

INFLUENCE OF ERP IN HIGHER EDUCATION

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Abstract

The Information systems are major technological inventions in the current century. However the influence of Information systems in the public sector organizations like Higher Education appears to be more challenging. The development of an Integrated Information System-Enterprise Resource planning system in educational institutions and dynamic state of Higher Education institutions are discussed in detail. It is found through literature review that in theory, universities implement ERP systems focusing on benefits and practically struggling to implement. It is also evident that minimal documentation on successful and failure ERP case studies on Higher Education in the United Kingdom can be found in literature.

Keywords: ERP, Information Systems, Higher Education.

Introduction

Information systems are inter-disciplinary systems containing inter-related information and knowledge components with identifiable boundary, working together for some purpose (Sabry and Alshawi, 2009). The role of Information system in an organization is increasing and encompassing to improve the efficiency of existing business processes and enable new processes that are capable of transforming businesses. The development of Information systems in public sector organizations like universities appears to be more challenging because of tight budget (Kleist, Williams and Peace, 2004). It is argued that Higher Education institutions need to re-examine the use of Information system to obtain better control over internal operations and cope with the demand for greater accountability from external agencies (Guan et al., 2002). They also suggest that Higher Education must adopt an integrated information system approach to organize the scattered data that will enable decision-making process easier for the administrators. An information system, including an Enterprise Resource Planning (ERP) system, is user-interfaced and designed to provide information useful to support strategy, operations, management analysis and decision-making functions in an organization (Matende and Ogao, 2013). ERP systems are widely used by small, medium-sized and large corporations around the world. Universities have turned to ERP as a means of replacing existing management and administration computer systems (Pollock and Cornford, 2004).

Statement of the Problem

Universities have vast information to manage and more complex processes to execute. Students have difficulties (include studies, personal, emotional, etc.) in their academic study and coping with the learning tasks (Elias et al, 2010). In the modern Information system like Enterprise Resource planning systems can give the solution for this difficulty. It is significant that Enterprise Resource planning is an information system that integrates (in an only system) all organizational functions and processes (Karsak and Ozogul, 2007; Zahedi et al., 2011) facilitating the processes in the administrative functions (Drucker, 1998), providing cost reduction, waste of time, among other benefits (Hendricks et al., 2007). The literature review shows that higher education institutions generally face several dilemmas: Due to high dependence on external stakeholders, they need a better approach to keep track of their activities and achievements to meet the demands from those stakeholders. On the other hand, issues like tight budget, bureaucratic structure, resistance to changes and others inhibit their abilities to develop an integrated information system to support the unique needs of their sub-units (Nakatani, Chuang; 2005).

In reality, Organizational spending on ERP systems has surged in recent years and is expected to continue to grow in the wake of technological advancement in cloud computing and 'pay-as-you-go' solutions (Gartner, 2012). This growth is mainly due to the extreme benefits and value promised by ERP systems in information capabilities and resources; intellectual capital through knowledge creation; and improvements in operational, managerial and strategic dimensions (Molla and Bhalla, 2006; Woo, 2007).

Despite of all its benefits, it is found that universities are struggling to implement ERP system practically. This paper focused the difficulties in implementing ERP systems is huge and very less number of Higher Education institutions have implemented ERP. Also this paper discussed elaborately about the main benefits of Higher Education is based on theoretically.

Objective of this Study

Overall Objective

This study sought to investigate the influence of ERP systems in Higher Education in the United Kingdom

Specific Objectives

- To determine the influence of ERP systems
- To discuss the dynamic state of Higher Education
- To theoretically identify the universities implemented ERP through literature review
- To tabulate the theoretically identified success and failed case studies in ERP implementation

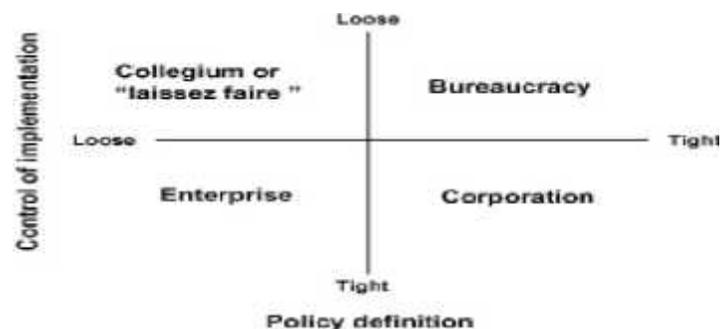
Literature Review

Dynamic State of Higher Education

Information technology is increasingly becoming important for higher education to remain competitive (McCredie, 2003). Every university needs an integrated information system that supports all its business functions and offer accurate, clean and stable data, available in real time to users across multiple departments and business functions. Such a system would allow operating efficiently, to make informed decisions and to offer the best educational experience possible to the university students (Lupu, 2008).

