SIGNIFICANCE OF BPR & ERP IMPLEMENTATION IN HEALTHCARE INDUSTRY: AN EXPLORATORY RESEARCH

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ABSTRACT

This paper seeks to signify the implementation of Business process Reengineering (BPR) and then Enterprise Resource Planning (ERP) for the betterment of existing scenario of organizations’ under Healthcare Industry in India, as the market is still at the nascent stage. This paper also explores different critical success factors (CSR) factors in BPR and ERP implementation towards Healthcare Industry. This paper is based upon exploratory research i.e analysing the historical cases dealt with national and International hospitals and Pharmaceuticals, where the BPR and ERP played their significant role in enhancing their overall efficiency. This paper analyses the significance of BPR in increasing the effective use of pre-operating area and equipment, reduces waiting time of patients at Emergency Department and service Work stations and provides better value for purchases. By implementing ERP along with BPR the organization improves the performance of existing business processes, reduces receivable days, credit returns and also improves the back-end efficiency. This paper is only restricted to healthcare Industry and its findings are based on the cases analysed. Therefore it is left to the researches to what extent they use them. This paper has not considered the financial aspects involved in implementing BPR and ERP. The analysis may help only for those similar organizations those are under study. This paper provides different ways to reduce patient waiting times, credit returns, improve back-end efficiency. This paper also reveals different top ERP solution providers and their clients who got benefited in Indian Context.

Key words: Healthcare, exploratory research, case study, business process re-engineering, enterprise resource planning.
I. INTRODUCTION

The potential Healthcare industry is treated as one of the world's largest sectors of service with total revenues of approximately USD 2.8 Trillions. In India as well, the healthcare industry is a major one in service sector with USD 40 Billion revenues by constituting 5% of GDP and is offering employment to around 4 million people. As per the World health Organization (WHO) 2010 report, private sector is spending more in healthcare than public sector. One way this indicates that healthcare is growing enormously. The major driving factors for the growth of healthcare industry are demographic and Economic factors. These have bought dramatic improvements in the processes performed by the companies in Healthcare industry. Studies emphasise that there are several organizations those got benefited by reengineering their business processes at National and International level such as Indraprastha Apollo Hospital, GCR hospital, Singapore hospital in surgical work, Geneva pharmaceuticals and so on.

Apart, it was found that Information Technology (IT) is used as a tool in better performing Business Process Reengineering. Hammer and Champy (1993) say that IT is an integral part of reengineering as an enabler since it permits companies to reengineer business process. Davenport and short (1990) say that IT and BPR have a recursive relationship. Examples such as Amazon, Wal-mart, General Electric, Ford motor corporations’ have proved the significance of IT in BPR. Further, Enterprise Resource Planning (ERP) is the latest solution the IT has provided for improving the efficiency of business processes. The ERP implementation has several tangible and intangible benefits reported by Delloite consulting. Therefore, ERP systems software has spread its wings across all industries. This paper analysed certain examples of healthcare industry those got benefited using ERP such as Geneva pharmaceuticals, Siriraj university hospital, Wockhardt, Piedmont healthcare management group, and Pharma Co. But there are certain points come to the mind, when it comes to the ERP implementation. The major disadvantage is its value investment. It was found from the studies that nearly 83.33% of companies from Indonesia (Dantes and Hasibaun, 2011), 50%-75% of US firms (Hawari and Heeks, 2010), ~ 90% china firms failed in ERP Implementations, majorly include FoxMeyer Drugs, Applied Materials, Hershey, Mobil Europe, and Dow Chemicals. Here, there are two aspects to be analyzed. Firstly, whether the implementation of BPR or ERP comes first and secondly, which are the critical success factors (CSFs) to be considered in their process of successful implementation. These aspects are in detail discussed in the forecoming sessions. The objectives of the study are

i. to examine the effects of chosen firms undergone BPR and ERP implementations in healthcare Industry

ii. to explore the critical success factors underlining for BPR and ERP successful implementations in Healthcare industry.

