AN ANALYSIS OF ENTERPRISE RESOURCE PLANNING IN THE UNIVERSITY EDUCATION SYSTEM

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ABSTRACT

A higher education ERP system helps manage business workflows at College and Universities. It streamlines the flow of information between all business functions and departments within the institution. ERP provides an integrated and continuously updated view of core business processes using common databases maintained by a database management system. ERP system track business resources–cash, raw materials, production capacity–and the status of business commitments: orders, purchase orders, and payroll.

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. 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. ERP Systems can be local based or Cloud-based. Cloud based applications are growing in recent days due to information being readily available from any location with internet access. The Present paper points out the ERP project critical success factors (CSFs) with a focus on higher education institutes (HEIs).

Keywords: ERP in higher education, CSFs, ROI, BPR.

1. INTRODUCTION

Enterprise Resource Planning (ERP) systems also named integrated information solutions are one of the biggest and the most important areas of the development of information systems in the business field. ERP systems give us the ability to control all main functions of the business in the organization through using integrated information architecture. The main objective of implementing ERP systems is to

connect all units of the business and all organizational functions into a unified integrated information system, which meets business needs and satisfies the users of the entire organization.

Generally, ERP systems include different software modules to guarantee the automation and integration of business functions, by accessing, sharing, practicing information and data in real-time, improving process flow, getting better data analysis, and improving the business performance. Moreover, the most important concept of the ERP system is a central database, using a single database greatly simplifies information flow across the organization. So, the information will be entered only once, and then it will be available for all users with real-time.

ERP system increases the accessibility of information as it allows doing different activities in parallel form. Therefore, automation and integration of business process in ERP helps to perform different activities and allow faster access to information. Recently, universities started to exploit business packages for managing their processes and technologies in order to increase their performance and controlling cost and services. In addition to integrate and automate their processes, such as student records and admission and improved the quality of managing resources, improved the efficiency of operation, and increased universities' competitive advantages. Therefore, universities or higher education institutes are more willing to adopt the ERP systems. On the other hand, universities spent more than five billion dollars for the investment of ERP systems during the years. Lately, vendors started to expand their products range to include new applications to meet the requirements of universities' market; e.g. a management application for student life cycle from Oracle and SAP. The essence of the system generally contains modules which support a student management and administration such as the registration procedures. Management of human resources such as controlling staff. Financial issues such as accounting and payments. Besides, the ERP system can include more advanced features of some other applications, such as e-learning.

Thus, one critical factor will not guarantee the success of the ERP systems implementation as it needs a mixture of critical factors to achieve the desire decisions. From an ERP point of view, CSFs are the number of significant factors, activities, and key areas that organizations should focus on and give it a special consideration in order to achieve a successful performance, and help in planning and implementing the ERP system. Literature studies identified a plenty of critical factors, which have an impact on ERP implementation, these factors guide, influence, and help to get the desire goals. Nevertheless, 60% to 80% are the failure of ERP systems of meeting the expected results in university's environment. That fact that ERP system implementation practices were full with devastating implementation stories, as the system has never been on time, budget, and achieving the goals. That will happen when organization miss the understanding of the software implementation, how to keep the system efficient and maintain its functionality, then the systems will be useless. So, defined that the software engineering includes the process, methods and tools, which enable the combination of computer systems to be developed in time

and quality. In addition, researchers defined the software engineering as "an engineering discipline that is concerned with all aspects of software production.

1.1 Benefits of ERP system in University Education System

• **Cost Effective:** Perhaps the most prominent advantage of using ERP in education is the costing factor. Saving on the amount of man hours let you save so much on finance. Basic campus management requires a lot of manpower to manage things like fee collection, the grueling admission process, etc. When this management is done online, a lot is saved on the finance sector which can be used in other useful purposes.

• **Better organization of data:** Organize your data the way you want. Education ERP gives you a lot of ways to organize data of your institution that would help in proper management of it. Data is managed well and available with a single click of a mouse.

• **Data is secured:** Data or information stored in web servers are far more secured that those stored physically in shelves. Storing information and data stored by ERP software in servers have backup systems and thus, your information is preserved! Is it possible with physical storing of data and files?