Higher Education is viewed as more of “Corporate” form of an organization. Traditional Universities have become more commercialized and they are struggling to find their identity (Noble, 1998a, b cited in Wagner and Newell, 2004). This paradigm shift brings many challenges including increased expectations of stakeholders such as students and governments, decreasing governmental support, meeting quality and performance requirements and maintaining competitive education environments (Fisher, 2006 cited in Abugabah, Sansogni and Alfarraj, 2013). The biggest challenge faced by the universities is the explosive growth of educational data and its usage to improve the management (Khare, 2014).

Currently, whole of the academic world is aware of the benefits, ICT brings to the institution. ICT take its role not only from the point of education and research activities, but also from the business aspect, which is used to support business functions –administrative, organizational, accounting and so on (Zornada and Velkavrh, 2005). To illustrate the fact that Universities are dynamically changing and possess multiple cultures, Ian McNay provided a diagram by mapping the “ four Culture” components – Collegium (Traditional University), Bureaucracy (policies, rules, formal roles etc.), Corporation (group of people united under an umbrella) and Enterprise (all aspects of a business). They are defined in terms of the degree of closure (tightness or looseness) in their definition of policy and their control over implementation (Pollock and Cornford, 2005). The Universities focus is shifted from the Collegium to Corporation sector is clearly depicted in fig: 1. The reason behind that includes the application of ICTs, aligned with pressures on funding the imposition of increasingly short term and instrumental policy goals by the principal funders of Higher Education and so on (Pollock and Cornford, 2005). Their research also suggests that Universities must be seen as “Highly Heterogeneous Institutional Ensemble”.



Influence of ERP Systems in Higher Education

Rico (2004) defines an ERP system in Higher Education context as “an information technology solution that integrates and automates recruitment, admissions, financial aid, student records and most academic and administrative services”.

This section outlines the significance of ERP systems and analyses the rationale for universities in adopting it. The phenomenon of the widespread adoption of ERP systems is described as the “ERP Revolution”(Ross, 1999). Over the last 10-15 years, organisations have been in growing numbers; turning to Enterprise Resource Planning systems to consolidate their information technology infrastructure, streamline business processes to become more efficient and effective. Up until today, universities all over the world have been choosing information systems based on the need to satisfy different request in a short time. In current competitive environment, universities are under high pressure trying to adopt new strategies to improve their performance. There is more pressure to change the business processes than in the past and mostly includes the need for long term cost reductions, increased customer demands, increased competition for students and potentially more government regulations (Judith; 2005). Dearlove(1998) states that this has led to the changes in the Governance and in the management of higher education institutions. Allen, Kern and Havenhand (2002) points out the fact from Heiskanen, Newman and Simila (2000) that part of the Higher Education’s strategy to respond to these issues has been to adopt state-of-art technology to reduce duplication of efforts and resources to improve management information provision and ameliorate organisational efficiency and effectiveness. Although, significant investment amount of time and money has been spent on the improvement of Management Information Systems, in Higher Education Institutions, large area is unexplored by researchers with few exceptions.

Universities as organisations face many problems common to most modern organisations, including, for instance, the problems of coordinating resources, controlling costs, of simulating and facilitating enterprise among staff, and so on (Lockwood, 1985). Since universities have problems common to a wide range of organisations, then the standard tools of contemporary organisational analysis and institutional management- including computer systems used by large corporations around the world, such as ERP systems- can be similarly applied in universities (Pollock and Cornford, 2004). In contrast, there are fuzzy or unclear boundaries between universities, Institutes and other kinds of organizations, and while it is widely accepted that they engage in many of the same activities as others, they are still thought of as something” bit different”. (Pollock and Cornford; 2004). To conclude, the Universities are different from the other kind of large organisations and therefore require specific tailor- made ERP systems (Abugabah and Sanzongi, 2010).

