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An Investigation on Implementation of Enterprise Resource Planning Framework in Educational Institutions

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Abstract**—***Due to rapid globalization, the educational segment is getting tougher. Enterprise Resource Planning (ERP) is a system that is used to combine all the information or operations of a company into a single unit. Enterprise Resource Planning (ERP) system of educational institution have become popular because they can replace older legacy systems, modernize the campus environment, improve efficiency and provide new services to end users. Enterprise Resource Planning has successfully been used in various sectors like industries, management, aviation, data warehousing etc. But, Enterprise Resource Planning has not been used in the development of system at the academic institute. The general objective of the study is to study Information quality and System quality of ERP system in educational institution, examine the satisfaction level of ERP users in educational institution and analyze the impact of ERP system on performance in educational institution. Primary source was structured questionnaire through online survey and secondary sources were books, research journals, reports and web portals. For data analysis and hypothesis testing different statistical techniques are used like mean, Standard deviation, Z-test and F-Test. Findings of the study will be useful to motivate and educate educational institution about implementation of ERP system.*

Keywords:— *Enterprise Resource Planning, Information System, ERP Components Integration, ERP Modules, ANOVA, Hypotheses Testing.*

1. INTRODUCATION

Technological advancements and infrastructure facilities determine the progress and prosperity of a nation. Enterprise Resource Planning (ERP) system of educational institution have become popular because they can replace older legacy systems, modernize the campus environment, improve efficiency and provide new services to end users. Enterprise Resource Planning system is developing the integration of all the resources of educational institution. Enterprise Resource Planning (ERP) is a system that is used to combine all the information or operations of a company into a single unit. The standard ERP system will utilize both computer hardware and software in order to achieve this. Perhaps one of the most important parts of the ERP system is the central database. This database will be used to store information from various modules.

2. ERP CONCEPTS

Enterprise: The enterprise is any organization that has a set of common goals.

Resource: Resources can be in the form

of human resources (Manpower), capacity resources (machine, plants, warehouses etc.), inventory resources (finished goods and raw materials stock), etc.

Planning: For effective utilization of resources, an enterprise needs to plan and undertaken a variety of planning activities like demand planning, distribution planning, production planning, capacity planning, material planning, maintenance planning, financial planning and budgeting, quality planning, new product planning etc.

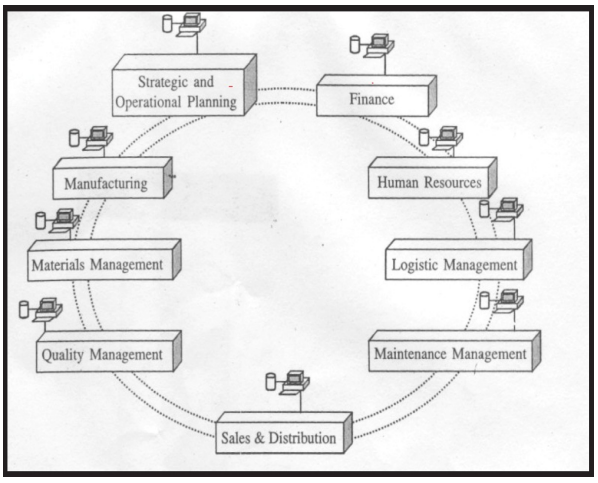

Figure 1: Isolated Information System a Pre-ERP Scenario

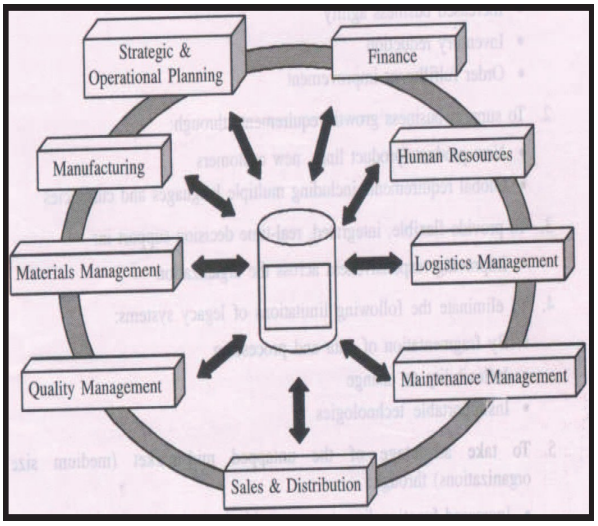

Figure 2. Integrated ERP System

Benefits of ERP implementation

- Information Integration
- Reduction of lead time
- Improve access to accurate & timely information
- Enhances workflow, increases efficiency, and reduces paper work
- User friendly web based interfaces
- Streamlines processes & eases adoption of best business practices
- Establishes a foundation for new systems & integrates existing systems
- Reduce operating costs
- Facilitated day to day management
- Support strategic planning