This paper is mainly limited to the study of Hospitals and Pharmaceutical sectors of Healthcare Industry. This paper helps these sectors to understand the usage of BPR and ERP Implementations and vendors, for their prospect. The second session discuss literature review, third discuss Research Methodology, and in the fourth and fifth, case studies, CSFs, findings and conclusion are discussed. Let us move to the next session i.e. Literature review.
II. LITERATURE REVIEW

i. Healthcare Industry

1. Global Scenario: As per the Global Industry classification standard and the Industry Classification benchmark, the healthcare industry got broadly classified in to two main groups. First, health care equipment and services comprise companies and entities that provide medical equipment, medical supplies, and health care services, such as hospitals, home health care providers, and nursing homes. The second industry group comprises sectors companies that produce biotechnology, pharmaceuticals, and related life sciences. The global healthcare providers Industry grew by 5.4 % in 2011 to reach a value of USD 6333.1bn and are expected to reach a value of USD 8381.9 bn by 2016. Outpatient care is the largest segment of global health care industry accounted for nearly 38.7% of the industries total value. The Americans accounts for 50.3% of the global healthcare provider sector. Studies reveal that G8 countries contributed an amount of USD 4,591.1 bn, BRIC nations contributed USD 633.7 bn, NAFTA contributed about USD 2,941.5bn for the Healthcare Industry where US, China and Canada are the major contributors.

In the latest survey, PWC global healthcare (Q1, 2012 analysis) has found that the china has stood in rank 2nd for the first time in global M&A of worth USD 3,709 bn, next to USA. From the studies, the key driving factors for the growth of global health care identified are one company Philosophy, Competitive Advantage, Workforce mobility, Shared best practices and Global leverage. In this way the global healthcare is growing in a faster pace. Let us look in to the healthcare scenario in India.

a. Indian Scenario

The Indian Healthcare sector currently represents a USD 65 Billion industry as of 30th May,2012 and is expected to be USD 280bn by 2020(IBRF, Nov.2011-Healthcare Report). The healthcare industry in India is divided in to five sectors as shown in chart no.1. The Industry led by Hospital segment with 71% occupancy followed by other sectors as expected. A break-up of the sectors as is provided in Chart.No.1

The Indian Healthcare Industry reminds majorly two factors namely Demographic and Economic. The demographic factors include Increase in population, Shift in demographics, Raise in Disposable income, Increase in incidence of Lifestyle related diseases, raising literacy and the economic factors include are Tax benefits, Medical tourism, and Insurance coverage. (Source: KPMG, 2010 Healthcare Report).
In providing healthcare services, the private sector and public sector are taking a lot of initiatives such as introducing day care centres by Nova and developing Public – Private Partnerships i.e. PPP models respectively. There is lack in number of Medical colleges, hospitals, doctors (6 for 10,000 people), nurses, dentists, patient beds and others related to the health care Industry. Government schemes such as Rashtriya Swasthya Bima Yojna, Nirmaya Health Insurance Schemes and allowance of 100% FDI in health related services encourage Industry to grow a lot.

II. Business Process Re-engineering (BPR) - An Overview

BPR originated in the 1950s as large enterprises began to explore the potential impact of computers on the efficiency and effectiveness of their business processes. In the early 1990s, BPR had an explosive dissemination, especially after the publication of the book by Hammer and Champy (1993) entitled “Reengineering the Corporation: A Manifesto for Business Revolution”. Hammer and Champy (1993, p. 32) had defined BPR as “the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed”. They sold more than 1.7 mn copies and got translated in to 19 languages.

