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ERP Systems Functionalities in Higher Education

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Abstract

The educational ERP of business activities in higher education go through a different modules. ERP in higher education should respond the real requirements of education system. Enhancements or mere adaptations of legacy solutions, which stemmed from the experience in business practice, are not always successful. The current paper shows the contents of the ERP that serve the education system successfully also shows the needs and future expectations of higher education institutions and the current business oriented ERP system.

Keywords: ERP in higher education, campus management, change management, Education Resource Planning

1. Introduction

Enterprise Resource Planning or ERP is an industry term for integrated, multi-modules application software packages that are designed to serve and support multiple business functions (Bahar Yelken 2005). ERP system can include software for manufacturing, order entry, accounts receivable and payable, general ledger, purchasing, warehousing, transportation and human resources. Evolving out of the manufacturing industry, ERP implies the use of packaged software rather than proprietary software written by or for one customer. ERP modules may be able to interface with an organization's own software with varying degrees of effort, and, depending on the software, ERP

modules may be alterable via the vendor's proprietary tools as well as proprietary or standard programming languages. (Lehrstuhl für Wirtschaftsinformatik 2014).

2. Brief History of ERP

The focus of manufacturing systems in the 1960's was on Inventory control. Most of the software packages then (usually customized) were designed to handle inventory based on traditional inventory concepts. In the 1970's the focus shifted to MRP (Material Requirement Planning) systems that translated the Master Schedule built for the end items into time-phased net requirements for the sub-assemblies, components and raw materials planning and procurement. (Fusion ERP 2009)

In the 1980's the concept of MRP-II (Manufacturing Resources Planning) evolved which was an extension of MRP to shop floor and Distribution management activities. In the early 1990's, MRP-II was further extended to cover areas like Engineering, Finance, Human Resources, Projects Management etc i.e. the complete gamut of activities within any business enterprise. Hence, the term ERP (Enterprise Resource Planning) systems as a complex and comprehensive software packages designed to integrate business processes and functions. Despite the difficulties and risks of implementing such a system, the last decade has seen a remarkable global extension of such systems into other disciplines such as Higher Education. The Saudi Arabian government started to implement them in both private and public organizations, including the higher education (HE). HE in Saudi Arabia applies integrated solutions to replace existing systems, supporting all its business functions and improving effectiveness and efficiency. (Althonayan 2013).

3. ERP in Higher Education

ERP systems are used by large corporations around the world, recently replacing management, financial and administration computer systems in the higher education sectors (Pollock and Conford 2005). ERP has played a significant role in the IT management of higher education but it was –to some extent- far from the core discipline of the higher education. It is important to define ERP systems in higher education as being multiple in scopes, tracking a range of activities of including those of human resource systems, administrative student information systems and financial systems (Robert, 2004). Despite the challenges of implementing ERP systems, organizations in the corporate sector, which likely operate in more financially competitive environments than those in the non-profit sector as most of higher education institutions, have experienced numerous benefits from ERP systems during the last two decades only on the management , financial and administrative level. Higher education has always been a sector that have unique organizational models and core processes as well as objectives compared to other business , the higher education system supports the academic activities in colleges including some basic process such as scheduling, learning process - advising and follow up and performance indicators- , and examination process.

Previous studies have identified many similarities between implementing ERP system software in educational institutes and in other organizations (Pollock and Cornford, 2005). It is therefore important to study the implications of using ERP systems in higher education and the necessary information required to avoid the problems caused by legacy systems, in order to address the role of ERP in changing educational organizations and the implications of its use in similar organizational cultures.

As per the empirical research (Hussein 2014) The researcher selects 3 from 25 Saudi universities have an experience in ERP systems:

1. King Abdul Aziz university, its system name`s is ODES plus
2. King Saud university, its system name`s is MADAR
3. King Fahd University, its system e Moraslat.