Information System investments fall in one of the three Categories: infrastructure, business operations, and market influence (Peter, 1996). The amount of money spent by United Kingdom Higher Education sector on Information and communication Technologies is around £1 billion per annum representing 10% of the sector’s total turnover (NCIHE; 1997). ERP falls in to the category of business operations and Ward (1996) suggest the driving forces for ERP adoption in universities are

- Improve the performance of existing activities
- Integration of data and systems
- Avoid business disadvantage or allowing a business risk to become critical

The higher education sector has turned to Enterprise Resource Planning Systems in the hope of helping them to cope up with the changed environment to achieve more efficiency and accessibility for all members and improve end users performance by providing better managerial tools (Ahed and Louis; 2010). Despite the availability of powerful computers, advanced network, communication infrastructures, sophisticated software applications, university decision makers, still there is a lack of access to the critical information necessary for informed decision making. Therefore implementing ERP systems in Higher education is most expensive that the management will ever think of implementing them (Van; 2008). Joint Information Systems Committee (JISC) introduced ERP systems as a strategic tool to the United Kingdom Higher Education Institutions (JISC website, 1998).

The information flows in the university are often channeled through disparate sub-systems resulting in fragmentation and duplication of resources and services (Liang et al, 1998). ERP-“Making everything appear as one to the user with a single system interface” can be a solution, in the view of Fox (1996). Universities prefer to use ERP systems for Academic and administrative purposes. The administrative functions include human resources, accounting, payroll and billing. The academic functions include admissions, recruitment, registration and all aspects of student records. The top reasons universities adopt ERP solutions are to replace legacy systems, improve customer service, transform enterprise processes, correct Y2K problems, modernize computer systems, improve administration, maintain competitiveness, increase operating efficiency and adhere to regulatory compliance (King, Kvavik, & Voloudakis, 2002). As late as in the nineties, many higher education institutions want to take the advantage of ERP systems by having an integrated database shared by different business functions and, consequently, different business modules of a single integral information solution where data can be transferred between individual processes and accessible by various users in real time. Murphy (2004) figures out that the use of up-to-date information approaches is an additional advantage not only within a higher education, but also for people who constantly interact with the institution (students, teachers, researchers, etc.). Oliver and Romm (2002) examined the rationale behind universities adopting ERP systems. The outcomes were flexibility, greater usability, integration of data and systems, Business Process reengineering, reduced maintenance and so on.

In the literature extensive attention has been paid to the explanation of ERP adoption decisions (Rogers, 1995) and Fleishcher (1990) developed a conceptual framework by identifying three sets of variables that influence ERP adoption as

- New technology
- The characteristics of the organization
- Its market environment and social network

ERP adoption is partly justified in terms of the need to address the problems faced by the existing Information systems and the desire towards modern effective technologies. Current research shows that universities express the desire to invest in ERP systems and gradually recognize the problems with the existing Information systems. Many common issues like budget, resources, change management, communication, system functionality, user's perspective exist in the adoption phase similar to the implementation and Post implementation phase which have been investigated by previous researchers. There is a continuous growth on the development of ERP systems design and features to cater industry-specific needs resulting in applications for operational areas such as human resources, finance and administration and functions specific to specialized industries, including Higher Education sector (Davenport, 1998).

ERP Implementation in Higher Education

ERP systems are the largest integrated software adopted by universities, along with significant investments in their implementations (Bhamangol, Nandavadekar and Khilari, 2011). ERP system implementations are very expensive; take a relatively long time to implement, and the massive task can sometimes take its toll on the staff tasked with its use and implementation (Ike and Mogens, 2005). Indeed, existing ERP research has neglected higher education sector worldwide, even though most universities have implemented or in the process of implementing an ERP system (Ahed and Louis, 2010).

Okunoye and Frolick (2006) highlight the experience of ERP implementation at University of Winsconsin-Superior by Yakovlev(2002), George Washington University by Swartz and Orgill(2001), West Virginia University(Siau and Messersmith,2003) and University of Nebraska (Sieber et al.,1999). Research in British Higher Education unfolds the fact that universities started ERP implementation projects, unfortunately concluding's are unavailable as the projects are finished yet (Ferrell, 2003). The situation still prevails...Higher education institutions do not realize the significance of the ERP system because of very few successful implementations (Shruti, Preeti and Tripathi, 2011).