Whitman and Gibson (1997) developed a study for discovering why enterprises use BPR. The reasons identified are to improve inefficient business processes, to be industrial leader, to reorganize business functions, and to improve current industry position. It was observed from the studies that 75-80% of the companies namely IBM, Texas, Johnson & Johnson, Ford, Shell oil, American express, Wall-Mart, Tacobell, Hawlett Packard like so many had started reengineering and achieved tremendous success (Muthu, chera.ghi. And Whitman, 1999; Sunil Thanwani, 2000). Forrester Inc. has shown 60 – 70 % of BPR efforts have either failed or did not achieve the expected benefits. Accordingly, to implement BPR successfully, critical success factors should be identified and analyzed (Maleki and

![Chart No. 1 – Market Breakup by Revenues](source: IBRF, Health care – November 2011 Report.)
Bhekhakhain, 2011). Caccia-Bava (2005) argued that hospital’s BPR implementations were more successful than before. The other studies revealed 29 best practices in relation with healthcare Industry by analyzing 10 case studies, in which the previous best practices are included (Netjes, Mans, Reijers, Aalst, vanwersch, 2010). The most popular best practices are task elimination, task composition, Integral technology, Empower, order assignment, Resequencing, Specialist-generalist, Integration, parallelism, Numerical Involvement.

In case of Singapore Hospital, increase in average daily operations from 162 to 168 and reduction in utilization of preoperational area from 90% to 62% (Kumar and Ozdamar, 2004). In case of Tan Tock Seng Hospital, the 2nd largest in singapore the BPR had totally eliminated the waiting time of patients in Accident & Emergency Department that used to be 27minutes and reduction in overall waiting time of a patient in the hospital from 133.93 min to 123.33 min. using SIMUL 8, a simulation tool in the process.

![Chart No. 2: Market Share of ERP Vendors in Service Sector](chart2.png)

iii. Enterprise Resource Planning (ERP) – An Overview

ERP is defined as a process of integrating all functional information on a single computer system. Tsai, Lin, Chen, and Hung (2007) indicated that implementing ERP systems can bring benefits for companies (Daniel O,leary,2004). Many companies have problems in ERP implementation including Dell computers, Hershi Foods, Apple computers, Whirlpool (Shahin, Sadri, and Gazor, 2010). Baki (2005) argued that companies should select the ERP solution that best matches organizational information needs.
Recently in 2012 ERP Report of panorama consulting, it is clearly given that Big-Bang implementation approach was used by 34% of companies, ~46% of companies used phase rollout and the rest 20% used Hybrid layout. In order to implement, there is a requirement of ERP vendors (e.g. SAP AG, Oracle, Microsoft, Infor, SAGE etc., from chart no.2) and Implementation partners (like IBM, Accenture), those took an average of 16 months. It is also revealed from the study that overall 81% of the ERP implementers are satisfied with their ERP selection. (Source: 2012 ERP Report of PC). In the case of children’s hospital of central California got benefited by implementing Lawson’s ERP and other technical resources with the support of VMware technology (VMware Inc., 2010). The KBHS in Linz, Austria’s 3rd largest hospital implemented SAP R/3, SAP PMS, SAP Netweaver, i.s.h.med tools and achieved better outpatient maintenance, integration among other six hospitals in the group and provides better documentation of medical notes (Hrönn Kold Sigurðardóttir, 2008).

As well, Indraprastha Apollo hospital has automated the stock procurement and tracking system by incorporating Microsoft SharePoint server 2010, which was purely earlier in manual system. Let us see how BPR and ERP correlate.

iv. BPR and ERP in Together – An outlook

According to Kraemmergaard and Moller (2000), ERP systems pave the way for BPR since the implementation of ERP systems requires examination of many business processes. The BPR and ERP are treated as an Inseperable twins (Sunil Tanwai, 2000). A survey made to 220 European companies implementing SAP showed that simultaneous implementation of BPR and SAP has proved to be the most effective and powerful method for business improvement (Chemical Marketing Reporter 1996). Wei et al. (2005) demonstrated that a successful ERP project involves business process change management, ERP software system and cooperative vendor’s selection, system implementation, and investigation of system practicality. Subramoniam, Tounsi, and Krishnankutty (2009) examined the role of BPR in implementing ERP systems.