• **More automated administration:** The entire administration which was otherwise managed using huge manpower, involving all possible flaws that are not tracked easily and managed. With education ERP, the point of flaws in managing important administration processes like fee collection, library books, admission list, etc is nearly minimal, unless there are some human errors in filling up information or technical glitches.

• **A quicker management process:** Education ERP software quickens the entire process of institutional management to great extent, lets say in a matter of seconds. All you need to wait for is the implementation of the ERP software and you are set for a faster management of your institution like never before. Be it the admission process of an entire new batch of students or generating customized reports on a particular batch is a task done in minutes.

• More focus on education: When most of the time is saved from taking one-to-one attendance in class or filling up the mark sheet after every exam, a lot of time is saved to be invested in what is more important- teaching.

1.2 Limitations of ERP System in University Education System

Of course, there is other side of the coin too. Even if the management of your institution is available within the single click of a mouse, there are some limitations that prevents institutions to choose education ERP solutions for better management. Some of them being,

- One failure of ERP in education can be measured in terms of achievement of Return on Investment (ROI). When the ERP implementation doesn't yield enough ROI, it can be a failure.
- The cost of ERP, its planning and implementation, customization, configuration, etc might be too much for lesser profit-driven schools.

- Most ERPs are difficult to learn and use. With complicated user interface that requires thorough user training, it requires complete participation of users. Time has come for all educational institutions to go the smarter way. Re-organize the management systems of your institutions to match the evolving technology in every aspect of life.

1.3 Business Activities of Educational Organizations and ERP systems

There have been numerous studies on ERP implementation and several related issues such as implementation procedures, business process and outcomes. Although these studies discuss many important issues in detail, even vendor selection and implementation team, research about ERP system in higher education is still at the infancy stage. Indeed, existing ERP research has neglected the higher education sector worldwide, even though most universities have implemented or are in the process of implementing an ERP system. Thus, research in issues related to ERP and users in higher education represents a forward step in analyzing the actual benefits potentially brought by these systems to organizations. Although ERP systems in higher education institutions currently represent their largest software investment, it is not likely to be the final one. Universities are planning to renew and install other enterprise–wide systems in the future, which necessitate the call for more research efforts in this area. The series of studies conducted to assess ERPs in higher education and their associated benefits with a focus on process performance and the effect of factors such as culture and leadership on process performance in an ERP system environment. These studies concluded that ERP systems were implemented to improve services for students, faculty and staff. However, 50% of these implementations went over budgets and over timeline schedules. Although these studies did not give attention to user perspectives, they raised awareness and made some important contributions about ERPs in a significant environment (Higher education institutions) which represents one of the most important sectors that invested in ERP to achieve valuable outcomes from that investment. It was also investigated that which factors are important when implementing ERP in higher education and which factors lead to success or failure. As for instance, the staff training is very important process when implementing ERP in higher education in order to reap more benefits from these systems. The impacts of ERP system on business process and performance in higher education were also analyzed. The study concluded that ERP potentially improves business performance in higher education by enhancing services offered to students, faculty and staff. The study found that, factors such as change management, behavior management emotions, communication, and the implementation process approach and system functionality had profound effects on implementation success. ERP systems

for higher education develop in the direction of support for key administrative and academic services. The core of such a system usually supports minimal student administration **(enrolment procedures and student enrolment, financial support for students, student data),** human resource management (monitoring of employees) and finance (accounting, payments, investments, budget).

Important Factors for Successful Implementation Successful implementation of ERP with regular follow-up only will be effective, and it will yield a better result. But Implementing an ERP system is complicated, time-consuming, and very costly, too **(Davenport, 1998).** Based on the available literature about ERP implementation in HEI, many countries struggling due to various factors **(Aldayel, Aldayel & Mudimigh, 2011)**,

1.3.1 Some of the important factors which have to be seriously considered are listed below:

• Top management Support: This is one of the most important factors; without topmanagement support, ERP cannot implement successfully.

• Consultant: Consultant plays a very important role in ERP implementation; therefore the consultant must be well experienced and the hand of full knowledge about ERP.

• Cost: Before implementing top management must be aware of project cost; otherwise, the project may fail while halfway through.

• ERP Selection: While evaluating, proper ERP selection has not done based on the requirement; it may misfit for the institution.