ERP implementation in Higher Education sector has been increasing globally. Large amount of literature focusing on various dimensions (like Success and Failure factors) of ERP implementation is available especially in the United States and Australia. Research by Beekhuyzen shows that in 2002,86% of Australian universities tried implementing at least one module of an ERP system of which 38% adopted ERP from a single vendor and 48% adopted best-of breed and 14% favored their old legacy systems. Indian Higher Education has started to adopt and implement ERP systems. Many universities in the United Kingdom have tried implementing few modules of an ERP system. Also ERP is designed into certain modules; this is problematic for universities to adopt these packaged systems because institutions need to alter their business processes to fit into these systems (Von Hellens et al, 2005).Research conducted in the implementation of ERP in higher education sector is minimal. It has only been in the past 10 years that ERP appeared the higher education sector rooting its appearance to Information Systems literature (Hawkins and Rudy, 2007). These systems were formerly designed for commercial organizations, and minor efforts have been taken to fit them to universities requirement (Beekhuyzen et al, 2001).

Today many public and private organizations worldwide are implementing ERP systems in place of the functional legacy systems that are not any more well compatible with the modern business environment (Al-Fawaz, Al-Salti, Eldabi; 2008). However, the organisations are still in the process of marching towards the implementation of ERP system which is more difficult and challenging (Kroente, 2008). It is proved that ERP implementation is successful in business organisations and Helens, Nilesen and Beekhuyzen (2005) conducted a study in Australia and found that higher educational institutions do not realise the significance of ERP systems as very few have successfully implemented. ERP implementation is associated with a tinted history of scarce successes and failures (Moore, 2010). Markus and tannis (2002) project the project managers and consultants view of success as 'completing the project on time and within budget and management view is the smooth transition to adopt the new system. The ERP projects cancelled before implementation or other form of implementation that failed miserably, leaving the adopters in huge financial losses are categorised as 'complete failure' and the implementation with strenuous adjustment process for users of the system which often leads to periodic disruption of daily operations are categorised as 'partial failure' (Gargeya and Brady, 2005). Another problem that was discussed in the Literature was the budget factor, the raise in projected cost compared to the estimated cost. The University of Minnesota's projected cost was \$38M, which finally reached \$60M. The implementation cost of Ohio state university reached \$85M from it's projected cost \$53M.

Implementation of ERP systems is difficult and places tremendous demands on corporate time and resources (Al-Mashari et al., 2003) and many literatures provides evidence that ERP implementations have been classified as failures because they did not achieve predetermined corporate goals (Bingi et al., 1999). Furthermore, previous research has primarily examined the experience of specific organisations that implemented ERP systems, detailing a single case study of how they implemented the system in their organisation (Chien and Tsaur, 2007; Snider et al., 2009; Woo, 2007). Extent literature suggests that valuable lessons could be learned from implementation experiences (Davison, 2002; Sheu et al., 2004, Soh et al., 2000). Rabaa'I et al (2009) raises questions regarding the effective evaluation of ERP in higher education sector. It becomes very important to determine the success of ERP implementations, because a huge budget and human resources are invested therein. Thus implementation of an ERP system is a careful exercise that involves strategic thinking, precision planning and negotiations with departments and divisions (Bingi, Sharma nadGodla; 1999). Large volumes of academic journals focus on the implementation issues and how they can be avoided but research focusing on its investigation range to totally understand the potential of an ERP system is still lacking (Haseh et al., 2001). However implementation of ERP Higher Education in the United Kingdom is still in their institutional repositories or blogs. There is comparatively little attention and researches that measures ERP success or failure in this sector (Rabaa'i, Bandara and Gable; 2009). This piece of research aims to put an effort focussing on the factors influencing ERP implementation based on different perspectives.

Researchers have argued that ERP implementation is a never-ending cycle of continuous improvement, the focus is primarily on initial implementation efforts, and immediate success results achieved from those efforts (Sun et al., 2009). For instance, Rabaa'i(2009) highlights the quotes of the chief information officer at George Washington University from Murphy (2004) relating integrated information solutions to competitive advantage as "... institutions which are unlikely to switch to integrated information solutions, will find it difficult to retain their market share of students. Students will, sooner or later demand services, offered by other institutions..."

