A COST-EFFECTIVE ERP FORMULATION – A PROTOTYPE FOR SMALL ENTERPRISES

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ABSTRACT- Enormous increase in the scope of operation, unpredictable augment in the awareness levels of the customers, enlargement in the tech savvy nature of the customers irrespective of the literacy level and educational background; the endless speed with which the customers expect the companies to respond to their needs and demands; and many other such factors, have become the challenges for survival of many companies universally. A necessity arose for companies to look for a way out to eliminate the need for manual entries and rely on something that would consistently help in retrieving the accurate accounting statements and various cost details. In the light of the above, the present research paper demonstrates prototype ERP software developed with three modules relating to Sales, Purchases and Inventory Management. For the purpose of prototype, using MS Excel along with Visual basic coding the research paper explains how a cost-effective ERP can be generated. However the actual ERP software would be designed using MS SQL and .net. This module, serving as a basis to create similar other modules, can help in crafting ERP system in an organisation, especially, where the scale of operations is not very high.

Key words- MS Excel, Module, MS SQL, .net, ERP.

I. INTRODUCTION

The upsurge of competition in the business world at national as well as international level is undoubtedly sending jitters to the companies causing various entities in the sector to re-strategize their policies for survival. Gone are the days when few heads of different functions in the company would exercise control on every minute detail relating to the day to day functioning of the organisation. Enormous increase in the scope of operation, unpredictable augment in the awareness levels of the customers, enlargement in the tech savvynature of the customers irrespective of the literacy level and educational background; the endless speed with which the customers expect the companies to respond to their needs and demands; and many other such factors, have become the challenges for survival of many companies universally. A necessity arose for companies to look for a way out to eliminate the need for manual entries and rely on something that would consistently help in retrieving the accurate accounting statements and various cost details.Besides, the traditional techniques and methods the companies are following, are making them lose out on efficiency, time, goodwill, loyal customers, and finally, the chances of survival itself.

The Information Technology (IT) indisputably has come to the rescue of all types of organisations. But the individual turnkey software packages that are being reckoned to hitherto focus on a particular area of operations such as financial management, manufacturing, or inventory control and so on. Keeping the business data in disparate systems implythat the data cannot be tied together to gain insight into the entire business. Finding gainful entry and assuring solutions to all the above problems of the business, the ERP systems provide enterprise wide integration leading to faster and more efficient business processes, instant access to the latest information.

ERP system can help cash flow by enabling a faster cash to cash cycle through the use of capacity planning, more accurate scheduling, and increased visibility of material availability. Enterprise wide integration provided by ERP links all the internal functions leading to faster design to manufacturing times, faster sales order entries, besidesfinding fastest route through order fulfilment.

In the light of the above, the present research paper demonstrates prototype ERP software developed with three modules relating to Sales, Purchases and Inventory Management. For the purpose of prototype, using MS Excel along with Visual basic coding, the research paper explains how a cost-effective ERP can be created. However the actual ERP software would be designed using MS SQL and .net. This module, serving as a basis to create similar other modules that can help in crafting ERP system in an organisation especially where the scale of operations is not very high.

II. REVIEW OF LITERATURE

M. Lynne Markus and Cornelis Tanis[1] in their research on "The Enterprise System Experience—From Adoption to Success" stated that Enterprise systems are a breakthrough in the field of Information Technology because of the multidimensional benefits it provides to business. Enterprise systems implementation brings about a lot of changes not just in software, hardware, networks and databases but also in the fundamental way a business runs by achieving integration of business processes, system and information.

Shari Shang & Peter B Seddon[2] have categorized the benefits of ERP implementation in to 5 categories in

their research paper on "Assessing and managing the benefits of enterprise systems: the business manager's perspective". They are improvements in operational, managerial, strategic functions and changes in IT infrastructure and organizational effectiveness. They gave a framework to illustrate the benefits of ERP in the form of "Perceived Net Benefit Flow graphs [PNBFs]"

Another study on "A Comprehensive Framework for Classifying the Benefits of ERP Systems" by same authors Shari Shang & Peter B Seddon[3] emphasizes on the reduction in payroll processing time, resource management and decision making, IT costs reduction and increase in the IT capability and building a consistent vision across the organization as the benefits of implementing ERP.