• Cultural: - Cultural fit also may affect the proper implementation, mostly ERP developed by the developed countries, some criteria such as terminology, language, etc., it may not be suitable for all institutions. Therefore, while selecting ERP, select which will properly fit for the institution.

• Employee Resistance: - Employees may resist due to various reasons such as over workload due to double data entry, may not like change management, perception, retention of institution process, don't want to change their work culture since they are familiar with the existing system, etc.

• Project Management: Poor project management, less knowledge, and poor planning may lead to challenging of ERP implementation.

• Clearly Defined Goals: The goal and scope of the project should be communicated clearly to the vendors before implementation.

• Project Planning: Proper planning should be done, and it should be properly communicated to all.

• Implementation Strategy: Proper implementation strategy should be followed.

• Customization: Customization should be avoided or at least less customization, because it may cost you more as well as time-consuming.

• Business Process Reengineering (BPR): Poor quality of BPR will lead to incorrect system configuration, and if the consultant did not map the functionalities depending on the institute requirement, it might lead to incompatibility with ERP and institution requirements.

• Infrastructure: Poor IT infrastructure may lead to a slow process.

• Training: - Proper training has to be given to the user based on their level of IT knowledge. Users may not be able to attend a single session due to busy with their existing workload; therefore, multiple time training may require 338 Seventeenth AIMS International Conference on Management

• Testing: Without proper testing, put itlive may affect the entire institute process. Therefore, thorough live testing should be done before put it on live.

• Too Tight Project Schedule: Due to budget constraints, top management insisted on reducing the project schedule or without proper training may lead to project failure.

• Communication: Proper communication is important while implementing ERP; each stage of implementation should be communicated from top management to end-user as well as a consultant by the ERP vendor.

2. REVIEW OF LITERATURE

ERP benefits cannot be fully realized unless a strong alignment and reconciliation mechanism is established between technical and organizational imperatives based on the principles of process orientation. It is suggested in the taxonomy that measurement takes place in a balanced perspective, and for the purpose of providing useful information that can enable the decision-making process and, which can help deliver the corporate objectives and therefore lead the business competitively forward. Upon this premise, the taxonomy is based on a comprehensive analysis of ERP literature combining research studies and organizational experiences. The taxonomy reflects the essential features of ERP systems, as being built based on the principles of business process management. Furthermore, it illustrates that ERP benefits are realized when a tight link is established between implementation approach and business process performance measures.

The nature of the university environment is a dynamic and change rapidly, wherefore the ERP system is an appropriate work, which can enhance and transform to meet different needs of different users (**Motiwalla & Thompson, 2008)**

The demand for implementing ERP in organizations is increasing apace. Nowadays, around 40% of colleges has already executed ERP computer code. The strategy for implementing ERP has varied relying upon several vendors that provide totally different hosting services. a number of the leading vendors are: SAP, Oracle and Microsoft. Although, all of them follow similar basic methodology and submit to many phases that are: Preparation, Design, Development, Testing, Deployment, and Operation. The success of an implementation primarily depends on however closely the implementation consultants, users and vendors

work along to realize the general objectives of the organization. throughout the course of implementation, the quality package might bear modifications which can be an easy one or a significant 'functionality' change. Implementing such changes is understood as Customization. A "big bang" implementation involves having all modules in any respect locations enforced at identical time. Characteristics of this approach embrace no want for temporary interfaces, restricted demand to take care of gift computer code, cross-module practicality and overall price if no contingencies arise. Phased implementation one or a set at a time, typically one location at a time. Advantages of approach include: a smoothing of resource necessities, a capability to specialize in a specific module, availability of existing gift systems, as fallback, reduced risk, the information gained with every part and therefore the quality of demonstrable operating system. The wave approach: This approach involves the applying various waves of modification to different business units or regions. Parallel implementation: This approach involves each ERP and an existing system running along for a fix amount of time. Instant cutovers (flip-the-switch): This approach is lower in price motivates users to convert to the new system and reduces the requirement for redundant systems, but it tends to be risky, trying to users and needs a high level of contingency designing.