The main aim of ERP implementation in Higher Education is to provide them with an increased ability for research and teaching at a fairly low cost (Khare, 2014). Universities and colleges all around the globe are facing challenges in successfully implementing an ERP system to align themselves with the expectations of the students, staff, stakeholders and government. The high failure rates suggest that understanding and implementing is a biggest challenge (Al-Mashari, 2006). Definitely there's a growing demand for participatory research in this area. It's impossible for an ERP system to have all the features expected by the clients. There are numerous problems associated in implementing a successful ERP system. This led to the dilemma whether or not to implement ERP systems. Kalema, Olugbara, Kekwaletswe(2014) suggest that the decision to buy, select an implement an ERP system and the factors associated with it like when and how to implement it is a difficult task for any organization (Fauscette, 2013). Higgins(2006) also provides a detailed perspective on organizational readiness factor. Communications across departments, in-house expertise including technical and non-technical factors are highlighted Wheatley (2000) calculates the average ERP implementation period for any organization to be 23 months. Swartz and Orgill (2001) suggest that it takes two years to implement in a university with a budget of \$20M.

Despite the large amount of literature on ERP implementation, only very few articles specifically focuses on Higher Education. Okunoye and Frolick (2006) highlight the experience of ERP implementation at University of Winsconsin-superior by Yakovlev (2002), George Washington University by Swartz and Orgill (2001) and West Viginia University and Siau and Messersmith (2003) and Sieber et al(1999) at the University of Nebraska. Okunoye et al., (2008) researched the ERP implementation at Agora university and highlighted the involvement of faculty during the design phase of the implementation project as a vital factor. Research in British Higher Education unfolds the fact that universities started ERP implementation projects, unfortunately concluding's are unavailable as the projects are finished yet(Ferrell, 2003).The situation still prevails....

ERP Success and Failure Case Studies

The statistics presented by the Conference Board Survey group (IT Cortex, 2009) indicates that an ERP project is more likely to be unsuccessful and the findings show that 51% of their respondents found it unsuccessful and 46% reflected the lack of understanding on the system usage to improve their business functionalities. Some successful universities have realized the value of successful ERP implementation like the College of Southern Maryland and Pima Community College in Arizona. In the industrial sector, the Earthgrains Company alleged a net improvement of 2.4 to 3.3% in 1997, Par industries improved delivery performance, and Reduced shipping time of IBM Storage Systems are some examples of successful ERP implementation (Ehie and Madsen; 2005).. The table below provides a list of public sector organizations that have implemented ERP systems. Though large number of universities is implementing ERP systems, it is transparent that they are less documented irrespective of their results.

Table 1: Successful ERP Case Studies (Adapted and modified from Wong, Wein; and Sulaiman and Al-Hudhaif,2012)

Organization Name	Year of Documentation	Results
Fox Meyer Drugs	1993-1998	Implemented SAP/R3. Excess Shipment resulting from incorrect order and costing the company millions of dollars.
Siemens Power Transmission	21994-1997	Implemented SAP .Lack of Top Management Commitment, insufficient funding to continue the project
Hershey Foods Corporation	1996-2000	Implemented SAP R/3. Integrated two systems and had not been tested adequately.
Reebok	2001	ERP failed because it was incompatible with the organization process
Whirlpool Corporation	2001	Implemented SAP. Lack of Co-ordination between business and technical experts. Company ignored the cautionary advice from the consultant and project went live resulted in delayed shipments to distributors and retailers.
UNSW (Australian Higher Education)	2002	Implemented PeopleSoft. Budget over runs and it was expensive for the university to take people out of normal positions.
Royal Melbourne Institute of Technology		The university went live before complete implementation and incurred a loss of AUS\$ 47 million. Also, the student enrollment was difficult.
Ferazzoli Imports of New England	2009	Ferazzoli Imports of New England.
National Health Service	2011	After Spending £12 billion, NHS abandoned the project that was aimed at centralizing electronic health records of its citizens.
City Time Payroll System Project, New York, USA	2011	The project failed due to cost overruns, from budgeted \$63 million to an estimated amount of \$760 million, and a criminal probe.
Ingram Micro Australia	2011	The Problem with SAP implementation at Ingram Micro led to a significant drop in its net income twice in year 2011.
Montclair State University, New Jersey, USA	2011	Peoplesoft implementation at Montclair University faced problems leading to University filing lawsuit against the oracle for the botched implementation.
ParknPool, USA	2011	The furniture seller company sued Epicor over the failed ERP project.
Marin County, California, USA	2011	Marin County filed a lawsuit against Deloitte Consulting and SAP over a failed ERP project.
Whaley Foodservice Repairs, South Carolina, USA	2011	Epicor was sued by the commercial kitchens equipment company for a project, which cost the company more than 5 times the original estimated amount of \$190,000.
State of Idaho, USA	2011	Idaho state faced problems due to design defects and other issues that led various payment delays and faulty claims processing after installing a new system provided by Unisys. The state could suffer loss of millions of dollars due to the faulty Medicaid claims.
Care Source Management Group, USA	2011	The group halted the ERP project and sued Lawson to pay damaged of \$1.5 million as the software it provided didn't delivered the expected results.
The Victorian Order of Nurses, Nova Scotia, Canada	2011	The implementation of SAP's Payroll system resulted in issuance of faculty paychecks to nurses for at least six months.
Lumber Liquidators	2010	Problems with SAP System were encountered.
Dillard's, Inc.	2010	JDA's i2 implementation failed to meet customers' expectations.
Hewlett Packard	1998-2005	Implemented SAP. Aimed to centralize into a single SAP system resulted in Cost overrun that incurred \$160 million.
Allied Waste Industries	2005	Pulled the plug on a \$130 million SAP R/3 system.
Waste Management Incorporation	2005-2007	Cancelled SAP implementation after investing \$45 million of a \$250 million project. Implemented SAP and found it non-functional in December 2007.
University of Massachusetts	2003-2005	Implemented PeopleSoft. The new online registration system crashed the day before classes commenced.
Stanford University	2003-2005	Wanted to get rid of 20 year old Mainframe software. Welcomed students with a nonfunctioning Web portal. The students struggled finding their classes and so on.
Indiana University	2003-2005	Around 3000 students were denied financial aid because of the problem in the implemented new ERP system.