Current business world is characterized by global competition which makes enterprises adopt to Enterprise Resource Planning [ERP] Systems. But ERP systems have their share of issues and challenges as well. The main challenge in ERP implementation, as mentioned by Olga Volkoff and Steve Sawyer[4] in their study on "ERP Implementation Teams, Consultants, and Information Sharing", is the inherent technological complexity of the software package itself and the necessity of huge changes in the business processes and structure. Also the role of the consultants is not to be discounted and the cost of this contributes to a major part of the cost of implementation of ERP.

ParijatUpadhyay, RanaBasu, RitanjanaAdhikary and Pranab K Dan[5]did a comparative study of the issues affecting ERPimplementation. They identified that the cost of implementing an ERP is about 2 to 6% of the sales and this visit cost is just the tip of the iceberg. This is one of the major reasons and challenges for Small enterprises to adopt ERP systems. SMEs have needs same as that of the large systems but the challenges they face cannot be compared to that of the large enterprises.

Jayantha RajapakseandPeter B. Seddon[6] published their findings as "Why ERP may not be Suitable for Organisations in Developing Countries in Asia" and explained in detail the factors that discourage ERP implementation in developing countries. They are high costs of implantation, viability, clash of best practices and integration with business practices, lack of knowledge and finally staff reduction which is the result of implementing and integrated, automated system.

Ashish Kr. Dixit and Om Prakash[7], identified some such major challenges faced by SMEs for implementing ERP. They opined that lack of required degree of awareness about the vendors, applications etc is one of the issues. Also SMEs tend to perceive that ERP is a magic wand but only for large enterprises. There were reports about failures of ERP making SMEs think that ERP is waste of money, efforts and time. Then there is the trade-off between the extent of customization of ERP and its performance. ERP consultants want the SMEs to mould their business to the standard practices of ERP, whereas Small Enterprises want to pull the rope the other way and customize the ERP package to suit their business needs.Of course the obvious problem of availability of capital is always there for small enterprises, preventing them into venture into the expensive ERP implementation projects.

After researching on "A STUDY OF ISSUES AFFECTING ERP IMPLEMENTATION IN SMEs" Ashish Kr. Dixit and Om Prakash see that there is a need for SMEs to think of alternate ways to cope with the dynamic markets.

Cloud computing is one such alternative adapted by small enterprises but it raises some serious privacy and confidentiality issues and can be disclosed for unauthorized purpose especially because the data is present in some remote server on the cloud, explains Mark D Ryan[8] in his Viewpoint on "Cloud Computing Privacy Concerns on our Doorstep".

III. SIGNIFICANCE OF THE STUDY

The key challenges of implementing an ERP system are

- High cost involved in executing ERP solutions in small organizations
- Rapid changes in business needs and scalability
- High capital investment
- Time taken to roll out an ERP system

Although more and more companies are implementing ERP systems to manage their businesses more effectively, yet many small companies, especially the start-up companies, are continuously looking for cost- effective ERP Solutions. In this context, in the current research paper we present a cost- effective prototype ERP software that was developed especially for small firms and start-up companies. This prototype ERP demonstrates the development of final product as a solution with the help of integration of three important functions such as inventory management, Sales Management and Purchase management.

IV. OBJECTIVES

- To understand the requirement of cost-effective ERP for small enterprises and the need for its rapid deployment
- To develop a cost-effective prototype ERP software for rapid deployment in small enterprises and start-up firms.
- To analyse various deployment options available and reduce the deployment duration.

V. METHODOLOGY

For the purpose of developing the current prototype ERP software, six most commonly used parameters pertaining to small firms such as Sales, Purchases,

Inventory, Personnel Production and Finance are chosen and applied as six modules. The complete cost-effective ERP is thus formulated and finalised based on thesesix modules.

The current research paper however focuses on three such modules for demonstration. They are Inventory management, Purchase Management and Sales management. These modules are described in the following discussion. The diagram representing the process flow between these modules also constitutes part of the discussion.