Heiskanen, Newman and Similä, (2000) recommend that ERP computer code, which contains best practices from the company business trade, is not acceptable for universities, since universities have distinctive structures and decision-making processes. Organizational culture heavily affects ERP implementation. **Tsichritzis (1999)** indicates that today's universities are forced to admit that "education could be a business and students square measure the customers". ERP implementation encourages universities take an additional business-like approach to education, leading to cultural changes together with "the use of social control language and techniques". There will be resistance to ERP implementation at universities as a result of it involves not simply the adoption of a replacement data system, however a holistic amendment in structure culture. While their square measure numerous kinds of management hierarchy from university to college, **Birnbaum & Edelson (1989)** describes that there exist two sources of authorities at intervals a university: body authority and tutorial authority. ERP implementation is believed to bolster body authority as a model of governance. For teachers, this could cause concern that use of a replacement system that leads to exaggerated transparency of their transactions would lead to a loss of management. On the opposite hand, body employees could concern for his or her job security once redundant processes square measure eliminated work functions square measure machine-driven system across a university. Moreover, **Pollock and Cornford (2005)** argue that ERP, as a "generic sort of solution" from the company trade, may well be a bad strategy for universities. Despite HEI's wants for distinctive business functions, ERP solutions limit their decisions and encourage adopting a "generic solution". Since there are few discussions and issues concerning the challenges that universities may face from generic ERP system adoption, there is very little assurance that the method is going to be sure-fire. Also, as ERP systems square measure "large integrated packaged solutions" with dynamic complexness, is

going to cause difficulties with implementation for management and IT employees in universities, even those that might need comprehensive understanding of their own organizations. this is often as a result of universities have dilated a spread of systems several of that have typically competitor functions whenever that they had specific wants. within the worst case, universities do not forever have management or IT employees United Nations agency square measure well-versed in structure functions. Standardization and integration, each of that square measure key options of ERP systems, limit flexibility in university systems. This loss of flexibility could lead employees to make 'workarounds' during which staff conceive to persevere their previous processes. This response to new ERP systems could ultimately increase employees' workloads and build a knowledge gap between the system and reality.

There have been numerous studies on ERP implementation and several related issues such as implementation procedures, business process and outcomes. Although these studies discuss many important issues in detail, even vendor selection and implementation team, research about ERP system in higher education is still at the infancy stage. Indeed, existing ERP research has neglected the higher education sector worldwide, even though most universities have implemented or are in the process of implementing an ERP system. Thus research in issues related to ERP and users in higher education represents a forward step in analyzing the actual benefits potentially brought by these systems to organizations. Although ERP systems in higher education institutions currently represent their largest software investment, it is not likely to be the final one. Universities are planning to renew and install other enterprise–wide systems in the future, which necessitate the call for more research efforts in this area. The series of studies conducted to assess ERPs in higher education and their associated benefits with a focus on process performance and the effect of factors such as culture and leadership on process performance in an ERP system environment. These studies concluded that ERP systems were implemented to improve services for students, faculty and staff. However, 50% of these implementations went over budgets and over timeline schedules. Although these studies did not give attention to user perspectives, they raised awareness and made some important contributions about ERPs in a significant environment (Higher education institutions) which represents one of the most important sectors that invested in ERP to achieve valuable outcomes from that investment. It was also investigated that which factors are important when implementing ERP in higher education and which factors lead to success or failure. As for instance, the staff training is very important process when implementing ERP in higher education in order to reap more benefits from these systems. The impacts of ERP system on business process and performance in higher education were also analyzed. The study concluded that ERP potentially improves business performance in higher education by enhancing services offered to students, faculty and staff. The study found that, factors such as change management, behavior management emotions, communication, and the implementation process approach and system functionality had profound effects on implementation success. ERP systems

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Cloud ERP appeared and defined as a combination of ERP software by implementing it on cloud provider; until to acquire utility of both cloud computing and ERP systems to improve and organize all the companies' processes and data **(Kiadehi & Mohammadi, 2012).**

In the study of **(Olugbura, Kalema & Kakwaletswe, 2014)** they identified the Critical Success Factors in a case study of higher education, they organized the factors into categories: organizational, technical, vendor, individual, cultural, social, political and national. Hence, this thesis is focused on the technological field where the CSFs are:

1. Complexity.
2. Network reliability.
3. Flexibility and efficiency of use.
4. System's response time to users' requests.
5. Data quality, analysis, and conversion.
6. Customization.
7. User friendliness, help, and documentation.
8. Visibility of the system's status.
9. Robustness and error prevention.
10. Software development, testing and troubleshooting.