Table 2: ERP Failure Case Studies (Adapted and Modified from Wong, Wein; and Sulaiman and Al-Hudhaif, 2012)

Organization Name	Year of Documentation	Reasons
Monsanto (Chemical and Life Sciences)	1999	Good Management structure, balanced redesign of business processes and investment in re-skilling by providing training and acquisition of external expertise.
Earth grains (Bakery Products)	2000	Implemented SAP R/3. The project had a clear strategy and each department had analyst-reporting issues to the management. Change compensation system to employees after implementation was also provided. Implementation involved interpersonal skills for training and strong knowledge on technical and the company's business processes.
U.S. Mint (Coin Production Company)	2000	Implemented PeopleSoft. The project started with a business requirement. Employers were able to see how everything needed to be coordinated. People received training in the use of the system and used the external consultant on the project. The project involved Senior Management and understood that the project will be painful and will incur \$80 million savings in next seven years.
Georgetown University	2001	Serving over 30,000 students. The financial aid and admission automated successfully.
Louisiana State University	2000	Served more than 45000 students and successful implementation includes Course listings, libraries, human resources, e-mail, campus information, public relations, registration, admissions and so on.
Department of Administrative Services of Georgia's Corporation	2000	Effective communication via Web page, E-mail, instant messaging, as well as face-to-face meetings and extensive planning led to successful implementation. Queries that would take a month are fulfilled immediately. Annual contract reviews would have taken weeks in previous system are now done in hours. And also it decreased the time taken for audit preparation by at least 50%
Bradley Corporation	2000	Change of Business process led to a successful implementation and has gained considerable benefits, which includes lower inventory levels and warehouse space requirements, increased sales without adding more staff, decreased lead times and increased on-time deliveries.
The University of Nebraska-Lincoln	2003	ERP implemented successfully for recruitment and admissions.
The University of Houston	2003	Served 51,000 students. Successfully implemented Admissions, Recruitment, student records and administration.
Greece University	2005	The study was based on the perceived benefits according to the user's expectation. One year after implementation, the study found that the perception of the users was more positive than before. ERP has increased flexibility in information provision through effective monitoring of the university assets and revenue expenditure flow and hence, Improved decision-making. Empirical results of the research also confirmed that a number of benefits have been derived, especially in accounting and management information.

Conclusion

The exponential growth of ERP systems and its migration towards higher education has encouraged many researchers to analyse the factors behind implementation. The investment (few billions) made by universities in last few years in implementing ERP systems is huge. It's proved in literature that ERP is gaining popularity in spite of its failed or mixed results or in implementation. Irrespective of its results, it is noticeable that Enterprise Resource Planning systems implementation in Higher Education is well documented worldwide but very minimal could be found with regards to the United Kingdom Higher Education. Also, it is evident that Higher Education has bounced into the implementation of Enterprise Resource Planning Systems only concerning its benefits with the very minimal understanding of its existing state of Information Systems. So, the benefits are more theoretically experienced as the failed implementations are huge.

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