

# ANALYSING THE EFFECTIVENESS OF IMPLEMENTING ENTERPRISE RESOURCE PLANNING SYSTEMS IN THE PRINTING INDUSTRY

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## Abstract

*An Enterprise Resource Planning System (ERP System) has the potential to seamlessly integrate various processes and functions of an organisation, and generate a comprehensive picture of the entire company. The printing industry of Pakistan is currently at a state of decline. Traditional methods of doing business are too slow for the industry which is trying to compete against electronic publishing. Hence this industry can be an ideal target to become re-organised and re-structured through ERP. This paper addresses the challenges in ERP adoption faced by typical business units through the case study of 5 major large scale printing organizations in Pakistan and explores possible advantages that ERP systems can bring to this industry. There has been one previous attempt in Pakistan to restructure the largest printing press by introducing SAP, which failed due to lack of technical expertise and a well planned training support. In this paper we attempt to draw on the approaches deployed in ERP implementations in other sectors, which have been successful and examine the extent to which this can be adapted in the printing industry, which modules should be prioritised and what how effective would each module be.*

*Keywords: ERP, Enterprise Resource Planning, Printing Industry, Pakistan, MIS.*

## 1 INTRODUCTION

The objective of this research is to find out how effective ERP implementations would be for the Pakistani printing industry. An evaluation of the existing status of IT in Pakistani printing firms is conducted. A list of modules which should be implemented first is identified followed by analysing the benefits that could be derived from such an implementation. There are of course certain ethical issues that have been handled carefully and no data or information has been inserted in this research without prior consent from the personnel concerned. Throughout the paper, the words “ERP”, “Enterprise Resource Planning Systems” and “ERP Systems” are used interchangeably.

### 1.1 Enterprise Resource Planning Systems

The concept of ERP can be analysed from different perspectives. Firstly, ERP is like a product in the form of software. Secondly, it can be viewed as a means of mapping multiple processes and data of a company and generating a comprehensive integrative structure (Klaus et al, 2000). There are several ERP definitions, which carry a lot of similarity. Klaus et al (2000) define ERP as:

*A comprehensive package of software solutions which seek to integrate the complete range of business processes and functions in order to present a holistic view of the business from a single information and IT architecture*

Yen et al (2001) prefer to define ERP as:

*software that can be used to integrate information across all functions of an organisation to automate corporate business processes... a business management system that integrates all facets of the business.*

It can be noted that both these definitions have one thing in common... integration. This is what ERP does. It integrates all functions and processes of a business and generates a comprehensive view of the entire company. This is facilitated via a single database approach through which redundancy of data is eliminated, see figure 1.

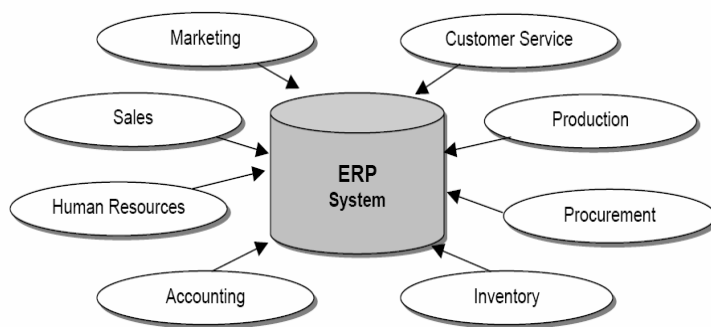


Figure 1. Departments and ERP Systems. (Hedman and Kalling, 2002)

## 1.2 Purpose of ERP

Enterprise Resource Planning is a method for effective planning and control of all resources needed to take, make, ship and account for customer orders in a manufacturing, distribution or service company (Sheikh, 2003). Large organisations typically have many different kinds of information systems that support different functions, organisation levels, and business processes (Pressman, 2003). However all these systems are usually built around different functions, and managers end up having a hard time assembling the data they need for a comprehensive overall picture of the organisational operations. For instance, sales personnel might not be able to tell at the time they place an order whether the items that were ordered were in stock; customers could not track their orders; and manufacturing could not communicate easily with finance to plan for new production.

Enterprise Resource Planning systems solve this problem by collecting data from various key business processes and storing the data in a single comprehensive data repository where they can be used by other parts of the business (Laudon and Laudon, 2003). Managers emerge with more precise and timely information for coordinating the daily operations of the business and a firm-wide view of business processes and information flows.

ERP solutions use technology to address business issues, at the same time striving to keep technology transparent for the users. Users do not need to learn more about bits and bytes but they need to know how operational and long-term business issues could be effectively addressed with technology, albeit using a user-friendly interface (Ushasri, 1999). Such systems can provide general managers with a firm-wide understanding of value creation and cost structure. ERP systems can help create a "customer driven" or "demand" organisation, which better serves the customer's value chain (Foss and Stone, 2003).

Enterprise systems purport to replace legacy systems based on out-dated information technology (Chaterji, 1999). The organisation's systems rarely include vendors and customers (Laudon and Laudon, 2003), see figure 2.