These systems serve administrative and academic sections in all of these universities and its branches. Researcher collects data about 3 previous universities ERP systems through interviewing three types of users in these universities, despite of the different systems name and design, but the result is 3 systems cover the following administrative sectors:

1. Human resource
2. Financial management
3. Procurement management
4. Where house (store) management
5. Student registration management
6. Library management

4. Higher Education ERP software misfit

Due to poor ERP selection and evaluation process, ERP software can be found to be ill-fitting with the business requirements. For instance, if the ERP software is not in compliance with the legislative environment, the leasing companies will not be able to provide its users activities with the right legal framework assuming is a nonprofit environment with – to some extent- a bureaucratic methodology. The major cases of misfiting ERP in higher education. (Charisma 2014).

High turnover rate of project team members
In non profit organization as higher education institutions with the governmental payroll, if the project team members suffer from high work stress and workload when coping with the implementation, some member teams may resign from their job, which means insufficient ERP knowledge and skill transfer among project teams during the ERP implementation life cycle. In the end, users and project team members will have insufficient ERP knowledge for performing their daily tasks when using the ERP system.

Over-reliance on heavy customization
Due to software mismatch, heavy customization will be required in the areas of program customization and report customization. Customization could cause project delays, overspent budget and an unreliable system (due to poor quality of customization, unresolved system bugs and insufficient testing). Customizing the ERP to fit with specific leasing business processes might lead to sacrificing "best practices" embedded in the ERP system.

Poor consultant effectiveness
Some of the consultants can be considered to be inexperienced with ERP systems and unable to provide a professional level of advice on EPR project planning.
Consultants that communicate ineffectively during the project phase and just suggest workarounds without applying professional skills to conduct BPR (Business Process Reengineering) to bridge the gap between ERP systems and business processes are considered inefficient.

Poor IT infrastructure
If the top management has insufficient financial resource provided for the implementation process, then a low performance IT infrastructure hardware will be proposed by the consultants and project manager (so as) to reduce the costs of ERP implementation. The poor IT infrastructure will most probably lead to a slow processing capability of the ERP system.

Poor knowledge transfer
Inexperienced consultants that are not aware about the specificity of the leasing industry and try to practice during training sessions will not deliver professional ERP training to the users. Also, if the training material is not written properly, all the information will be found to be too brief and unhelpful.

Poor project management effectiveness
If there is limited ERP knowledge, capability and poor project management skills, the ERP project will be considered to be challenging and demanding, as it involves managing systems, people (project team, users and external consultant) as well as re-designing business processes. It is

important for the project manager to effectively manage the consultants, for example, in evaluating their communication and training performance, when conducting BPR (Business Process Reengineering), and when testing the system performance.

Poor quality of Business Process Reengineering (BPR)
It is also possible that some of the project team members to have an unclear vision of
why or how to conduct BPR because their consultants provided unprofessional advice for conducting BPR. It will be difficult for project team members to collaborate and contribute to BPR, and the poor quality of BPR will lead to incorrect system configuration problems. If the business processes are not successfully reengineered to fit with the ERP systems, and the project teams are not ready for the adaptation of new business processes, they will not have the mindset for implementing or using the ERP system.

Moreover, during the BPR process, if the consultants will not conduct mapping analysis to map the software functionalities with business requirements, this will lead to a mismatch between ERP and business processes.

Poor quality of testing
An over-tight project schedule and an insufficient knowledge in testing ERP systems, will conduct in a rush and low quality. The ERP testing result is an indicator for revealing the readiness of the ERP system to "go live" (from the perspectives of examining IT infrastructure capacity, correct configuration of ERP system, if people - including users and project team - were equipped with sufficient knowledge and skills, and data was of good quality).

Poor top management support
Top management is expected to provide support in the areas of committing to the ERP project, sufficient financial and human resource, and the resolution of political problems if necessary. Limited financial support will contribute to a rushed ERP implementation process, project team members will be overloaded and high staff turnover rate, ineffective knowledge transfer, and political problems will occurred. Insufficient commitment will lead to political problems which will hinder the implementation process (causing poor BPR, widespread user resistance to change and low user satisfaction).