While describing the software architecture of the prototype, a brief explanation is also given as to why MS excel is taken as the platform for developing the prototype. The screen shorts of the three modules are depicted for bringing about clarity in understanding through demonstration. The interdependency of the three modules and the need for their integration follows the description. Finally, the functions of each of the three modules are listed out for highlighting the competitive advantage of the prototype.

5.1 ERP MODULES

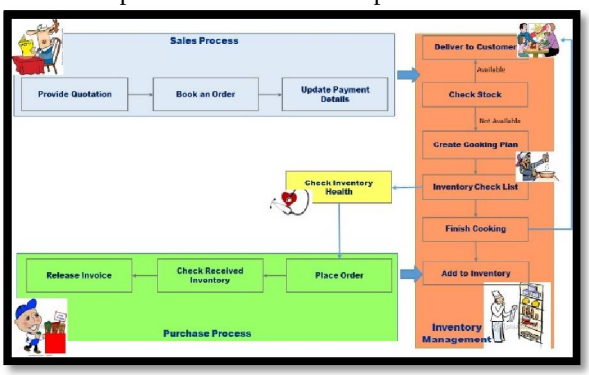
Underestimation of raw material requirement often results in misplaced orders, leaving the customer dissatisfied. On the other hand, maintaining excess inventory leads to wastage of raw material. In any case, the cost of inefficient inventory management is both excessive and unwarranted. If the management controls the trade-off between out of stock cost and overstocking cost efficiently, the capital saved can be diverted to improve other modules like production, marketing etc.

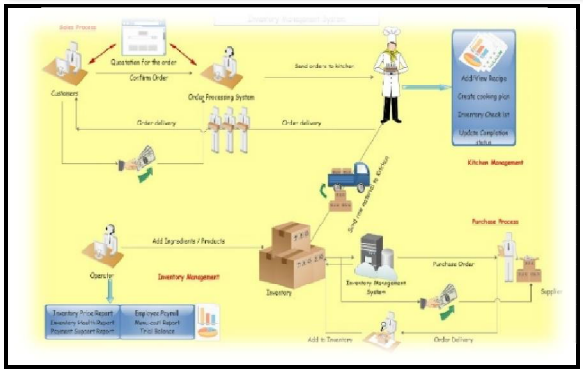
Moreover data flows from different modules make inventory handling complex and handling it manually puts Data Integrity at stake. An integrated system like ERP fed with standardized business rules eases the burden of inventory management. So the main aim of inventory management system is to tell the manager "When to order" and "How much to order".

The picture below gives a glimpse of a typical day in a production unit. The three main and largely interdependent operations are sales process, Purchase process and inventory management. When a new order comes in, the sales process provides a quotation and upon approval of which, books a new order. This will trigger the inventory management process where the order placed is checked against available inventory. If the customer order is for a readily available product, it is delivered to the customer.If the products ordered needs to be produced, the production process will be triggered and a cooking plan is created. The inventory is then updated (reduced) and the products are delivered to the customer.

Also the inventory is checked for the minimum levels and when the level falls below the minimum, purchase process is triggered and required raw material is ordered. When the products ordered are received, a verification of goods is done and invoice is released.

The entire process is shown in the picture below.





5.2SOFTWARE ARCHITECTURE

To help these small enterprises reap the benefits of ERP without exhausting their financial resources, a simple yet efficient tool can be developed using a well-known and easy to operate platform like Microsoft excel. The falling cost of hardware and burgeoning capacity of Information technology continues to help the lower level firms of the industry to take the path of integration. What remains is the knowhow constraints of software development. So this paper focuses on bringing down the complexity of software development to as low as possible. The prototype is developed using Microsoft Excel and Visual basic and the actual development can be done using .net and SQL.The various components of the software architecture and pointers to the development of same is explained in the following sections. The proposed architecture will have a 3-tier structure with Database layer as Tier I, Application layer as Tier II and Client layer as Tier III. For the prototype MS Excel has been used and for the proposed ERP solution, MS SQL is proposed as Database, .net can be used to develop prototype, the client layer can be developed using .net and html. Also, the ability to access management reports using mobile application can be incorporated in the ERP solution.