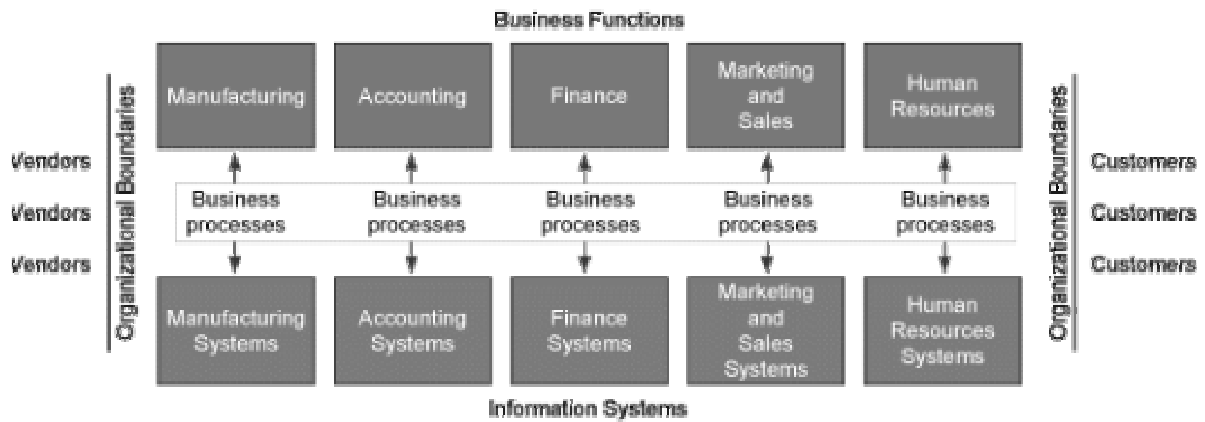


Figure 2. *Traditional view of systems (Hedman and Kalling, 2002)*

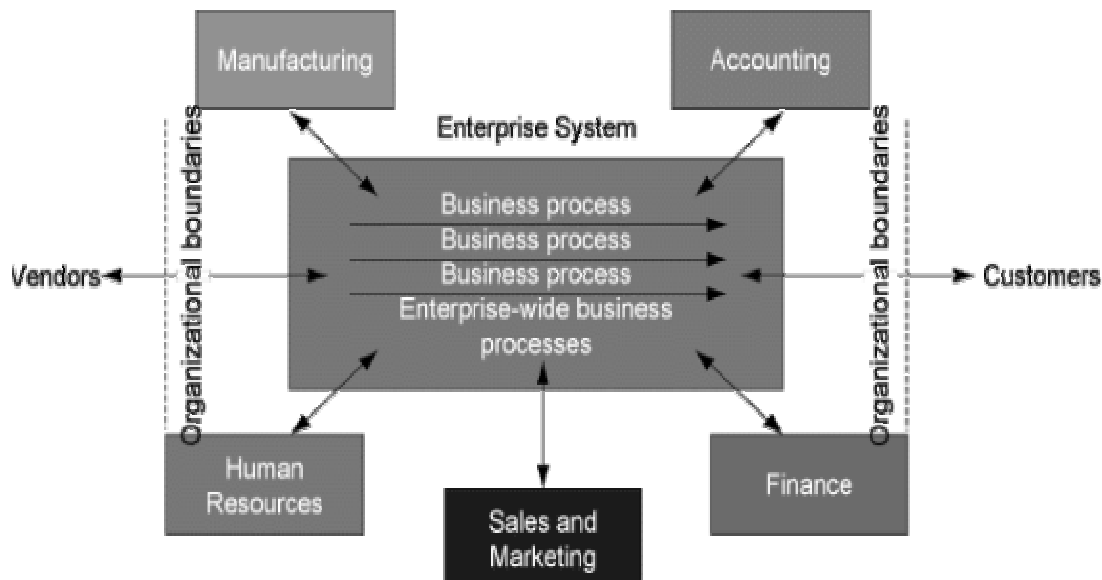


Figure 3. *Enterprise Resource Planning Systems (Ushasri, 1999)*

Enterprise systems can integrate the key business processes of an entire firm into a single software system that allows information to flow seamlessly throughout the organization (Burton, 1999). These systems may include transactions with customers and vendors, see figure 3.

The prospect of successfully and rapidly transforming the corporate nervous system, re-training thousands of workers, while also redesigning the fundamental business processes, all at once, while carrying on business as usual is daunting (Sadagopan, 1999). The costs of enterprise systems are large, upfront, highly visible, and politically charged, while their benefits are elusive to describe in concrete terms at the beginning of an enterprise project (Derek, 1998). The reason is that the benefits often accrue from employees using the system after it is completed and gaining the knowledge of business operations heretofore impossible to learn.

A software project lifecycle follows the following 5 steps (Pressman, 2003):

- Analysis

- Design
- Implementation
- Testing and Debugging
- Documenting

The typical life cycle of an ERP system development has more steps than a software project lifecycle. The reason being, an ERP is a complete flexible business solution while a software solution is more of a limited and stiff solution to a specific business need. The lifecycle of an ERP system is shown in figure 4.



Figure 4. ERP Project Lifecycle (Ensyncsolutions, 2005)

As can be seen from the figure above, implementing an ERP system is a 10 stage process which accounts for the time it takes to complete.

### 1.3 The Printing Industry

The enormous export potential of the paper and printing industry remains an untapped treasure in Pakistan (Bashar, 2002). Over the years, the industry has attained a height where it is serving and adequately meeting the entire paper and printing needs of the industry including the multinational companies. According to a survey, there are around 1500 printing presses of various sizes all over the country (The Economist, 2004 Vol. 3). It is however surprising that despite having a strong industrial and technical base, this industry has been neglected in the country and so far no database is available regarding the performance of the industry. Machinery in Pakistan is usually imported from foreign vendors such as Germany and Japan, Pakistan has not even a single research and development facility for the printing industry (Paggai, 2003 Vol. 4).

The decline of the industry does not imply that eventually there will be no print media. Printing can never be replaced completely. The type of printing or the technology behind it is the only thing that will evolve. Offset printing would probably be replaced by digital print in the next 10 years in the US but since Pakistan is backward in this respect, it would take at least 20 years for something like this to happen.

The Pakistani printing industry is at a stage of survival where small firms will not be able to compete against the giants because of their potential to invest large amounts and import expensive machinery (The Economist, 2003 Vol. 1). This in turn implies that there will be a significant reduction in the small scale printing firms as large scale firms would be able to print the same product more cheaply and quickly, using state of the art machinery, and delivering better quality. Keeping this in mind, Information Technology should be used as a tool to compete in the print market whether it is for innovation of new methods of printing or managing the day-to-day operations (Kipphan, 2001).

The industry has taken some really commendable measures in importing technology in the last 3 years. PAPGAI has been holding yearly exhibitions in Karachi, the industrial capital of Pakistan, where printing firms from all over the Pakistan, Japan and China display their technologies and new printing innovative techniques (Print2Pak, 2005, Vol. 3). This gives a chance for organisations to discover what is going on in the printing world.

#### 1.4 ERP for the Printing Industry

Since we cannot do much investment in the R&D sector, what we can do is use IT as a tool to strengthen the managerial aspects of large and medium scale printing firms. Streamlining manufacturing operations through ERP systems is one solution to the problem, although it requires a lot of effort and technical expertise. The implementation of an enterprise resource planning (ERP) system can provide a printing firm with a comprehensive internal architecture by lowering total costs in the complete supply chain and automating many of the basic processes of the company, from finance and accounts receivable operations to those on the shop floor (Leland, 2000).