Too tight project schedule
If the top management and the project manager will like to reduce the budget of the ERP project and they will set the project schedule too tight, the implementation activities will be conducted in a rush (e.g., project planning, BPR, training, testing and so on) in order to meet the project deadline. The project team and users will overload the system.

Unclear concept of the nature and use of ERP system from the users' perspective
Due to poor quality of training and insufficient education delivered by the top management and project team, users will not have a given clear idea of the nature and use of the ERP system. Conclusions: they will not understand the rationale for implementing the ERP system or the process of implementation and they will not be prepared for the implementation, they will take resistance to change, which will lead to political problems, poor quality of BPR and a resistance to using the system.

Unrealistic expectations from top management concerning the ERP System
If top management will assume that the ERP implementation will provide great solutions without considering the complexity of the ERP system, this will lead to possible implementation process complications and associated risks. This gave the whole project team and users unrealistic expectations. This misconception will lead to superficial project planning and an underestimation of budget and resource allocation, and will result in failure of ERP implementation from a project

management perspective

5. Modules of ERP in business VS Higher Education

As scientific and teaching enterprises become 'big business' and universities throughout the world struggle to revamp or reorganize their identity within an era focused on "commercializing higher education" (Kassel 2009 UNISCO report), software vendors are increasingly viewing the education market as a lucrative "industry" potentially worth several hundred billion dollars in revenue (Kassel 2009 , UNISCO report). The growing popularity of ERP technology within today's uncertain educational environment has the potential to redefine intra-organizational operations and transform administrative functioning within many universities. In addition, if vendors are able to market successfully their non Arabic or foreign Euro / US model as a viable "industry solution" for multiple cultural contexts, higher education operations may become more standardized, so far most of the ERP systems include a similar modules , for the sake of the research a clear description of ERP modules are shown in the following table.

ERP comparative modules for some of the vendors working in GCC in Table (1)

SAP	Oracle	PeopleSoft	JD Edwards
Sales & Distribution	Marketing, Sales	Supply chain	Order management
Materials Management MRP	Procurement	Supplier relationship	Inventory, procurement
Production Planning MRPII (with others)	Manufacturing		Manufacturing mgmt
Quality Management		Enterprise perform	Technical foundation
Plant Maintenance	Service	Enterprise service	
Human Resources	Human Resources	Human capital mgmt	Workforce management
Financial Accounting	Financials	Financial mgmt solution	Financial management
Controlling			Time & Expense mgmt
Asset Management	Asset Management		Enterprise asset mgmt
Project System	Projects		Project management

Workflow: prompt actions	Order Management		
Industry solutions: best practices	Contracts		Subcontract, real estate

Table (1)

Apparently none of the above venders solicitous the higher education ERP real functionalities, although the ERP space in higher education is moving rapidly. Vendors that have not spent much time understanding the needs of higher education are doing much better now than previously, though they can still do much better. Because of the growing competition, vendors are working at rolling out integrated suites of software that support the thin client Web interface and object oriented systems. New versions are now rolling out much faster, making it challenging to keep up with the ERP project that never seems to end. As soon as you are done with the implementation, you are working on the next major upgrade, of course the available ERP in the market is not matured enough to meet and satisfy the higher education requirements. This paper is supposed to be means to an end, that end being innovation for using ERP in higher education in full satisfaction, now a days   the means become the End.