Features of Enterprise Resource Planning System

- ERP facilitates companywide integrated information system covering all functional areas like manufacturing, selling and distribution, payable, receivable, inventory, accounts, human resources, purchases etc.
- ERP performs core corporate activities and increases customer service.
- ERP bridges the information gap across the organization.
- ERP provides for complete integration of systems not only across the department in a company but also across the companies under the same management.
- ERP is the only solution for better project management.
- ERP allows automatic introduction of latest technologies like Electronic Fund Transfer (EFT), Electronic Data Interchange (EDI), internet, intranet, Video Conferencing, E-Commerce etc.
- ERP not only addresses the current requirement of the company but also provides the opportunity of continually improving and refining

business processes.

- ERP provides business intelligence tools like decision support system (DSS), Executive Information System (EIS), Reporting, Data Mining and Early warning Systems (Robots) for enabling people to make better decisions and thus improve their business processes.

3. LITERATURE REVIEW

Costa et al (2020) identified the main determinants of individual performance by understanding support of ERP usage on management learning. This study presents a success model of ERP usage for learning management context.

Ruivo et al (2020) assesses the effect of some extended Enterprise Resource Planning (ERP) capabilities (Collaboration, Analytics, Web-portals, Add-ons) and ERP use on ERP value.

Abdo et al (2019) aimed at finding the most CFSs impacting the implementation process from the point of view of ERP users working in a large construction company. Most critical on esa total of 26 factors were identified from the literature. The results showed that top management involvement and awareness, training and support for users, and implementation team composition are the most significant factors of ERP implantation success.

Alaskari et al (2019) developed a theoretical framework that can be used by SMEs to select the most appropriate ERP system, the framework consist of three phases: Define, Evaluate and Select. The findings of this work supports both manufacturing and service organizations seeking to implement ERP systems by determining the most appropriate ERP system invaluable toward enhancing successful implementation, minimizing the risk of a non-fitting ERP system and consequent project failures.

Maliszewska et al (2019) developed a methodology for implementing S-ERP (Sustainable Enterprise Resource Planning) system in small and medium manufacturing companies.

Jituri et al (2018) presents the relative contribution of ERP and Lean system to facilitate in the realization of business objectives in manufacturing. The presented concept is based on systematic mapping of publications contributed in the field of ERP system and lean manufacturing system.

Adil et al (2017) proposed a two phase structural model for evaluating ERP CSFs. In the first phase of the study, interpretive structural modeling is adopted to structure CSFs in a hierarchical form. In the second phase, hierarchically structured CSFs are evaluated by using fuzzy cognitive maps.

Fernandez et al (2017) investigated the impact of Enterprise Resource Planning (ERP) system on Public Sector Organizations (PSO) using two perspectives of the Balanced Scorecard (BSC) performance measurement framework; financial and customer.

Hsing-Jung Li et al (2017) investigates possible CSFs for the life cycle of an ERP system. This study also analyses the effects of CSFs from the perspective of Information Technology Governance (ITG).

Ali et al (2016) followed the Systematic Literature Review (SLR) research method to explore the benefits and challenges of implementing ERP systems over a cloud environment. Implementing and running ERP systems over the cloud offers great advantages and benefits, in spite of its many difficulties and challenges.

Hou et al (2016) proposed a model to test the effects of employees' perceptions of work alienation and organizational support on their intention to use ERP in a State-owned enterprise.

Jayawickrama et al (2016) discusses ERP systems implementation in UK

manufacturing and service sector organizations, focusing on empirical evidence of an innovative KM approach for improving knowledge competence for ERP success.

Schwade et al (2016) investigates the teaching of practical ERP skills to students at German-speaking Universities. The discussion is centered on an innovative teaching concept called "The ERP Challenge", which was developed to give students a hands-on experience with a commercial standard ERP system.

Ahmadi et al (2015) develops a novel approach to managing these interrelated activities to get ready for implementing an ERP system. The approach enables an organization to evaluate its ERP implementation readiness by assessing the degree to which it can achieve the interrelated readiness relevant activities using fuzzy cognitive maps.

4. THEROETICAL FRAMEWORK

Information Quality: Information quality refers to the quality of the information the system produces. Dimension is the result of the production and communicated to the users in various forms of output.

System Quality:

System quality refers to the production of information where system is the technology developed and responsible to create information. System Quality measures the desired operational characteristics of an Information system, e.g. whether or not there are bugs in the systems, the consistency of the user interface, ease of use, response rates in interactive systems, quality of documentation, and sometimes, quality and maintainability of the program code.