Various printing giants have already jumped into the ERP era all around the world. ERP software like PECAS Vision II offers a low-risk option for anyone in search of a printing or packaging management information system (John, 2003). As small firms try to survive, their survival will be based on acquisitions and mergers. For them, future growth is not going to be too difficult, based on the continuation of business strategies which are still proving to be successful as long as they are in conjunction with the latest technology (Holohan, 2005).

Printing firms are in great need for centralisation and ERP is the ideal mode for it. "Our goal with XML – PrintBuyer, a specialised printing ERP software, is to leverage a corporation's existing investment in an e-procurement or ERP system and to streamline print workflow, cut costs, and, most importantly, centralize control and accountability of the print buying process-something that's sorely missing today," explains iPrint Enterprise Systems Group vice president Tom Haley (Newton, 2001). ERP systems would henceforth help the printing industry by not only centralising all data but also enabling MIS applications to run smoothly.

The current range of online intermediate print-related services include solutions to manage print ordering and service support, total service providers, auction sites and print procurement sites. Many of these systems and categories fall into the category of Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM) solutions or products (Speirs, 2005).

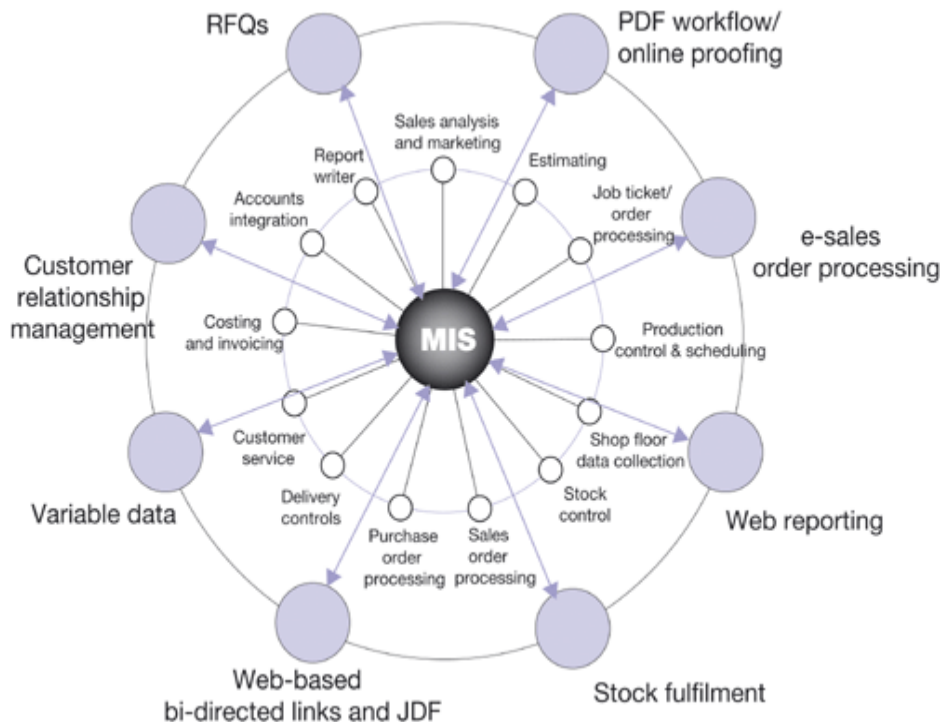


Figure 5. Range of established modules forming the main core of an MIS, plus a selection of add-on online e-commerce modules of ERP and CRM (Foss and Stone, 2003)

As mentioned before, the reason why the first EPR attempt failed in the Pakistan Printing industry was lack of training and skilled personnel to run the system. The rapid pace of technological change has had a major impact on the size of the workforce needed in the printing industry, as well as on the occupational mix and the type of skills required (Smallbone et.al, 2000). This factor should be considered when designing and deploying ERP systems.

## 2. RESEARCH APPROACH

This research has been based on an interpretive approach. The theoretical aspects of Enterprise Resource Planning were already known to a large extent prior to the commencement of the research. The idea thus was, to apply that theoretical knowledge on the printing industry of Pakistan and evaluate how effective it would be. The aim of this research is to assist the designers of an ERP system for the printing industry of Pakistan at Stage 1 - "Solution Inquiry". Therefore in order to do so, the inductive reasoning approach has been used since the aim was to find something new for the printing industry and try to discover the advantages ERP could bring about for the industry. The beauty of this is that ERP is something that can be easily replicated in any organisation within the same industry with a little bit of customisation. Hence every printing organisation in Pakistan need not be approached as the task in hand was to initially identify the basic printing processes.

The adopted strategy for this thesis was thus a qualitative one where every attempt has been made to discover what benefits are waiting for printing companies in Pakistan from ERP. Hence, this research strategy involved direct semi-structured interviews and the elicitation of primary qualitative data on ERP adoption and integration issues.

As has been mentioned, there is no existing work carried out in this area. Semi-structured telephonic interviews have been conducted along with a few visits to the targeted printing firms. The research questions are all linked to this statement as they include what benefits ERP can bring to the printing industry, and why is ERP needed.

The targeted population for research was basically the large and medium scaled printing companies in Pakistan. Due to ambiguities that can arise in some company registration formalities, whilst in actual fact there are about 23 large scale printing companies in Pakistan, officially, the number under this category of companies is actually recorded as 5.

Since, the population itself is small, no sampling has been done and the whole population has been taken as the target for this thesis. These five firms are:

- Packages Limited
- Yaqeen Art Press
- Saima Packages
- Rehman Packages
- Merit Packaging Ltd

Keeping this in mind, the objective of this research is to create awareness in these 5 organizations about ERP, as they seem to be interested, and then if ERP is successful in these organisations, the other 23 companies can then be targeted. Semi-structured interviews have been conducted with various department managers within the 5 large scaled organisations being targeted for this research. Before the interviews were conducted, some interviewees were given some material so that they could prepare themselves for the interview. The interviews were aimed to identify the following:

- Present status and dependency of IT within the organisation
- Extent and usage of IT as a strategic function of the business
- Adaptation of In-house development and outsourcing
- Budget allocation for IT enhancements and business solutions
- Acceptability of IT based solutions within the organisation
- Future plans for IT enhancements
- ERP familiarity and current research status
- Existing sub-systems and their interdependency
- Drawbacks of existing sub-systems and possible future threats
- Previous ERP implementation attempts and results
- System analysis of existing manual and semi-automated business processes