5.2.1 DEPLOYMENT OPTIONS

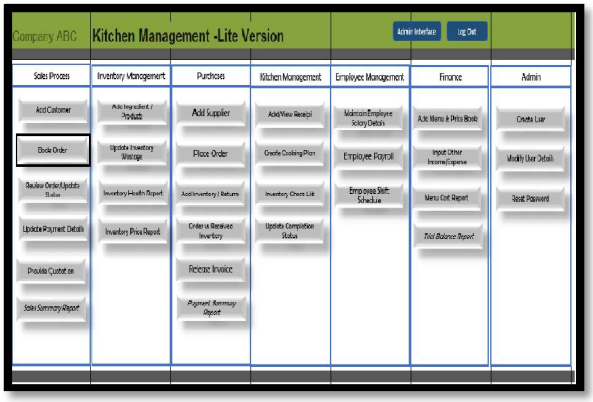
Today most of the ERP vendors talk about the following deployment options

1. On Premise: Here the client uses their own software and hardware. ERP is installed directly in the customer location or data centre

2. Public Cloud: Initial investment can be optimized in public cloud where the customer follows the standard procedures on deployment.
3. Private cloud: Business requirements are met and a dedicated private cloud is allotted to the client. Initial investment is optimized by using centrally maintained infrastructure.

5.3 PROTOTYPE DEMONSTRATION

A detail description of one of the functions of Inventory management can be given using the business case of placing a sales order for a finished good and reducing the inventory accordingly.
'Book Order' function of Sales Process is the first of a series of steps to be followed to complete an order to cash cycle.



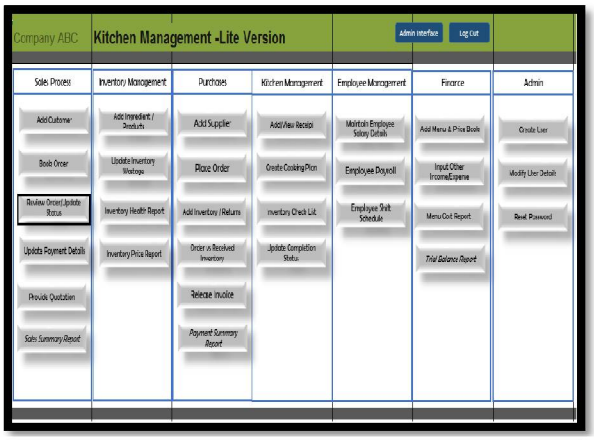
The required items can be selected and book the order.

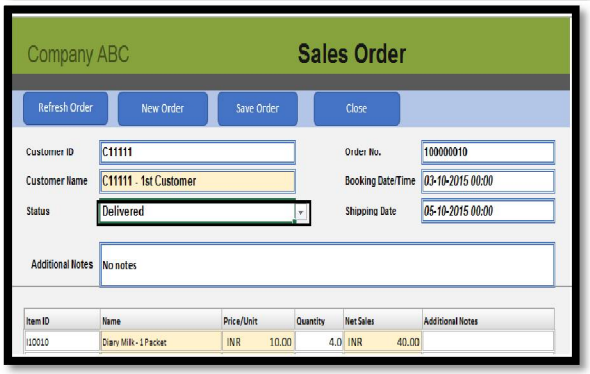


The inventory health report shows the quantity available of all the items.



When the order is catered and delivered to the customer, the status is changed in the Sales process to "Delivered".





This change in the order status will trigger a change in the inventory and reduces the available quantity for the particular item.



Several such functions along with their interdependencies can be coded and developed in MS EXCEL in very short time and with low cost.

VI. COMPETITIVE ADVANTAGE OF THE CURRENT PROTOTYPE

Numerous critical success factors have been identified by many researchers in ERP implementation. The list includes factors like top management support, data accuracy, training, need for a project champion, efficient project management and change management etc.

The current study however focuses on the 3 critical factors for small enterprises in ERP implementation.

- **Rapid Deployment**

ERP implementation is long process and Small enterprises cannot afford as much time especially in a dynamic market environment and high degree of threat from Porter's five forces viz. Suppliers, buyers, rivals, new entrants and substitutes. The efficiency of ERP implementation in small firms thus depend on how quickly the firm is able to respond to the changing business environment. Rapid deployment is hence a critical success factor.