In case of Piedmont healthcare management group, a problem with existing QuickBooks was totally reengineered by using Sage solutions namely Sage MAS 500 ERP, Sage Time sheet, Sage payroll, and sage Abra. Finally, Sage reduced 20% of staff ‘s workload and reduced 35% of vendors cost (sage software inc., 2007). The other case, Narayana Hrudayalaya, a Bangalore based hospital treated as a Wal-Mart with Mother Teresa heart, planning for implementing Oracle ERP and SRIT’s HIS( Hospital information system) for improving back-end efficiency.

III. RESEARCH METHODOLOGY

In this paper the methodology applied is exploratory research method i.e case study. Researchers can use case study methodology for many purposes such as to explore new areas and issues, to describe a process or the effects of an event, especially when such events influence many different parties and to explain a complex phenomenon (Kohn, 1997). This paper describes the effects of BPR and ERP Implementations on the chosen firms under study. Four organizations were chosen for study, out of
which two are International and the other two are national. In each of the two, one is a hospital and the other is a pharmaceutical. Let us move to results section.

IV. RESULTS

A. Case Analysis : International cases

i. Case 1: Geneva pharmaceuticals

About Company: Geneva pharmaceutical, a generic drug company is a North American subsidiary of Novartis International AG was founded by Detroit pharmacist, Stanley Tutag in 1946. Presently, it is located at Broomfield in Colorado. It has two processes namely manufacturing and distribution. It has 200 products, 250 customers (i.e distributors, drugstores) where distributors account for 70% of sales and 20% by Drugstores. Geneva decided not to sell their products through direct marketing or mail order or Internet based retail. Geneva uses High Volume sales strategy, Incentive system (Rebates, Chargebacks).

The problems with the existing system (discussed infront) overcome by the organization by deciding to re-engineer the Supply side processes, Demand side processes and to integrate the both. As it had two divisions, the branded drug division was provided with BPCS for data processing environment whereas generics division was provided with R/3 SAP implementation. It was decided that the R/3 SAP implementation undergo Phased Rollout with module in 3 phases. The phases are shown as follows

<table>
<thead>
<tr>
<th>3 Phases</th>
<th>Processes</th>
<th>Modules Installed</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>Supply side</td>
<td>MM,PP,FICO_AP</td>
<td>6 months</td>
</tr>
<tr>
<td>Phase II</td>
<td>Demand side</td>
<td>SD,MM,FICO_AR</td>
<td>6 months</td>
</tr>
<tr>
<td>Phase III</td>
<td>Integration of Both</td>
<td>APO,BIW,MES</td>
<td>6 months</td>
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Table No.1: Phased Rollout with modules in three phases

Problem: The existing Macpac was unable to perform simulation, create planned orders and to support distribution resource planning.

Solution: R/3 SAP - Standard processes are transferred, no redesign or enhancement. Implementation was done with a team of 36 members using ASAP methodology. After 4 months, a review showed the implementation was spinning out of control due lack of coordination between personnel and limited implementation experience with consultants, leads to lack of Leadership of chosen team director. A new leader was deployed and it went well.
**Result:** Eliminated the need for Data rekeying and validating.

**Flaw:** Unable to customize all business users’ requirements.

   Eg: Inability to carry two due dates.

   Phase II – October -1998 – Demand side Implementation

**Problem:** The existing Macpac or FYI planner were unable to adjust Rebate structures for the same customer, unable to forecast customer patterns i.e on customer – to – customer basis. ( By FYI planner), unable to provide customer accounts data to sales personnel results no preparation for a sales transaction and Customer sales and service are managed in Batch mode i.e difficult to accomplish. (by Macpac).

**Solution:** Redesigning of Sales and Distribution processes. It rolled in 3 stages – Conceptual Design, Conference room pilot, and Change management, where mainly four areas are targeted for redesigning namely product destruction, customer dispute resolution, pricing strategy and service level. Fish bone approach helped in process analysis and simulation was used in redesigning demand side process that went live on February 1st 2000.

**Result:** With 99.5% of customer service level by 2000 year end, improved schedule making and Demand forecasting.

Phase III – Integrating supply and Demand processes i.e Integrating Manufacturing resources planning (MRPII) & Sales and operations planning SOP

**Problem:** Existing sales and operations planning was manual, time consuming, constrained by errors in data re-entry and validation across sales, production and financial system and lack of data analysis capability.