On the basis of the above, a second stream of interviews were carried out which were basically designed to get a feedback on the proposal of implementing an ERP system. For this purpose, ERP as a business tool, a strategic option and an operational mechanism was presented to these 5 organisations and their response was noted. A questionnaire was also distributed along with the interviews to the interviewees and their response was recorded. The basic idea behind this 2<sup>nd</sup> stream of interviews and the accompanying questionnaires were to identify the organisational response to the following:

- Increasing the budget to implement an ERP system for business ease whether it is done via local ERP vendors or through the purchase of customisable ERP solutions e.g. SAP, BAAN, Oracle etc.
- Using ERP as a strategic tool against competitors.
- Comprehending the advantages that ERP systems designed for printing companies in Pakistan could bring to the organisation in terms of operational benefits, long term financial benefits and effective resource management.
- Exploiting the grey areas (segments within the business which are currently not being utilised) and demonstrating the reasons why they have been unsuccessful for the organisation in the past and could be beneficial in the future through ERP implementations.
- Giving a picture to the organisation of a series of limitless possibilities for future enhancements after an ERP implementation is carried out (linking and devising plans of deploying Supply Chain Management and Customer Relationship Management Systems).
- Describing ERP implementation in various foreign Printing firms across the globe and what change and impact has been derived by them.
- Possible drawbacks and limitations associated to such an implementation and ways to handle them.

The response received from the concerned helped in justifying the initial hypothesis of this research, whether introducing ERP in the printing industry of Pakistan can be seen as productive and beneficial for the industry in the future and hence, should these 5 large scale firms that have been identified as potential ERP users, take the step of investing in ERP packages. In order to achieve a high level of credibility for the conclusions presented in this thesis, it is important to demonstrate that the research was designed and conducted in such a way that it accurately identifies and describes the phenomenon that was investigated (Ryan et al, 1992). In order to do this, emphasis has to be laid on the issues to describe the validity and reliability of this research and sources of errors.

### 3. RESULTS

#### 3.1 Questionnaire and Interviews – Stream 1

Since this research was primarily a qualitative research which took the assistance of a quantitative questionnaire in some cases for accuracy of data, the results obtained from the interviews and the questionnaire will be discussed together for better understanding.

The response of companies as a whole on the questionnaires sent to them has been recorded. The questionnaires, within an organisation, were targeted at General Managers, Finance Managers, HR Managers, Director, IT Managers, Distribution Heads, Procurement Managers, Operations Managers and Sales and Marketing Managers. The respondents were given the option to answer the questions related to his/her specific department. The primary focus in this phase was on the interviews, the questionnaire was used when needed. The questionnaire handed out was basically designed to understand the level of focus, satisfaction and other quantitative measures in an organisation.

The finance department is where the money comes from and goes to. The level of importance (rating) given by the General Managers of the five organisations for the finance department was 5 and would require more focus in implementation of an ERP package. After the interviews, it was discovered, that even though the finance department is a very highly rated department, its budget was very low and was usually understaffed. The finance managers were asked to identify the information sub-systems currently existing in the finance department of their respective organisations.

Sub-System Name	No. of Organizations
Transaction Processing System	2
Budget Allocation and Financial Planner	0
Payroll Management	3
Forecasting System	0
Consignment Costing System	1

*Table 1. Sub-systems existing in the finance department of organizations*

As can be seen from the result, the payroll system was the one currently used by every organisation. Hence, if ERP were to be implemented, it would be essential to see whether the existing payroll system has the capability to seamlessly communicate with the other modules within the same department, or whether there should be a re-development of the payroll system on the basis of a business process re-engineering. Apparently, two out of five organisations are using 3<sup>rd</sup> party software bought off the shelf which handles their payroll (could not handle complex problems), while one of them is using only the payroll module of Oracle Financial which does provide an excellent level of integration with various ERP systems. Eventually, the three organisations were asked to point out their level of satisfaction achieved from the existing payroll softwares and their response was noted.

Organization	Satisfaction Level
Limited	60 %
Rehman Packages	40 %
Saima Packages	35 %
Overall Satisfaction (average)	43.3 %

Table 2. *Level of Satisfaction from existing Payroll system*

It was noted that Packages Limited and Rehman Packages organisations had invested money to automate their transactions through offline transaction processing system by deploying the payroll module of Oracle Financials. However, they had not adopted the TPS module from the same suite. Both firms were asked to point out their level of satisfaction derived from this system and their response was noted. Packages Limited quoted a figure of 50% while Rehman Packages were 30% satisfied with their TPS (Overall Satisfaction Average = 40%). The satisfaction rate in this case is once again less than 50% for these two firms which shows that they are looking for another system to be installed.

A consignment costing system has been implemented at Merit Packaging Ltd since most of the raw materials they use are imported. The system keeps track of which raw material (paper, ink, card) would be arriving on which date and would record the costs associated in its delivery from the supplier to its premises (logistics, taxes, temporary storage etc). Merit Packaging Ltd has given an 80% satisfaction level on their existing Consignment Costing system which shows that the implementation has turned out to be a profitable move. The system however was designed as a desktop application. If the system was redeployed as a web based application, it would have been a more effective solution because users at the shipment receiving point would simply be able to add new purchase orders which would get updated right away.

Besides these systems, no other financial system has been deployed by any of the organisations in focus. It was discovered that financial budgeting and planning is the heart of every Pakistani printing firm plan for the following year. Nearly all the planning is done using spreadsheets. However, there is not specific system designed or deployed in any organisation which caters for financial planning and budgeting. Forecasting, on the other hand, is an area which only happened to be an issue of importance for Saima Packages. As for all other printing presses, it does not play a major role because of the attitude towards work that has been there in Pakistan for the past 50 years. This business attitude is a reflection of the “we’ll see when we are there” approach to work.

The Operations department in a printing press has a close link to Manufacturing Resource Planning and Material Requirement Planning. It basically involves the processes from the point where a job first arrives, to the point where the delivery is received by client. The level of importance (rating) given by the General Managers of the five organisations for the operations department was 5. Since ERP is basically derived from MRP (Manufacturing Resource Planning), the Operations Department would be a key target for the implementation of ERP. The operations department of the large scale printing firm in Pakistan was the only department where technology was visible. The entire process is primarily dependant on the level of quality control that the organization can provide on a particular job at a low cost. The general managers of the 5 companies in view were asked to point out which of the following systems currently exist in their business setups:

Sub-System Name	No. of Organisations
Inventory Management	2
Quality Control System	2
Sales Order Processing System	0
Purchase Order Processing System	0
Process Controlling System	0

Table 3. *Sub-systems existing in the finance department of organisations*

Only two organisations currently have an inventory management system. However when the managers of the other organisations were asked about this, their response was that an inventory management system would be the most crucial system that their organisation would invest in.