3. IMPORTANCE AND RELEVANCE OF STUDY

After studying the university system and internal documents it has been concluded that the fragmented systems are the main problem that our university systems suffer; as each department has separated system from others, which leads to several problems, such as:

- ❖ Multiple identifications of data in each system.
- ❖ No integrated solution that controls the data flow.
- ❖ Lack of administrative and academic services.
- ❖ Manual operations.
- ❖ Low quality and time of performance.
- ❖ Data redundancy.

As a result, for the above-mentioned problems, universities started to adopt and implement an ERP system to solve the problems occurring in their old fragmented systems. In addition, the universities attracted to adopt ERP systems because of global trends, increasing in students' numbers, the learning environment and

competitive between universities, and the need for quality and performance. This forces university's decision makers to think about developing and replace the university systems with ERP, which provide a useful management tools, user accessibility, and increase performance (**Aldayel, Aldayel & Mudimigh, 2011**). All these advantages encouraged the adoption of ERP systems to be involved strongly to the competitive market (**Aldayel, Aldayel & Mudimigh, 2011**).

In addition, ERP systems' implementation, performance, success, and circumstances in business organizations have been studied and researched during last decade. Still many publications are needed in the field of ERP implementation in universities' environment (**Qian, Schmidt & Scott, 2015).**

Because of that, the researcher got more interest to study the environments of universities that will implement ERP system packages. According to the university circumstances, our universities need to find out a pre-development analysis that includes the solid knowledge, which is related to the ERP development process and CSFs that are highly connected with their environment. Therefore, system pre-implementation preparation is considered one of the ERP success keys that must have our concern and perform. So, one of our thesis objectives is to provide a complete understanding of the ERP CSFs, benefits, risks, challenges, usage, universities' environment, and functional issues and spot the light to the ERP adoption, selection, packages, and implementation.

4. RESEARCH GAPS

The activities, methodologies, and tools which will be used during the implementation processes is one of the key factors that affect a successful system implementation (**Fetouh, Abbassy & Moawad, 2011).** Also, the implementing of the ERP system is a big challenge because it has a lot of dimensions which are affected by the success of this type of integrated systems. It is important to consider how to deal with the ERP development projects, what must be done to make it possible while considering the ERP implementation strategies, methods, techniques, and the differences between approaches. Thus, we need a framework to organize how to deal with implementing an ERP system. Recently, the universities became more willing to adopt the ERP systems, which help them managing and integrating their processes and technologies to increase the performance and controlling cost and services and acquiring the desired advantages of the ERP systems. By studying the system and the internal documents of the university, the fragmented systems were the main problem that the university systems suffer from. As every departments in the university has its own separated system, which leads to several problems. To override the problems, the research covered three main sections; to explore the technical CSFs; when implementing an ERP system must need to think of the CSFs and because of the complex nature of the ERP system the one critical factor will not guarantee the success of the ERP systems implementation so it needs a mixture of critical factors to achieve the desire decisions, this research study the technical CSFs which are particular for University as few studies are only specialized for university trying to building a good IT infrastructure.

In addition, to help universities to prepare for implementation the ERP system in order to improve their computerized system. To help the University applying the ERP system with a systematic approach and standardized methods, which are extracted from the software engineering practices and the ERP solution. Then to reflect this knowledge into a framework, this framework is a well-planned implementation stage, which are essential and required to ensure the feasible development and the success of the universities ERP system. Finally, to create an evaluation plan in order to ensure the satisfaction of the users after three years of effective usage.

5. RESEARCH OBJECTIVES

The main aim of the ERP system is to integrate all the organization's departments and procedures across it to a centralized database, which serves all departments and all of their functions and needs. Each department has to install a particular system to perform their work. Then the ERP systems integrate all software programs to ease the communication and sharing information between departments (**Frimpon, 2011**).