Table 1: Information Quality Measures

S. No.	Information Quality Measures
1	Accuracy, Precision, Currency, Timeliness, Reliability, Completeness, Conciseness, Format, Relevance
2	Perceived usefulness of specific report items
3	Perceived usefulness of specific report items
4	Perceived importance of each information item
5	Currency, Sufficiency, Understandability, Freedom from bias, Timeliness, Reliability, Relevance to decisions, Comparability, Quantitativeness
6	Report accuracy, Report timeliness
7	Report usefulness
8	Completeness of information, Accuracy of information, Relevance of reports, Timeliness of reports
9	Usefulness of information
10	Report accuracy, Report relevance, Understandability, Report timeliness

Suggested ERP Model

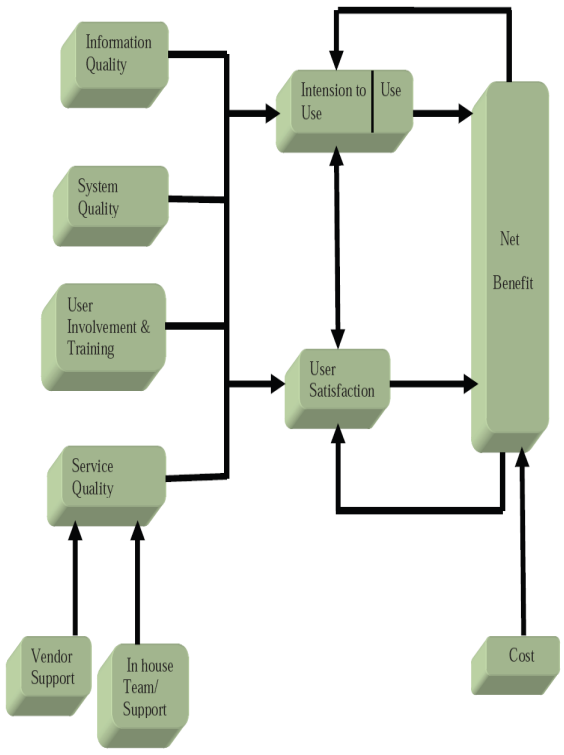

Figure 3: Suggested Model for End User Satisfaction using ERP System

Table 2: System Quality Measures

S. No.	System Quality Measures
1	Convenience of access, flexibility of the system, integration of systems, response time
2	Realization of user expectations
3	Reliability, response time, ease of use, ease of learning
4	Response time
5	Perceived usefulness of IS
6	Usefulness of DSS features
7	Usefulness of specific functions
8	Resource utilization, investment utilization
9	IS sophistication (use of new technology)
10	Flexibility of system
11	Stored record error rate
12	Response time, system reliability, system accessibility

5. RESEARCH METHODOLOGY

The details about Questionnaire design, Sample Design and Statistical Design is given in this section. For the research design due weight is given to various points such as the objective of research, desired standard of accuracy etc. In this Research an attempt is made to find out the end user satisfaction of ERP system in the educational institutions. The Research is based on survey in educational institutions.

Data Collection

Primary data is collected through structured questionnaire. For this purpose an online survey questionnaire has been conducted among participants using Google form due to restriction in physical interaction. Secondary data is collected through books, research journals, reports and web portals.

Variable studied

In Questionnaire, 42 different variables related to ERP system are studies for analyzing overall ERP system of the educational systems. Demographic items were also drawn up to create a profile of each respondent. In the first part of the questionnaire age, gender, computer expertise, educational background of the respondent is checked. The 42 different questions are designed in questionnaire related to ERP based on the following variables:

- Information Quality
- System Quality
- User Satisfaction
- Ease of use
- Performance
- Technology Implementation
- Cost
- User Involvement & Training

Statistical Tools & Techniques used for Data Analysis

- Mean is used to measure central tendency of Variables.
- Standard of Deviation is used to Measure Dispersion is commonly denoted by the symbol σ. This measures the scatter of the values of items of a variable in the series around the true value of average.
- Pearson's Coefficient of correlation is calculated to study the Correlation of some variables.
- Z-test & ANOVA (F- test) is used for the Hypotheses Testing.
- Coding is done to represent each Variable in short format.
- MS Excel is used for analysis due to unavailability of registered SPSS application.