The existing systems lack a lot of things that ERP can bring in. One thing though, which the system did have, was a connectivity with the Quality Control System. When a new batch came in, a sample would be taken out and passed through a set of QC practices for that kind of paper. If the sample was approved, the batch was accepted.

The two organisations were thus asked to point out their level of satisfaction derived from the inventory management systems they have installed. Packages Limited quoted a figure of 40% while Saima Packages were not that satisfied with their Inventory Management System and quoted a 10% satisfaction rate. The Overall Satisfaction (average) is thus 25%. There is a lot of work that can be done in this area. Inventory Management is definitely a crucial element in Business Information systems.

All the firms have a quality assurance procedure, unfortunately only two firms have a quality assurance system. Quality control in printing comes at three stages (besides the quality checks that are performed during the printing life cycle): Raw material quality control at warehouse, printed material quality control in the operations department, binding quality control after finished product is sent for approval.

Packages Limited and Yaqeen Arts Press have deployed Quality control. The system performs quality checks at two stages. At the 1<sup>st</sup> stage, printing ink is tested by checking its density, water and oil combination, colour matching etc at different temperatures. The results are recorded in a similar way. At the 2<sup>nd</sup> stage the system takes in input from a densitometer which checks the density of ink on paper to ensure that the correct colour has been produced. Packages Limited claimed to be 55% satisfied with their QC Software while Yaqeen Arts quoted an 80% satisfaction rate. The Overall Satisfaction (average) was this 67.5%. Since the software only covers Stage 1 and does not cater for Stage 2 .

None of the organisations have an effective sales order processing or purchase order processing system. A more popular investment is the Process Controlling System which is the core of MRP II (Manufacturing Resource Planning II). It is a system which manages the daily operations in a manufacturing plant. In the printing industry of Pakistan, there are numerous independent systems that can be found in the operations department, each designed and serving a particular process within that department. But none of these systems are inter-related with each other and there is no controlling mechanism that is keeping track of these systems.

When asked regarding the level of satisfaction attained from these sub systems, the following responses were noted:

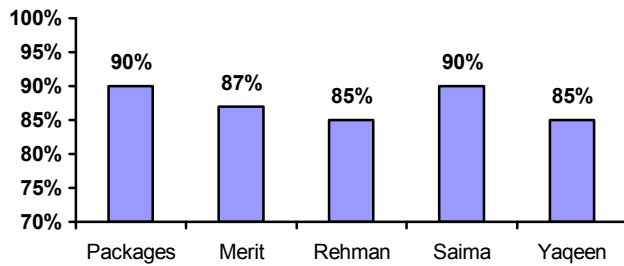


Figure 6. *Level of Satisfaction from Individual Process Control Subsystems*

After further research, it was found that this satisfaction level relates to individual subsystems. Another query response was thus requested to identify the organisation's satisfaction level over the whole operations department:

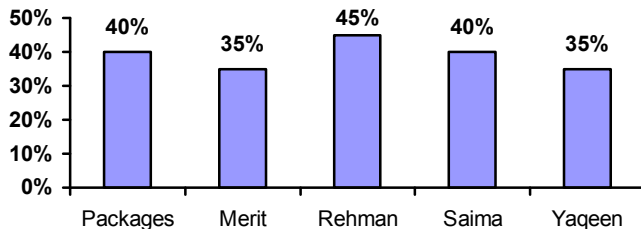


Figure 7. *Level of Satisfaction from Complete Operations Department*

As can be seen from Figure 4.2, none of the companies showed a high level of satisfaction derived from the performance of the whole operations department. One of the main reasons for a low satisfaction level is the lack of single system which manages these sub-systems and integrates them with each other. Secondly, all managers complained about the absence of a scheduling system where they can check which job could go on which machine and update the status of the availability of a machine. Finally, some managers mentioned that every time there is a problem with the job they are currently working on, and they need more paper, they need a view of the inventory at run time from where they can check the stock level.

Prepress activities are all those activities that are performed before the job enters the printing room. This includes composing, film making, negative to positive conversion, colour separation, machine scheduling, plate making etc. Prepress basically means converting a job into film and plates. It was extremely difficult to identify whether organisations were satisfied with their respective prepress department and its activities. Some organisations had a CTP technology (Computer to Plate) where data from the computer is printed on the plate without any films. The organisations were thus questioned on the effectiveness of the system and the satisfaction obtained from it.

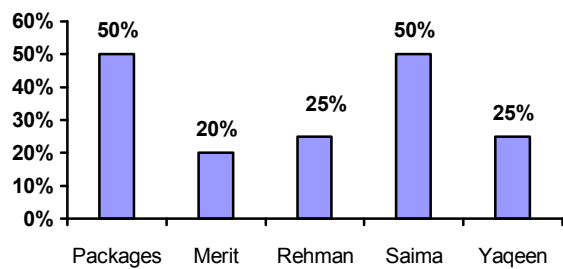


Figure 8. Level of Satisfaction from Prepress Systems

From Figure 4.3, it can be seen that all organisations are not entirely happy with their prepress activities. This may be because organizations are well aware of the new technologies out there and may be thinking in terms of innovation. The HR department is usually left in the dark about every printing press in Pakistan. It has the least number of employees (normally 3 – 4) reporting to the HR Manager. The following table shows the level of importance, based on relative concentration of the company as compared to other departments, given to the HR department by the General Managers of the five organisations. It also shows the satisfaction derived from their existing Employee Record Systems:

Organisation Name	Level of Importance	Satisfaction Level
Yaqeen Art Press	1	80 %
Packages Limited	2	30 %
Rehman Packages	1	20 %
Saima Packages	2	70 %
Merit Packaging Ltd	2	25 %
Overall Satisfaction		45 %

Table 4. Level of Importance & Satisfaction of the HR Department

Even though this department does not really have a high level of importance, all organisations have an employee record system. Every organisation has developed its own HR system. None of the systems have an employee image module, or an attendance module. Organisations that do have a payroll module do not share the same database as that of their Employee Records system.

HR as a strategic function of the business is not an area of focus in printing presses in Pakistan. The majority of the printing presses do not even have a separate HR department, as all hiring and firing is done by the manager of that particular department himself. Training is not supervised by the HR departments in any of these organisations.

