, 2001; Oliver and Romm, 2000; Rabaa'i and Gammack, 2008). Furthermore, regular cost reviews and budgetary authority of the project manager need to be established for successful resource management (Rabaa'i and Gammack, 2008). Apart from monetary resources for hard and software as well as internal staffing and consultancy, other resources, such as personnel, time budgets and technical solutions should be managed and allocated efficiently (Lee and Lee, 2001; Degenhardt et al., 2009; Fischer and Hartau, 2009; Jannek et al., 2009; Klug, 2009).

Project Performance Measurement: As part of requirement analysis and project planning, detailed metrics need to be developed and monitored throughout the project (Frye et al., 2007; Rabaa'i, 2009). The solution architecture serves as a

benchmark for avoiding scope creep or de-scoping on one side, and making requirements fit on the other side (Frye et al., 2007). A challenge in project performance measurement is rooted in a lack of a systematic evaluation approach (Rabaa'i et al., 2009). The use of pilot studies is recommended for effective testing and monitoring (Degenhardt et al., 2009; Klug, 2009). The fragmented administrative structure of HEIs allows partial implementations for test purposes, e.g. in a certain faculty or institute.

Project Communication: The unique fragmented structure of HEIs leads to inefficiencies in communication processes on different organizational levels, thus a stronger focus on communication within the project is required as an impact factor (Davis and Huang, 2007; Rabaa'i, 2009; Jannek et al. 2009). It is often a lack of accurate and timely information that increases the risk of failure (Degenhardt et al., 2009; Gates, 2004). In addition to formal documentation of project information and decisions (Degenhardt et al., 2009; Rabaa'i and Gammack, 2008), it is important to establish communication structures and use all forms of communication, such as jour-fixe meetings etc. (Degenhardt et al., 2009; Hurbean, 2008). Within the project, communication needs to be promoted between different departments and teams (Rabaa'i, 2009). The main objective is to achieve transparency on the capabilities of the new system and the planned changes (Degenhardt et al., 2009; Fisher, 2006).

Project Team

Project Leadership and Top Management Support: It is indisputable that this sub-category has a significant effect on the implementation projects in the HEI environment (Bologa et al., 2009; Davis and Huang, 2007; Infinedo, 2005; Nielsen, 2002; Rabaa'i, 2009). Despite the complicated consensus decision-making that prevails in the relationship between the faculty-level middle management and the top management (Degenhardt et al., 2009; Frye et al., 2007), the latter should receive accurate information on the project's status. It is not only of great importance that the project manager understands and supports the role of IT for higher education processes (Hurbean, 2008), but he or she also needs to promote the project (Rabaa'i, 2009; Frye et al., 2007) and ensure the employees acceptance of and readiness for change. The project manager shows leadership through management skills and motivation (Kuper and Göcks, 2007; Nielsen, 2002) as this role coordinated responsibilities and tasks as well as reports to the steering group and the HEI's executive board (Degenhardt et al., 2009; Frye et al., 2007). The position of the project champion resides with an IT executive - a role that is new to the organizational structure of HEIs (Klug, 2009).

Project Authority: The project manager should receive full budgetary control and responsibility of the project (Frye et al., 2007). In HEIs, top positions change regularly and the level of responsibility given to project managers is lower than in private companies (Frye et al., 2007; Rabaa'i and Gammack, 2008), especially in terms of restricted governmental and third-party funds. There is lack of structured monitoring of the project outcomes in order to evaluate the project manager's performance (Frye et al., 2007).

Interdisciplinary Team Structure: When composing the project team, it is essential to include employees from both, functional and technical areas (Kuper and Göcks, 2007; Nielsen, 2002). On the functional part, involvement from academic personnel is required. On the one side, strategic integration can be achieved with a diversified team in the form of common understanding of a project and an honest partnership (Bologa et al., 2009). On the other side, collaboration between team members, e.g. database administrators and application developers, ensures that the team as a whole is pulling in the same direction (Hurbean, 2008). Due to the fragmented responsibility, the steering group composition should reflect the different stakeholder groups of the project (Degenhardt et al., 2009), such as deans of the faculties.

Project Team Members' Skills: Apart from technical skills of the development team and the managerial skills of the functional teams (Infinedo, 2005), specific knowledge of HEI structures is required (Kuper and Göcks, 2007). In general, soft skills are necessary for effective communication and a comprehensive understanding of any issues that arise (Degenhardt et al. 2009). Therefore a competent and empowered team (Frye et al., 2007) includes only the best and brightest employees in a full-time position (Nielsen, 2002; Rabaa'i, 2009).