6. DATA ANALYSIS

Demographic Analysis

The respondent in the age group of 20-30 is 48.8% which is nearly half of the sample respondents followed by 38.1% respondents amounting to 32 respondents aged between 30 -40 years. Only 13.1% of the total sample respondents aged between 40-50 years. Though not very high these 13.1 % respondents reflect the willingness ability of the elderly staff in ERP usage. Out of the total 84 under study 84.5% are male and 15.5% are female. Thus, the sample taken for study stands as a testimony of the same of the total sample 84 respondent, 69% are frequent users while 18% are expert users and 13% respondents were found to be beginners in using computer. This shows that the educational institutions are keen on using ERP through appropriate trained personnel. It is found that half (50%) of the respondents are graduates, while 30.9% are holding Master's degree, 1.2% of the sample respondents were having educational qualification as high as Doctoral degree. 4.8% of respondents had a technical diploma while 9.5% of respondents were HSC. Though less 3.6% of respondent were only SSC. Thus, this reflects the fact that ERP users can come from a wide variety of educational levels. Respondent's usage of ERP system was found more than 38% using ERP system for more than 2-4 hrs. daily. This shows that majority work is done with this ERP system. The 25% of respondents were using the ERP system between 4-6 hrs.

Analysis of Factors

Table 3: Z- Test analysis for Information Quality * System Quality

Code	Factors Related to Information Quality & System Quality	N	Mean	SD	Z - Value
IQ1	Does ERP system provide the accurate Information which you need?	84	3.881	0.91	8.868
IQ2	Does the system provide reports that seem to be just about exactly what you need?	84	4.036	0.91	10.419
IQ3	ERP system reduced paper handling and re-entry of data, less duplication of effort	84	4.286	0.72	16.344
IQ4	Does the information content meet you need.	84	4.000	0.88	10.437
IQ5	Does ERP system fully meet the institution require-ment and no moremodification/Updations was needed.	84	3.107	1.06	0.923
SQ1	Does ERP system provide up to date information	84	3.583	1.06	5.067
SQ2	Do you get the information you need in time	84	4.214	0.69	16.003
SQ3	Is ERP system accurate?	84	4.179	0.88	12.270
SQ4	Time required for day to day decision making is re-duced	84	3.881	0.83	9.759
SQ5	ERP system provide the information in accurate time	84	4.024	0.78	12.095
SQ6	ERP system assists the management in day to day decision making process.	84	3.524	0.88	5.427

Table No. 4: Z–Test Analysis Efficiency for the Factor Performance

Code	Factors Related to Information Quality & System Quality	N	Mean	SD	Z - Value
P1	ERP system has reduced our institution activity work.	84	3.66	1.24	5.067
P2	ERP system has improved work efficiency & increased institution accountability.	84	3.82	1.19	0.867
P3	ERP system improved transparency in finance & administration activities.	84	3.84	1.09	10.426
P4	Increase interaction across the institution.	84	3.53	1.26	9.759
P5	The workload of our institution has decreased significantly.	84	3.70	1.22	7.652
P6	The nature of work of our institution has changed significantly.	84	3.51	1.28	5.427
P7	Insufficient supports and services from vendor.	84	2.83	1.21	8.868

Table 5: Z–Test Analysis for Adequate Training to Employees for the Factor User Involvement & Training of the ERP System

Code	Factors Related to Information Quality & System Quality	N	Mean	SD	Z - Value
UT1	Users are not adequately trained by the management to use the ERP system.	84	3.11	1.04	0.762
UT2	Failure to check unauthorized access to information	84	2.80	0.70	0.867
UT3	End user not involved & participated in the Implementation.	84	3.02	0.84	0.912

Findings of the Study

- ERP system not fully meets the institution requirement and more modification/Updations are needed as this factor scored lowest mean value 3.10.
- ERP system not much assists the management in day to day decision making process as this factor scored lowest mean among all the factors of system quality i.e. 3.52.
- ERP system does not provide up to date information as this scored lowest mean among all the factors of information quality i.e. 3.58.
- The present ERP system contains software bugs and data errors during processing of ERP system. Almost 60% respondent responded. As shown in table this factor scored mean value 2.84.
- ERP system does not solved maintenance problem associated with the old system. This factor scored mean value 2.77.

Conclusion of the study

Overall analyzing the responses it was found that the ERP system has helped the institutes' functions of different sector in improving their performance and yielding much better results. The research shows that the user satisfaction has increased due to implementation of ERP. The researcher had also analyzed the information and system quality and the analysis which shows that the end users are satisfied with the present ERP system, but require improvement in some areas. Even though ERP implementation has benefits for the education system but there are some problems which are faced by the institutes related to their present ERP system. The institutes are also facing some problems related to their ERP system like bugs and data errors, system is unable to check unauthorized user. According to this research the cost of the ERP system is major drawback and many end users responded that the ERP system does not solved the maintenance associated with old system. Thus the education institutes needs to rectify all the lacunas associated with their present ERP system to make it more effective.

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