There is absolutely no level of importance given to the Marketing department in the printing industry of Pakistan. For them, increasing their client list depends mainly on their quality and word-of-mouth advertising. There are no hoardings on the streets, no advertisements in any media whether paper or electronic and no advertising campaigns. What they do have is a sales force. In printing presses, a sales executive is termed as an Account Executive. Account Executives are assigned targets every month, for example 3 new clients to be introduced with their jobs this month. These targets are set by the Sales Manager. The logistics cost involved in getting a client is borne by the company and invoices of petrol are given to the sales manager who claims it for the employee from the Finance Department.

The managers and directors have no system installed which performs job scheduling, reporting, document managing or quotation handling. However, when these ideas were presented to the managers, their response was as follows:

Organisation	Level of Interest			
	Scheduling	Reporting	Document Management	Automated Quotations
Packages Limited	80 %	95 %	95 %	70 %
Merit Packaging Ltd	90 %	95 %	70 %	70 %
Rehman Packages	85 %	100 %	85 %	80 %
Saima Packages	100 %	100 %	90 %	90 %
Yaqeen Art Press	90 %	95 %	90 %	90 %
Overall Interest (avg.)	87 %	97 %	86 %	80 %

Table 5. *Level of Interest in Management Sub Systems*

As can be seen from their response, even though the management is not using any system to manage its daily office activities, they are all indeed in need of a such a system. The directors of these organisations were asked to comment on the current allocation of budget for the IT department to assist the business. The following information was recorded:

Organisation	Allocation of Budget (2005)			
	IT Budget as a Percentage of Total Budget	Existing Technology Enhancements	Maintenance of Existing Systems	New Technology and Research
Packages Limited	10 %	20 %	50 %	30 %
Merit Packaging Ltd	12 %	15 %	40 %	45 %
Rehman Packages	8 %	30 %	50 %	20 %
Saima Packages	15 %	20 %	40 %	40 %
Yaqeen Art Press	12 %	15 %	45 %	40 %
Overall Budget (avg.)	11.4 %	20 %	45 %	35 %

Table 6. *Allocation of Budget*

Table 4.6 describes the current allocation of budget for each organisation. As can be seen from the table, there is about 35% of the IT budget being set aside for research, which is quite a lot. The reason behind this is the recent need for technological changes to take place in the organisation. All organisations have realised their need to compete based on technological factors for business ease.

### 3.2 Analysis of Results

ERP is an expensive solution and with the existing budget for new development in these 5 organizations, a bottleneck situation was evident. This is because ERP requires a constant investment for about 10 years during the end of which things tend to settle down for the organisation and a maintenance cost is incurred from there onwards. The organisations in focus were asked whether they were willing to increase their existing budget of new research and development to implement ERP. Nearly all organisations had mixed views in this regard.

A lot of research on ERP was conducted after the interviews in order to plot down the printing industry of Pakistan on an ERP mapping. Firstly, an essential component of ERP is the Marketing and Sales tool, like Employee Reach, Sales Force Automation, etc. Apparently, this area has been found to be ignored in the printing industry.

An ERP system was presented to the organisations, tailored to match the business needs on the basis of the 1<sup>st</sup> phase of research conducted. The following diagram describes the scope of ERP used:

<p><b>Financials</b></p> <ul style="list-style-type: none"> <li>Accounts receivable and payable</li> <li>Asset accounting</li> <li>Cash management and forecasting</li> <li>Asset accounting</li> <li>Cash management and forecasting</li> <li>Cost-element and cost-center accounting</li> <li>Executive information system</li> <li>Financial consolidation</li> <li>General ledger</li> <li>Product-cost accounting</li> <li>Profitability analysis</li> <li>Profit-center accounting</li> <li>Standard and period-related costing</li> </ul>	<p><b>Operations and Logistics</b></p> <ul style="list-style-type: none"> <li>Inventory management</li> <li>Material requirements planning</li> <li>Materials management</li> <li>Plant maintenance</li> <li>Production planning</li> <li>Project management</li> <li>Purchasing</li> <li>Quality management</li> <li>Routing management</li> <li>Shipping</li> <li>Vendor evaluation</li> </ul>
<p><b>Human Resources</b></p> <ul style="list-style-type: none"> <li>Human-resources time accounting</li> <li>Payroll</li> <li>Personnel planning</li> <li>Travel expenses</li> </ul>	<p><b>Sales and Marketing</b></p> <ul style="list-style-type: none"> <li>Order management</li> <li>Pricing</li> <li>Sales management</li> <li>Sales planning</li> </ul>

Figure 9. *Scope of an ERP System (Davenport, 1998)*

On the basis of Figure 4.4 the following scope has been defined for ERP in Pakistan:

<p><b>Financials</b></p> <ul style="list-style-type: none"> <li>Accounts receivable and payable</li> <li>Asset accounting</li> <li>Cash management</li> <li>Executive information system</li> <li>General ledger</li> <li>Profitability analysis</li> <li>Profit-center accounting</li> </ul>	<p><b>Operations and Logistics</b></p> <ul style="list-style-type: none"> <li>Inventory management</li> <li>Material requirements planning</li> <li>Materials management</li> <li>Plant maintenance</li> <li>Production planning</li> <li>Project management</li> <li>Purchasing</li> <li>Quality management</li> <li>Shipping</li> <li>Vendor evaluation</li> </ul>
<p><b>Human Resources</b></p> <ul style="list-style-type: none"> <li>Human-resources time accounting</li> <li>Payroll</li> <li>Travel expenses</li> </ul>	<p><b>Sales and Marketing</b></p> <ul style="list-style-type: none"> <li>Order management</li> <li>Pricing</li> </ul>

Figure 10. *Modified Scope of an ERP System for the Printing Industry of Pakistan*

As can be seen from Figure 4.5, there are certain modules, which are missing from the actual system. These modules have been removed because they did not match up with the business practices of the printing industry of Pakistan.

The finance module is one of the two most important modules that can be deployed for this industry. If an implementation of ERP is undertaken for any of the printing firms discussed, the finance module should be the 1<sup>st</sup> one to be implemented. The *accounts receivable and accounts payable* will handle a

customer's payments. It will be like a Transaction Processing System, and will have a direct connectivity, if possible, to the systems deployed by suppliers.