Integration

The most important concern for HEIs, from the project management perspective and in terms of integration, is the fragmentation of organizational and technical landscapes. Not only responsibilities but also system acquisition and implementation are distributed "across stovepipes" (Frye et al., 2007) meaning that the nature of integrated systems is violated by disintegration during the implementation process. Academic processes are not truly integrated which makes the translation to the IIS difficult. However, due to the changes in higher education processes more interdisciplinary tasks, such

as eLearning and eServices have to be fulfilled by HEIs (Degkwitz and Schirmbacher, 2007). This results in an urgent need for integrated processing of information as well as a full integration of the system in daily operations (Rabaa'i, 2009). During implementation of the system, integrated testing, as well as technical and functional integration, needs to be ensured (Rabaa'i and Gammack, 2008).

Change Management and Organizational Culture

Change of organizational structure and responsibilities: A major component of change management deals with the conflict potential of organizational change in HEIs (Jannek et al., 2009). The self-image of academic personnel, their demand for freedom of research and teaching, is opposed to the changes resulting from implementation of integrated systems (Allen et al., 2002; Degkwitz and Schirmbacher, 2007; Haneke, 2001; Klug, 2009). The organizational structure of HEIs is characterized by bureaucratic decision-making processes due to the hybrid system of academic and administrative management (Allen et al., 2002; Degkwitz und Schirmbacher, 2007; Klug, 2009). Transparency in responsibilities and business processes brought up by IIS is not always welcome, nor is this benefit acknowledged (Haneke, 2001). Nevertheless, restructuring and careful analysis and distribution of roles should happen at an early stage of the project (Fischer and Hartau, 2009; Klug, 2009). Higher education business processes are not always eligible for centralization as in some cases specialized knowledge from the decentralized units is indispensable. For example, this is the case in procurement of high-value machinery for research purposes (Klug, 2009).

Business Process Reengineering (BPR): A radical change in business processes is mostly required in a higher education context as legacy structures rarely fit an integrated process perspective. The benefits of process integration are indisputable (Degkwitz and Schirmabcher, 2007; Rabaa'i and Gammack, 2008), however, a two-step approach can be suitable for HEIs. Due to a lack of a process-oriented culture, processes are translated into the IIS and radical BPR only takes place later on (Haneke, 2001). Unfortunately this second step results in a changed functional structure and changed roles. This can lead to a loss of task-related knowledge as the employee responsibilities shift (Hurbean, 2008). However, deep process change is necessary for two reasons. First, a service-oriented culture is demanded by students. This is reflected in the flexibility of course modules and administrative self-service (Degenhardt et al., 2009). Second, peculiarities of the public sector legacy processes require a high degree of process adaption to fit a standard system (Hurbean, 2008).

Stakeholder Participation: In contrast to private companies, stakeholders of an HEI have a distanced relationship and rarely identify themselves fully with the organization. Neither the administrative or academic staff, nor the students regard themselves as the core of the HEI (Pollock and Cornford, 2004). In order to overcome this distance and to achieve broad acceptance of the new processes and the system itself, stakeholder groups, among these end-users, need to be involved in the implementation project as intensive and early as possible (Davis and Huang, 2007; Frye et al., 2007; Hurbean, 2008; Jannek et al., 2009; Nielsen, 2002; Rabaa'i and Gammack, 2008). At the same time, involvement increases responsibility towards the outcome of the project (Hurbean, 2008) and promotes motivation and satisfaction of users (Lee and Lee, 2001; Klug, 2009). In the software selection phase, departments should mutually agree on the solution (Rabaa'i and Gammack, 2008). During the requirement analysis, data quality can be enhanced though user involvement (Haneke, 2001; Jannek et al., 2009; Lee and Lee, 2001; Nielsen, 2002), and key users who consolidate requirements (Klug, 2009).

Past implementation experience: Past experience with implementation of IIS determines project success, as the employee attitudes influence motivation and acceptance of the project (Allen et al., 2002). At the same time, organizational learning promotes positive project outcomes (Rabaa'i and Gammack, 2008).

User training: A lack of user training and education is thought to increase the risk of failure of an implementation project (Infinedo, 2005). End-user training should encompass testing and hands-on experience with the system (Nielsen, 2002; Rabaa'i 2009), and its timing, ideally close to the go-live date, has an impact (Fisher, 2006). User training can also be offered at least twice to give employees the opportunity to try and test the system in the meantime and come back with detailed questions and remarks (Klug, 2009; Nielsen, 2002). In general, users' perceptions of the system can be changed significantly through training (Jannek et al., 2009).