There is a common misconception in the ERP market confirms that getting a state of the art ERP application is the end, on the contrary , having the ERP in not the end , but it is the means where the end is the ultimate user satisfaction. Obviously, this is the situation of ERP system in higher education. The ultimate user satisfaction always depends on the higher education functionalities availability in the ERP application.
 The real functional requirements describes **what** higher education ERP system should do, while non-functional requirements place constraints on **how** the higher education ERP system will do so, based on that it worth to differentiate between higher education ERP functional and non-functional requirements. An example of a functional requirements for the higher education ERP system are shown in Table (2)

Seq	Functionality	Seq	Functionality
1	Institution profile	16	Internal massaging
2	Staff profile	17	Alumni management
3	Student profile	18	Hostel management
4	Feedback mechanism module	19	Transportation management
5	curriculum	20	Stuff attendance
6	Performance analysis	21	Semesters Calendar
7	Attendance	22	Library management
8	Score card	23	Accounting
9	Online examination	24	Fees management
10	Online assignment	25	Academic advising
11	Admission	26	Ad hock reporting
12	Payroll	27	Asset Management
13	Time table	28	Job / requirements analysis
14	Event management	29	Labor market demand
15	Notice board	30	Education / labor market observatory

Table (2)

The functional requirement is describing the **behaviour** of the system as it relates to the system's functionality. The non-functional requirement **elaborates a performance** characteristic of the system. Typically non-functional requirements fall into areas as shown in table (3)

Seq	Functionality	Seq	Functionality
1	Accessibility	13	Portability
2	Capacity, current & forecast	14	Quality
3	Compliance	15	Reliability
4	Documentation	16	Resilience
5	Disaster recovery	17	Response time
6	Efficiency	18	Robustness
7	Effectiveness	19	Scalability
8	Extensibility	20	Security
9	Fault tolerance	21	Stability
10	Interoperability	22	Supportability
11	Maintainability	23	Testability
12	Privacy	24	SLA

Table (3)

Finally as universities can move toward some best-practice models, the possibility of having proper ERP system for higher education can be done easily and successfully in case we have a clear definition of the higher education ERP FUNCTIONALITIES, then can be classified into higher education ERP modules as per the ERP products in the market.

6. Technical Preview of ERP in higher education

This paper confirms that ERP is not only having the application, but it comes across a combination of other basic methodological items. The table (4) shows a part of the other side of integrated solution and what is being missed for getting a workable ERP solution for higher education.

Seq	Item	Description	Tasks covered by ERP	Tasks NOT Covered by ERP	Impact factor % **
1	Strategy	Vision , Mission , Strategic objective , Goals	No	√	15
2	Business	Corporate policies, Operating Model, Business processes, Bylaws. Important	No	√	10
3	Data structure	Data models: conceptual, logical, and physical	√	√	10
4	ERP Application	Application software pool of data and knowledge	√	No	35
5	Workforce	Employee Assessment	X	√	5
6	Facilities	IT Infrastructure assessment :			15
		Clients	X	√	
		Network	X	√	
		Storage	X	√	
		Application	√	X	
		Data	√	X	
		Security	X	√	
		Change	X	√	

		Project Management	X	√	
		IT Administration	X	√	
7	Services	SLA/SLM "Service Level Management" to secure the corporate investments	X	√	10
8	Training	On going training plan for the whole staff in different levels	X	√	n/a

Table (4)

During implementation of higher education ERP , a little attention used to be placed on strategic planning, organizational culture, and use of disciplined project management principles. Though these were successful case studies, they contained evidence of the immense difficulty of implementing ERP solutions. Strategic planning is central to online education (Lawrence T. Gilroy 2011). It was believe strategic planning for information technology in universities is in a state of crisis. There have been some good studies that address issues of strategic planning (Levy & Beaulieu, 2003). A researcher could design a management framework for setting up online software for commercially successful firms, as well as small and disadvantaged universities.

 When reviewing a tripped or failed ERP implementation and determine the circumstances that led to its failure. Frequently, university management will conclude that the software doesn't work or it is too complex to implement in their unique environment. Management further compounds the failure by claiming that the wrong ERP system was chosen, and if they had the "right" software package they could recapture their initiative and achieve their original objectives. Yet, the paper shows that the software itself is rarely the source of failure. In fact, selecting the presumed "right" software package will most likely result in a second failure – this one even more costly than the first. Moreover the lack of proper ERP system integration would mean that the data would have to be manually exchanged between the current legacy system and the ERP system – although they already obtained a state of the art ERP solution.