The *Asset accounting module* will handle the fixed assets of the organisation. All machineries, their key characteristics, electronic documentations, purchase dates, cost, depreciation methods, life span etc would be entered in this module. The module will automatically calculate the depreciation at the end of the year according to the parameters set in it.

The *Cash management* and forecasting module will keep track of all incomes and expenses. It will basically be an automated version of the cash book. The forecasting module has been removed since all printing companies in Pakistan have a very small forecast period due to the increasing level and rate of competition. The Cost element and Cost centre accounting module has also been removed since all costs are accumulated and included as an expense in printing.

The *Executive Information System* would look after the whole Finance department. The system will manage all these other subsystems, and will be the place from where the administrator will create new users, provide administrative rights etc. The system will basically aid the Finance Manager who will be able to check what is going on in which area of the finance department. It will also provide a set of reports to the finance manager based on various views and criteria. The financial consolidation module has been removed since it is already incorporated inside the executive information system.

The *General Ledger* module will act as the main accounting record for the business and will use the existing manual double entry bookkeeping. All transactions that occur in the company, example purchase of raw materials, payment of expenses, etc, will be recorded in the general ledger which will automatically update a standardised Profit and Loss Account and the Balance Sheet. The product cost accounting module has been removed since the product in this case is a piece of printed paper being produced in bulk quantity.

The *Profitability analysis* module will be able to provide a good view of the amount of profit earned based on the investment per project. It can slice and dice the information in a variety of hierarchies, just like a rubrics cube. The main aim of Profitability analysis in ERP is external market segment reporting.

The Operations and Logistics section is the second most important area to be worked upon in the implementation of an ERP system for the printing industry of Pakistan. The *Inventory management* module will provide updates on the status of the inventory. The component basically deals with the following tasks:

- *Managing material stock on quantity basis*

All transactions that affect the stock level are entered live as well as the stock updates caused by this. The current view of the stock level can be checked at any time, and this includes paper that may have been ordered from a supplier and has not yet been received (link with purchase orders) or paper that is currently under quality inspection (link with the QC department).

- *Planning, entry and documenting all goods movements*

There may be internal or external movement of paper rolls and inks. For example, finished printed material may be transferred from the warehouse to the client (external) or from one warehouse to another (internal).

- *Performing physical inventory*

Various methods such as periodic inventory, continuous inventory, cycle counting etc can be incorporated for regular physical inventory checks. In the printing industry, inventory checks on paper may be performed at different levels of production for example an inventory check can be done at the quality control stage and get recorded into the system under the QC inspection heading.

The *Material Requirements Planning* module is like a computerised inventory control and production planning system. It will use the *Bill of Material (BOM)* as its basis. A BOM describes different components that together create a product. It includes all sub-assemblies, components, raw materials that go into a parent assembly, showing the quantity of each constituent required to make that

assembly. In the printing industry, this may be paper, binding cloth, binding glue, ink etc. Hence if a new paper is needed for a book, BOM would assist in raising an automated purchase order and a production order for that paper. BOM is directly linked to the inventory management system. The *Materials Management* module in the printing industry will probably be the most effective module for this industry since paper means the world to a printer, and a printer wastes most of it. The module will ensure that they have the right paper, in the right place, at the ideal quantity and price.

The *Plant Maintenance* module will ensure that the printing machines are working at optimum capacity and are being constantly monitored with regular maintenance checks. The *Production Planning* module will have a series of activities associated to it from scheduling to resource allocation, etc. The module will be operated by the operations manager who will be able to plan out which machine is to be used for which job. The *Project Management* module on the other hand will assist the operations manager to set up deadlines, allocate resources and update the status of a project. This module will have a web based view so that clients can check the current status of their jobs on line.

The *Purchasing* module will work in the following way. When a job quotation gets approved by the client, the specifications of the job are entered into the system. The system will automatically check to see whether the BOM has given any alerts for any shortages of paper or ink. If there is an alert, a purchase order will be generated and emailed to the supplier with the highest rating. A copy of the purchase order will be kept in the system as well.

The *Quality Management* module will be linked to the *Vendor Evaluation* module. The QC module will have a list of test cases to be performed on inks and paper once a batch is received. It would also have the sampling specifications needed for every type of paper and ink. Once the tests are performed, the system will decide on the basis of the results whether the batch should be approved or not. If the batch is approved, the vendor's rating is increased. The *Shipping* module will provide the user with an online interface from where he can keep track of the exact location of his delivery. The module will have complete planning of logistics built into it which would help the manager decide which vehicle and driver should be used to send the shipment to the client.

The HR system may be designed after the above systems have been implemented as it has a low priority. A *Human Resource Time Accounting* module can be implemented which will identify which employee has been working less hours. Every employee will be given a swipe card to use when signing in and signing out. The *Payroll* module will be connected to this module which will have an employee's complete information, previous trainings, salary, bonuses given etc. One thing to note here is the fact that in the printing industry of Pakistan, employees are not paid at an hourly rate instead it is always based on a monthly salary. The system will thus only tell whether he has been coming in or not, and whether he has been punctual so that bonuses can be allocated.

At this stage a *Personnel Planning* module will be quite irrelevant as well since there will be only 2 – 3 employees working in the HR department and they will not have enough time to maintain a personnel planning system. However, *Travel Expenses* module for the Sales force will be quite effective as it will allocate a budget to travelling which could be claimed by the account executive.

As already observed, there is absolutely no utilisation of a marketing department in the printing industry of Pakistan. The Sales department however may have an *Order management* system installed which can be linked to the client's ERP system if he has one. Clients could order online through a website which would facilitate the costing module and provide updates on the job status. A *Pricing* module can also be utilised in this way. The current market prices are placed into the system for paper, electricity units etc. This assists the Sales manager in setting up the parameters for the automated quotations. One more area which can be seen as a prospective advantage for the printing industry of Pakistan is the general management module. This would provide a bird's eye view for the managers and directors of the printing press on the performances of the Sales, Marketing, Finance and HR departments. A *Document Management* module may be installed at this point which handles contracts with distributors and suppliers etc.