**Solution:** Introduction of R/3 SAP overcomes the problem. SOP as it’s there in R/3 system. But it was unable to provide data analysis support.

Later, in 1999 when SAP released a module named APO-Advanced Purchase optimizer, helped for better data analysis. The ATP (Available to promise) provides customer with reasonable complete dates or partial fill dates.

**Result:** Better data analysis and integration.

In Future, the organization is planning for HR and quality control.

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**Case 2:** Siriraj Hospital established in 1888, a Non- Profit health care provider for Thailand poor and middle classes located in Bangkok. It was supported by Thai government and Royal families.
The hospital posse 2,636 beds, serves 16, 00,000 out patients, 80,000 in patient annually. The government launched a 30 baht(less than a dollar) program for the poor.

**Problem:** Finance and accounting functions became a strain, as the thai government changed the accounting standards from cash to accrual accounting system and even stagnated and decreased the grants. Manually, the organizational personnel felt strainful and moreover the costs were also increasing and even the doctors had problems in capturing key patient’s data.

**Pilot project** – The organization initiated SAP in their back office for their 30baht clinic, was interfaced with the front office standalone system i.e Medtrack. In 2003, siriraj gone for tenders for improving its financial, HR, purchasing, Inventory, accounting and Budgeting systems.

**Challenges** – Making departmental manual systems automated and online and to comply the system with govt. regulations and to connect legacy systems and standardize the formal processes.

**Solution** – On sept’2003, Accenture won the bid, implemented SAP R/3 4.7 on Microsoft platform that had provided a three-dimensional financial statement (Umesh Kulkarni, 2012) ensuring a smooth transition from cash to accrual accounting system. In support of simulation, finally the system went on live on April 2005 and took further nine more months in completion.

**Result:** Positive – Able to plan effectively due to the support of three-dimensional accounting system and were happy to have the accurate information at the Inventory department and at the ward level. More promisingly, the financial system in 30 baht program and other clinics runs very smoothly.

**B. Case Analysis : National Cases**

i. **Case 1:** Wockhardt limited, a leading player in healthcare industry, provides all types of services including manufacturing and marketing formulations, biopharmaceuticals, Nutrition products, vaccines, active pharmaceutical ingredients (API). It has manufacturing plants in India, USA, UK, Ireland and France. It’s 65% of revenues are generated from USA and Europe.

**Problem:** The existing ERP, Avalon provided certain problems such as unable to draw future road map, upgrade its technology, consolidation of data, duplication and reconciliation, lack of structured information and integration across all business functions, faster information availability and control of operations.

**Solution:** SAP AG was chosen by leaving Oracle as it suits more and ASAP methodology was deployed. IBM India was the implementation partner and it took 8 months to complete from May
2005. The modules implemented are MM, PM, PP, SD, QM, FICO, CS, HR and PLM in India, USA, UK, Ireland and Switzerland.

**Results:** Eliminated data redundancy resulted saving time, staff updating, real-time data management, organization data integration, stock visibility, business consolidation, reduction in receivable days (~130 to 100), reduced credit terms and able to integrate with heterogeneous systems like Electronic data Interchange (EDI) and Blackberry server. Through EDI, customer orders can be integrated while Blackberry helps in extracting the orders. SAP NetWeaver enables simple, secure and personalized access to information for employees and business partners.

**Future plans:**
To incorporate SAP CRM, SAP SCM, SAP APO, payroll module, SAP Net Weaver Exchange (SAP XI), and SAP NetWeaver component for Integration.

**Case 2:** Torrent Pharmaceuticals Ltd., is a part of Rs. 3125 crore (USD 714 M) strong Torrent Group having interests in power and pharmaceutical sectors. The Rs. 566 crore company employs over 500 scientists and has filed 210 patents for NCEs in all major markets worldwide.