Internal and external communication: Along with the importance of communication within the project team, there is need for a comprehensive communication strategy for the whole institution and beyond (Rabaa'i and Gammack, 2008). Prospective users need to be informed of the project scope, changes and activities and the limitations of the project (Fischer and Hartau, 2009; Infinedo, 2005; Jannek et al., 2009; Klug, 2009; Rabaa'i, 2009). A communication campaign should also involve the public (Degenhardt et al., 2007; Kuper and Göcks, 2007) while, internally, all communication sources should be employed (Bologa et al., 2009; Gates, 2004; Hurbean, 2008; Kuper and Göcks, 2007). In general, integrated processes require

a more efficient communication between employees in HEIs which in turn boosts the organizational communication culture (Degenhardt et al., 2009).

Vendor profile

Stability of software vendor: During the software selection phase, the requirements of the higher education processes need to be considered when choosing the software package (Nielsen, 2002). At this point, it is important to also evaluate the vendor's stability to ensure future cooperation (Lee and Lee, 2001; Oliver and Romm, 2000; Rabaa'i et al, 2009; Rabaa'i, 2009).

Consultancy expertise: Consultants play a major role in system implementation and have to be chosen carefully according to their domain experience, skills and knowledge of business capabilities of the software (Frye et al., 2007; Nielsen, 2002; Rabaa'i and Gammack, 2004), as well as integration with the HEI's needs and experiences (Rabaa'i et al., 2009). The significant investment required for consultancy pays off when there is effective knowledge transfer from consultants to internal personnel facilitates system operations (Bologa et al., 2009; Rabaa'i et al., 2009). A conflict of interest arises when the consulting company is also the vendor (Frye et al., 2007).

Software enhancements: A central issue in the vendor search is the criteria of expected software updates and advancement (Rabaa'i, 2009; Rabaa'i and Gammack, 2008). This sub-category is deeply rooted in the vendor's experience, stability and reliability (Oliver and Romm, 2000).

Customization

Cases of integrated systems implementation in HEIs show that major customization is necessary (Rabaa'i and Gammack, 2008). However, the recommendation is always to minimize customization of the standard software to ensure system upgradability (Davis and Huang, 2007; Frye et al., 2007; Nielsen, 2002; Oliver and Romm, 2000) and achievement of full benefits of the system (Rabaa'i et al., 2009; Rabaa'i, 2009). Nevertheless, a certain degree of customization is required to achieve a fit with the business processes. The main objective is to establish a balance between the cost of customization and the optimal business processes (Nielsen, 2002).

DISCUSSION OF THE CSF CONCEPT FOR HEIS

As identified through the qualitative content analysis, the mostly mentioned CSF category is "Change Management and Organizational Culture", in particular the factors stakeholder participation, internal and external communication and business process reengineering. In the specific context of the higher education sector this is a remarkable result due to the peculiarities of HEIs. They possess a sophisticated purpose combining the objectives of research and teaching for a greater public good. For that reason, their organizational structure is affected by distributed authority, a commonly accepted freedom of research and high level of administrative effort. The stakeholders of an HEI do not possess the sense of mutuality and belonging as employees of private companies usually do. Under these circumstances successful roll-out procedures depend more than in private companies on the willingness of the different stakeholder groups to cooperate. Effective communication and raising awareness as well as corporative collaboration are more complex but even more important than in private companies. Effective strategic change in a HEI is inherently more difficult than in other private institutions (Pollock and Cornford, 2004). This needs to result in an intensive communication plan with special focus on the different stakeholder groups from administrative units, research institutes and the students.

Pollock and Cornford (2004) and Al-Mashari et al. (2003) argue that while business companies can share some of these peculiarities, it is the unique combination of characteristics that make HEIs a different kind of organization requiring a different project management approach. The decentralized organizational structure and the diffused power distribution undermine the centralized nature of project management. Therefore, it is not possible to reproduce successful ERP system implementation applying the same methods as in the private sector. Nevertheless, existing frameworks of CSFs in relation to ERP system implementation in private companies need to be considered for classification and operationalization of the identified CSFs for selection and implementation of IIS in HEIs.