As the number of students, employees, lectures, and assets of universities are increasing, controlling of the universities' resources and process' became more complex. Therefore, the need of the ERP systems increased to support the concept of systems and data integration, helping decision making, and support enterprise evolution. In fact, the main objective of implementing ERP systems in universities is for academic purposes rather than profit (**Surendro & Blunder, 2014**).

The general objective of this study is to provide ERP system information that is related to the universities. The main goals of this study are:

1. Exploring and analysing the existing knowledge of literature about ERP system implementation and factors of success.

2. Studying and analysing the difference between business ERP system and university ERP system.

3. Defining the benefits and impacts of universities ERP.

4. Examining the university current situation and system by studying the universities environment as a case study.

5. Identifying CSFs of ERP systems that are related to the technical and software engineering perspective which are coupled with universities' environment.

6. Constructing a framework to ease the implementation of ERP systems in University.

6. RESEARCH METHODOLOGY

1. Current Knowledge: Business ERP system vs. university ERP system.

_ Definitions: Business ERP system and university ERP system.

_ ERP system evolution.

_ Business ERP system modules vs. university ERP system modules.

_ Business ERP system architecture vs. university ERP system architecture.

_ ERP systems Advantages and disadvantages in both business organizations and universities.

_ ERP system risks and challenges.

2. ERP system implementation

_ System development using software engineering point of view

_ ERP system implementation strategies, topics, practices and activities.

_ University ERP system frameworks.

_ Critical success factors☐technical factors.

7. REFERENCES

Abeer ALdayel, Mashael Aldayel, and Abdullah Al-Mudimigh. The critical success factors of erp implementation in higher education in saudi arabia: a case study. Journal of Information Technology and Economic Development, 2(2):1, 2011.

Amr Fetouh, Ahmed el Abbassy, and Ramadan Moawad. Applying agile approach in erp implementation. IJCSNS, 11(8):173, 2011.

Birnbaum, R., & Edelson, P. J. (1989). How colleges work: The cybernetics of academic organization and leadership. The Journal of Continuing Higher Education, 37(3), 27-29.

Thomas Davenport. Putting the enterprise into the enterprise system. Harvard business review, 76(4), 1998.

Elias Fathi Kiadehi and Shahriar Mohammadi. Cloud erp: Implementation of enterprise resource planning using cloud computing technology. Journal of Basic and Applied Scientific Research, 2(11):11422–11427, 2012.

Heiskanen, A., Newman, M., & Similä, J. (2000). The social dynamics of software development. Accounting, Management and Information Technologies, 10(1), 1-32. DoI: 10.1016/S0959-8022(99)00013-2

Kridanto Surendro and Olivia Bluder. Restructuring regular business erp system to be transformed into academic ERP System. In Advanced Informatics: Concept, Theory and Application (ICAICTA), 2014 International Conference of, pages 197–202. IEEE, 2014.

Lin Qian, Edie Schmidt, and RL Scott. Erp pre-implementation framework for higher education institution: A case study in purdue university. In Industrial Engineering and Engineering Management (IEEM), 2015 IEEE International Conference on, pages 1546– 1550. IEEE, 2015.

Luvai Motiwalla and Jeffrey Thompson. Enterprise Systems for Management. Prentice Hall Press, Upper Saddle River, NJ, USA, 1st edition, 2008.

Manishaben Jaiswal,Mehul patel,   "AUTOMATION WITH NETWORKING AND ARTIFICIAL INTELLIGENCE", International Journal of Creative Research Thoughts (IJCRT), ISSN:2320-2882, Volume.9, Issue 1, pp.4748-4759, January 2021, Available at :

http://www.ijcrt.org/papers/IJCRT2101582.pdf

Michael Frimpon. A Re-structuring of the Enterprise Resource Planning Implementation Process. International Journal of Business and Social Science, 2(24), 2011.

Oludayo Olugbara, Billy Mathias Kalema, and Ray M Kekwaletswe. Identifying Critical Success Factors: The case of ERP systems in Higher Education. 2014.

Pollock, N., & Cornford, J. (2005). Implications of enterprise resource planning systems for universities: An analysis of benefits and risks.

Tsichritzis, D. (1999). Reengineering the University. Communications of the ACM, 42(6), 93-100