**Problem:** Wait till month end of sales proceedings and no information on instant stock availability.

“the distribution guy had to call up our 'warriors' in the field for information, the accounting guy had to spend 80 percent of his valuable time in collecting data at the end of every month and had only 20 percent of his time left for MIS….”

by IT Head, Mr. Jyoti Bandopadhyay

**Solution:** Implemented SAP ERP 4.7 with IBM as Implementation partner, named as PROJECT TRIGGER by Torrentians. The Implementation duration was 8 months i.e from November 2003 – June 2004. They believe it brings out leadership quality in every individual task.

**Result:** No duplications and reconciliations for internally generated information, improved customer servicing, cycle time for all business transactions, employee productivity, employee morale and working capital management. But the organization was not that much satisfied with SAP and IBM, they developed their own team and done several modifications those better fit in to their organization.

C. **Critical success factors Identification**

i. **Critical Success Factors(CSFs) for BPR Implementation**
Accordingly, to implement BPR successfully, critical success factors (CSFs) should be identified and analyzed. In terms of BRP, CSFs are areas which organization must accomplish to achieve a successful implementation. From the studies of Maleki and Beikkhakhian (2011), they tried to identify the CSFs for BPR Implementations at Iranian SMEs. They considered six factors under study out of which only four are treated as drivers for successful BPR Implementation. They are namely “top management support”, “IT Infrastructure”, “Training”, and “Adequate financial resources”. The rest of them those were not considered are culture and less bureaucratic structure. The other study conducted by jamali et al.(2011) considered seven factors as similar to the previous study including one factor as extra i.e. collaborative work Environment. This study also revealed the above stated four factors as the most critical factors for successful BPR implementation.

ii. Critical Success Factors(CSFs) for ERP Implementation

From the literature of Wong and Tein (2002), they found that, there are twenty three most important CSFs to be considered while implementing ERP, as these are derived from the past failures and success stories of ERP implementations and nearly seventeen case studies. Similar studies had done by Plant and Willcocks (2007), identified 22 CSFs and analyzed to identify the most important CSFs. The factors like Top Management commitment, Clear goals and Objectives, Project Champion are equally treated as extremely important in pre and post Implementation process. The other factors can be considered are project team competence, vendor selection, Education of new business processes, management of Exceptions and user participation.

The study conducted by Olson and Zhao(2006), the CIO’s of fifteen organizations were interviewed, where twelve of them considered the factors like the top management support, project management, user participation, communication as most significant factors contribute towards ERP implementation. For Example, the studies (Wong and tein,2002) highlighted certain examples of failures such as Siemens power transmission, unable to implement due to lack of top management support. The other organization, Ralson Purina of manufacturing was able to implement oracle’s enterprise solution successfully due to the best support from top management. Similarly, sigma chemicals were also successfully implemented SAP due to their top management support. But in the studies it was clearly stated that all the CSFs considered in their reports can be considered equally for successful ERP Implementation.

V. DISCUSSION

The major findings are that the BPR has provided a supportive change in the business processes leads reduction in cost and time, improves quality, speed of operations and ERP has supported in transforming manual processes in to automation and availability of information any where any time. It’s also observed that BPR can better be done using ERP system. The majority of the organizations have adopted ERP for the integration of organization wide modules and legacy systems. The implementation partner plays a crucial role in availing the fruitful benefits of an ERP system. Not only this, there were several failures recorded in BPR and ERP Implementation not because of system but due to ignorance of certain critical success factors. The major CSFs identified are
Involvement of Top level management, Business process Reengineering, communication and user training/participation. From the interpretation of implementations, it is also observed that alone ERP is not providing fruitful results. Almost every organization is installing some supporting systems like SAP Net Weaver, SAP PMS, sage Time sheet, sage Abra, SRITs HIS for better usage of ERP system. There arises a question to identify any single solution that fits for all. As the survey is limited to few sectors of Healthcare Industry, it can be extended to remaining sectors and to other industries for better understanding of critical success factors, BPR and ERP systems adaptability. Finally, it’s recommended and concluded to go for BPR under the light of ERP and its supporting systems by choosing a right implementation partner for their successful Implementation.

REFERENCES