In their Unified CSF Model, Esteves and Pastor (2001) analyzed the relevance of CSFs and showed that stakeholder participation is most important for system customization. In particular, this would be in the early project stages. In the context of HEIs the meta-analysis has shown that this factor is especially important to achieve acceptance in regards to the

fragmented organization of an HEI. In regard to BPR there is a difference in relevance and timing compared to ERP systems implementation in private companies. While in private companies it is considered of importance in the project preparation (Esteves and Pastor, 2001) for HEIs a cultural shift, in particular in terms of the academic culture, requires a significantly more sensitive approach. The factor of internal and external communication bears more risk in HEIs as due to distributed authority a failure to achieve agreement in the early phases potentially endangers the whole project.

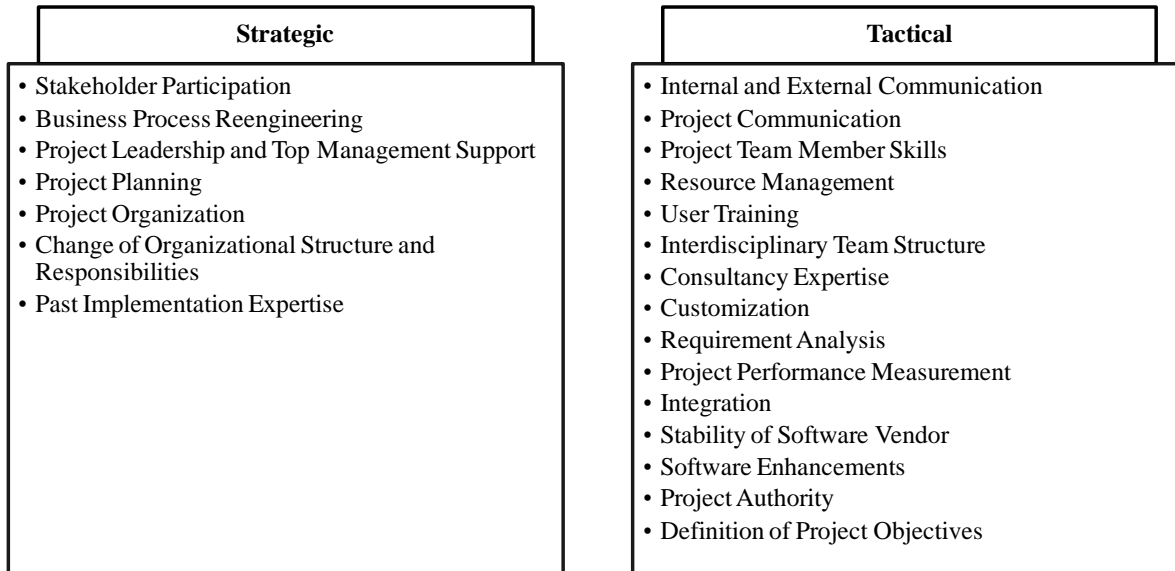


Figure 2. Taxonomy of CSFs for selection and integration of IIS in HEIs

Holland and Light (1999) and Esteves and Pastor (2001) differentiate between strategic and tactical CSFs for ERP system implementation. While strategic CSFs define the long-term objectives usually formulated by top-level management, tactical CSFs refer to medium or short-term planning and are addressed by operative management. The taxonomy in Figure 2 categorizes the previously identified CSFs and highlights that the strategic tasks of business process reengineering and stakeholder participation are the ones which need to be addressed with the highest priority in HEIs. Strategic planning in the higher education sector has initially been approached with much skepticism, especially by the academic staff (Anderson et al., 1999). With the implementation of IIS and the new understanding of a service culture towards their students, most HEIs have now taken on the challenge of shaping their own service-oriented and efficient organizational structure.

CONCLUSION AND FUTURE RESEARCH

This paper presents a meta-analysis of CSFs for the selection and implementation of IIS in HEIs for 21 publications identified through a comprehensive literature review. In total, 22 CSFs have been deduced from these publications applying a qualitative content analysis approach.

In reference to the initially stated research questions, following results can be summarized: During an implementation of IIS in HEIs special attention needs to be paid to the CSFs category “Change Management and Organizational Culture, in particular to stakeholder participation, internal and external communication and business process reengineering which had the highest number of overall mentions. In this context, many papers addressed the specific fragmented organizational structures of HEIs which corresponds with the importance of these factors. The unique constellation of characteristics of HEIs, namely fragmented organizational and technical structures, distributed authority and low process-orientation reveal the need for a different project management approach in comparison to ERP implementation in private companies.

Future research need to validate the results in regard to the differences in relevance of the CSFs in HEIs compared to private companies. From the project management perspective, it is of interest to align the CSFs with project management phases inherent to an HEI and define their dynamic importance in the course of the project.

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