- **Cost effectiveness**

Small enterprises do not have a huge capital available for such enterprise systems whereas the cost of ERP implementation is very high, with software package cost being just the tip of the iceberg. Moreover ERP implementation is not without failure, resulting in wastage of many resources.In such conditions it is important to have a business solution which can replicate the standard ERP system and yet stay within the budget of the enterprise.

- **Installation Simplicity**

Small enterprises also lack the technical expertise necessary for the ERP implementation and the cost of consultation is also high. A simplified version of ERP with the most critical processes would be a better option than investing in a full-fledged expensive ERP software package.

- **Operational Simplicity**

The cost does not end with the implementation of enterprise system but also includes the cost of training the employees especially for the small enterprises.

- **Expandability**

Any number of modules can be developed and added to the current ERP prototype depending upon the requirement of the business. Such expandability can be expensive and time taking for a traditional ERP system.

VII. SOCIAL RELEVANCE OF CURRENT ERP

With the rapid industrialisation and increasing need for efficient management of procedures and resources in the organisations, it has become very important to have a tool which can help coordinate several activities. The one Information Technology tool that best serves the above purpose is ERP. ERP gives the opportunity of integrating every procedure of business while improving the quality of several areas simultaneously. ERP also helps to increase production levels and to control costs more efficiently, leading to effectiveness in the overall control of the whole enterprise.

In the light of the significant role ERP is playing in the organisations of all types, the current ERP proves highly relevant to the society in general and the corporate sector in particular. While the software can be directly deployable by small and family type organisations dealing with the six modules, start-up firms can also replicate the model which has the flexibility needed for further addition of modules. The current ERP supersedes software of similar kind with its competitive advantage in the cost-effectiveness.

CONCLUSION

Discussing the importance of implementing ERP in any organisation the paper demonstrated a cost-effective prototype ERP solution that developed particularly for small firms and start-up companies.

Highlighting the main advantages and disadvantages of ERP from the point of view of different authorsreview of literature section of the paper brought to focus a comprehensive list of Critical Success Factors (CSFs).

In particular, the paper acknowledges that the implementation of ERP is associated with high risk and heavy cost and hence requires appropriate management. By developing a cost-effective ERP solution for small firms, the authors advise the start up organizations planning to implement ERP that they must learn how to identify the critical issues that affect the implementation process and know when in the process to address them effectively to ensure that the promised benefits are realized by avoiding the potential failures.

SCOPE FOR FURTHER RESEARCH

Future research can be done of analysing the gap between ERP theory and their actual practical use and implementation. The current research specifically can be extended to the following areas:

1. Developing similar software for mobile application.

1. Testing whether the cost-effectiveness of similarly developed ERP will remain with the increase in the number of modules, as applicable to big / multi-national companies.

2. For companies where each function supersedes the size of medium sized companies, testing whether similar ERP can be developed for individual function and yet, be integrated into a single common software retaining the cost-effectiveness and replicability.

3. While the scope of the current software is restricted to single-user mode, testing whether similar software can be developed for multi-user mode.

4. Testing whether the current software stands the test of cloud application and yet retain its competitive advantage.

ACKNOWLEDGEMENTS

The author submits this work at the Lotus Feet of Bhagawan Sri Sathya Sai Baba, whose unseen blessings and grace guided her in all the endeavours. The author expresses her deep sense of gratitude to

Sri Sathya Sai Institute of Higher Learning, her parent Institution, for encouraging her to take up the on-going project work pertaining to MBA course. The author acknowledges the excellent support extended by the research guide and co-author Prof.ChallaRadhaKumari, Department of Management and Commerce, SSSIHL AnantpurCampus,Prof.MadhuKapani, Director of the campus and the Dean of Humanities, SSSIHL.
Special thanks are due from the author, to Dr. Mrs Rita Gupta, Associate head, Department of Mathematics, SSSIHL Anantapur Campus, for her invaluable feedback on the draft paper. Finally Mr Kranthi Kumar who has taken sincere interest in enhancing my knowledge base in VLookUp programming needs exclusive expression of gratitude.

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