This cause a number of troubles because data especially if the data is not being properly exchanged between the two solutions. Loss or mutilation of data at the time of export would mean that a lot of complications would arise and the company may even have to suffer a lot of losses. The other side of deploying ERP may come more important rather than acquiring more hardware , software , network , etc..   Always SOW of any ERP solution does not cover the following:

i.   Internal Control
    Getting controls "right" during the initial ERP software implementation is often less
    expensive than retrofitting controls. System implementers tend to focus on issues of
    functionality rather than control - perhaps spending more time making sure orders can
    be processed, for example, than on security issues. The internal control includes: Segregation of
    duties; following policies; the integrity, ethical values; and competence of an organization's
    employees.
ii. Current policies and procedures (bylaws)

Policies and procedures are important resources which govern the operation of any ERP and specially in higher education. They provide belief statements and operating guidelines for stack holders and staff regarding the administration of program, property, student, staff and board matters.

iii.   Workforce assessment

ERP implementations are difficult and most of ERP vendors are not in their concern the workforce assessment. in benchmark studies (Gartner 2013) suggest nearly 66% of companies realize less than 50% of anticipated business benefits from their ERP implementation. So what does this mean? It means organizational change management is important. It means ERP projects are about people, NOT technology. The new system will impact roles, responsibilities and how business is conducted within an organization. A clear understanding of the impact of change allows the business to design a plan and address the different levels of changes accordingly. This approach creates user acceptance and buy-in of the new ERP system. When people use the system, benefits will be achieved.

iv.   Security Policy for the whole operation environment.
The right security, appropriately tailored to take proper account of the very wide range of different jobs we do, assets we handle and environments we work in, is a critical pre-requisite for meeting many of these challenges. It ensures we can keep and develop the public's trust that we will handle their information properly

The purpose of this preview was to optimize across implementation ERP the often fragmented legacy system processes (both manual and automated) into an integrated environment that is responsive to change and supportive of the delivery of the business strategy of the university and to confirm ERP is not only software enjoy all the non-functional items shown in table (3) in this paper
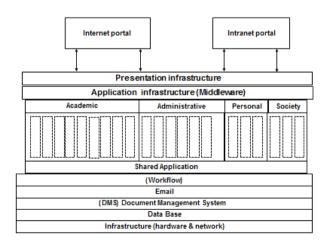
7.   KAU ERP Framework

Fig (1) ERP for higher education

KAU to achieve transformation of its administrative practices and process in order to ensure that all members of its Integrated KAU community benefit from reduced barriers, increased options for service delivery, advancement toward the goals of access and excellence, and redeployment of the savings achieved as a result of transformation to serve the core mission of scholarship and education. This transformation will be pursued in a manner, which creates benefits for the entire KAU system while supporting individual of the University/Colleges as they maintain their unique identities and pursue their unique academic missions.

One of KAU's strategic administrative goals is to realize the maximum value of KAU's resources for the benefit of KAU's students, faculty, and other academic / admin staff.

8. Conclusion

This paper proves that ERP is not the a mere acquiring of ERP application. Current ERP for business have different set of functionalities that is significantly different from the academic functionalities required for higher education institutions. ERP for higher education should be tailored specifically to address the academic functionality. Therefore ERP for higher education should start with the organization structure including strategy / policy , data flow, business processes structure, and academic functionalities as an unique discipline. The paper strongly recommend that , the Saudi Ministry of higher education should establish a unique ERP road map for higher education functionalities according to the suggested framework. This road map can achieve better control on universities operations, and effective processes management. In addition it will represent a new statement of requirements for ERP in higher education to which the ERP vendors will respond with a new ERP specifically addressing the real need of higher education.

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