### 3.3 Benefits to be derived

On the basis of these overall company pictures, the directors and shareholders can perform strategic business planning for competitive advantage in the industry. This will also enhance the company vision and it can think in terms of achieving economies of scale in technology and size. The following long term benefits can be obtained by implementing ERP in the printing industry of Pakistan:

- *External, not internal focus*

Printing companies will have the advantage of looking at clients, competitors, suppliers and even other industries and the business relationships and similarities with the outside world. Traditionally, their strategies have all been focused on internal processes and issues but once ERP is implemented, they can communicate with the systems of other organisations and learn from them

- *Adding Value, not cost reduction*

The printing industry of Pakistan is at a stage where everyone is competing against each other for cost. The majority of the medium scaled organisations are trying to go forth and increase in size, but are not able to because of the intensely low costs being offered by large scale organisations. What the large scale firms are losing is quality and value. Through ERP, better quality control can be established which can assist organisations in ensuring a quality standard.

- *Sharing the benefits*

Efficiency gains in the printing presses will be shareable in the organisation, with suppliers and customers. In the Pakistan printing industry, the attitude towards work in the past has prevented any system benefits being shared even within the organisation where departments have left each other in an unclear situation. This reduces benefits and would not allow them to be sustained but since ERP makes all transparent, benefits would then be enjoyed by everyone in the firm.

- *Understanding Clients*

An understanding of what clients can do with the printed material they have received, what value they can get from it, what problems they might encounter in gaining that value, etc can be interpreted through ERP. This would make clients feel more comfortable in dealing with the printing firm and in return, the press would end up with a high client retention rate.

- *Incremental Development*

ERP systems are not built overnight. However, this is a good sign since the company does not have to allocate the complete budget for entire ERP packages. ERP systems are implemented module by module. To an extent this is like developing applications by experimentation but also not stopping at milestones and considering what could be done next.

- *Business-driven innovation from technology-driven*

Probably the most important factor that will be achieved through ERP is that the company would realise its business potential after its technological potential is reached. The pressures of the marketplace will drive developments within printing presses at this stage. This would tend to cast doubt on the idea of competitive advantage from IT, but, in practice, it means that new or existing ERP will be providing or enabling a business opportunity or idea to be converted into reality. Hence, technology driven ideas will eventually give rise to business innovation.

- *Future enhancements*

ERP systems can be further expanded. Printing firms can build better Supply Chain Management Systems and Customer Relationship Management systems for business ease. This would obviously take a long time to evolve because people running Pakistani printing firms are time poor and like to see quick results and are extremely cost to benefit driven. The managers will need to understand that the benefits to be achieved will take some time but at the same hand, benefits would be guaranteed.

### 3.4 Questionnaire and Interviews – Stream 2

The primary focus in this phase was on the interviews, and the questionnaire was used only in a few areas. The organisations in focus were pre-informed about ERP and its advantages via various website references. Hence, the managers were well aware of the business aspects that ERP can cater for. The analysis of the results received from the 1<sup>st</sup> stream of interviews were given to the directors, the

advantages to be attained from ERP were pointed out and this stage was simply to check their level of acceptability. Some foreign printing companies who had implemented ERP in neighbouring countries like India and China were also discussed with the managers. Their websites were shown, business ease was identified and potential benefits were pointed out.

Out of the five organisations that were targeted for this research, three have agreed to increase their budget in order to opt for an ERP system. This was the 1<sup>st</sup> step taken after some time in this research that a certain level of acceptance of the idea was noted. The following table demonstrates this:

Organization	Allocation of Budget (2005)		
	IT Budget as a Percentage of Total Budget	New Technology and Research	Increase in the budget (2006)
Packages Limited	10 %	30 %	30 %
Merit Packaging Ltd	12 %	45 %	50 %
Rehman Packages	8 %	20 %	-
Saima Packages	15 %	40 %	-
Yaqeen Art Press	12 %	40 %	35 %
Overall Budget (avg.)	11.4 %	35 %	

Table 7 Allocation of Budget with ERP

After discussion with the managers of these firms, it was evident that the increase in budget was made by the firms that had finally seen the real picture they were facing. These are however estimated figures, a decision is still to be taken in the annual meeting of the board of directors and the organisations take no responsibility for a change in these figures.

The marketing and sales departments and the HR departments were discussed with the managers of the organisations. A success story was also discussed with each of the managers of a company named Pragati in India. The managers had their own view of the situation. According to them, Pakistan's quality standards are decreasing when it comes to printing. Advertising is a means of telling the customers that the company has some really good quality standards which the clients should take into consideration. But apparently, the minute a client sees an advertisement for a printing firm two things come into his mind: Quality can be sacrificed for low price, the idea is just to get printed material which is readable; since the company is advertising, its prices will be high. Hence this area could not be exploited in this research.

When the HR department and its low level of focus was discussed, it was found that the reason why HR is not given any importance is because HR is considered to be a support function of the business. Once again the mindset of the managers means that they believe they can handle the HR functions of an organisation, and where required, 2 – 3 employees in the HR department can do the rest.

#### 4. CONCLUSIONS

In order to be able to answer the research question in focus: *What is the effectiveness of introducing Enterprise Resource Planning systems in the printing industry as applicable to our case study sector namely the printing industry in Pakistan*, we have conducted an analysis of the Pakistan printing industry. The existing scope of IT has been identified, the potential advantages have been mapped based on the findings, and feedback has been received. This was done in order to determine whether ERP should be introduced in the printing industry in Pakistan or not and if so how it could best be deployed for maximum possible impact for all stakeholders.

The research showed that all the categories identified in the literature for ERP can be introduced in the printing industry. However, within each category, not all its modules can be adopted for this industry. This empirical study also showed that not all companies were eager to implement an ERP system in

their organisation, however the majority have decided that they will be deploying ERP based on the research conducted and the level of interest observed.

The research has also shown that the benefits of some areas of ERP are still to be fully understood by the stakeholders. This is primarily because of the dominance of the traditional methods of doing business and resistance to change. A deeply-rooted risk-averse disposition in some of the companies has been noted through the findings of this research in that some are apprehensive about first mover strategies so they are keen on implementing ERP only after it has been successful in other organisations within the same business sector.

ERP is equipped with a lot of advantages. Modules for the Finance, Operations and Administration should be the first to be implemented depending on the internal priorities of an organisation. ERP can then be expanded to other sectors of the business. It was also discovered that an online web based quotation system would attract lots of customers since no company in Pakistan is offering such a service which can be offered at very low implementation cost.

The recent trend in Pakistan has been a shift in the HR activities around the country. This gives an excellent opportunity for the printing firms to look into ERP solutions like Microsoft Great Plains. If a step such as this is taken now, it would definitely be a profitable move and the firm concerned will have the first mover advantage in this respect.

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