BPR Effect on ERP Implementation:
a Comparative Case Study

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Abstract—Business Process Reengineering (BPR) is an essential tool before an information system project implementation. Enterprise Resource Planning (ERP) projects definitely require the standardization and fixation of business processes from customer order to shipment. Therefore, ERP implementations are well proven to be coupled with BPR, although the extend and timing of BPR with respect to ERP implementation differ. This study aims at analyzing the effects of BPR on ERP implementation success. Basing on two Turkish ERP implementations in pharmaceutical sector, a comparative study is performed. One of the ERP implementations took place after a BPR implementation, whereas the other implementation was without a prior BPR application. Both implementations have been realized with the same consultant team, the case with prior BPR implementation going live first.

The results of the case study reveal that if business processes are not optimized and improved before an ERP implementation, ERP live system would face with disharmony problems of processes and processes automated by ERP. This suggests a definite precedence relationship between BPR and ERP applications

Keywords—Business Process Reengineering, Enterprise Resource Planning.

I. INTRODUCTION

AS markets become more competitive, organizations seek for new business opportunities to enhance their competitiveness. While doing so, organizations race with time in terms of agility. Many organizations have implemented Enterprise Resource Planning (ERP), but not all of them had a Business Process Reengineering (BPR) implementation before ERP. That is why ERP fails so often. Although, the vitality of BPR is well known, and even in the list of critical success factors in ERP implementation, it is usually omitted.

Business performance depends on how well a company manages its internal processes. Companies with effective business process management in place are able to analyze key performance indicators to monitor efficiency of day-to-day activities and employees against operational targets.

As the business world evolved it was no longer adequate for companies to merely offer their goods for sale, in order to stay viable they had to keep their competitive advantage [1].

- in the '60s industry concentrated on how to produce more (quantity),

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- in the '70s how to produce it cheaper (cost)
- in the '80s how to produce it better (quality)
- in the '90s how to produce it quicker (lead time)
- in the 21st century how to offer more (service)

II. BUSINESS PROCESS REENGINEERING

BPR is 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 [2]. BPR takes place from the conceptual design of the product to its final stage and even in sales and distribution of it [3].

Jacobson [4] describes a business process as; 'The set of internal activities performed to serve a customer', Bider [5] suggests that the BPR community feel there is no great mystery about what a process is - they follow the most general definition of business processes proposed by Hammer and Champy [6] that a process is a 'Set of partially ordered activities intended to reach a goal'

There are many BPR methodologies. As mentioned above their objective is same. The selected ones of . Feldmann, Harrison and Mayer are:

Methodology of Feldman [7]
- Develop vision & strategy
- Create desired culture
- Integrate & Improve enterprise
- Develop technology solutions

Methodology of Harrison [8]
- Determine customer requirements and goals for the process
- Map and measure the existing process
- Analyze and modify existing process
- Design a reengineered process
- Implement the reengineered process

Methodology of Mayer [9]
- Motivating reengineering
- Justifying reengineering
- Planning reengineering
- Setting up for reengineering
- As Is description and analysis
- To be design and validation
- Implementation

As Muthu, Whitman and Cheraghi [10], had designed, a comprehensive methodology could be obtained as:
Prepare for BPR
- Build Cross functional team

- Identify Customer driven objective
- Develop Strategic Purpose

Map & Analyze As-Is Process
- Create Activity Models
- Create Process Models
- Simulate & Perform ABC
- Identify disconnects & value adding processes

Design To-Be Processes
- Benchmark processes
- Design To-Be processes
- Validate To-Be processes
- Perform Trade-off Analysis

Reengineered processes
- Evolve Implementation plan
- Prototype & simulate transition plans.
- Initiate training programs
- Implement transition plan

Improve Continuously
- Initiate Ongoing measurement
- Review performance against target
- Improve process continuously

The top four reasons companies embark on BPR are to improve customer service, to reduce cycle time by reducing transactions, to reduce production/service costs and to improve quality [11].

III. ERP IMPLEMENTATIONS

As markets become more competitive, organizations seek new business opportunities to enhance their competitiveness. Often, organizations focus on improving their agility, i.e., the speed at which they can respond to consumers, improve service, enhance product quality and improve production efficiency. It is commonly accepted that information technology should be used to fundamentally change the business [12]. Many organizations, therefore, seek to improve their competitiveness by utilizing advanced information technology, such as ERP systems.

ERP systems have been considered an important development in the corporate use of information technology in the 1990s, enhancing organizational cross-functional efficiency and effectiveness through the seamless integration of all the information flowing through a company [13].

ERP is the business backbone. It is a cross-functional enterprise system that integrates and automates many of the internal business processes of a company, particularly those within the manufacturing, logistics, distribution, accounting, finance, and human resource functions of the business. Thus, ERP serves as the vital backbone information system of the enterprise, helping a company achieve the efficiency, agility, and responsiveness required to succeed in a dynamic business environment [13] and [14]. ERP software typically consists of integrated modules that give a company a real-time cross-functional view of its core business processes, such as production, order processing, and sales, and its resources, such as cash, raw materials, production capacity, and people. However, properly implementing ERP systems is a difficult

and costly process that has caused serious business losses for some companies, which underestimated the planning, development, and training that were necessary to reengineer their business processes to accommodate their new ERP systems. However, continuing developments in ERP software, including Web-enabled modules and e-business software suites, have made ERP more flexible and user-friendly, as well as extending it outward to a company's business partners [15].

A risk that is repeatedly identified in the literature is the lack of alignment between the organization strategy, structure, and processes and the chosen ERP application [13] and [14]. Both the business process reengineering literature [2], [6] and the ERP literature suggest that an ERP system alone cannot improve the company performance unless an organization restructures its operational processes, and this is generally accomplished through business process reengineering [16], [13] and [14].

Based on the preceding review of the literature and also on the research by Akkermans and van Helden [17], Grabski, Leech and Lu [18], and Somers and Nelson [19], Grabski, Stewart, and Leech [20] developed a list of
ERP implementation controls
- Business process reengineering
- Consultants' involvement
- Top management support
- Active steering committee
- Knowledgeable project team
- Close working relationship between the project team and consultants
- Detailed requirements specification
- Detailed implementation plan
- Frequent communication with the users
- Managing people
- User involvement
- Training
- Involvement of internal audit
- System testing prior to implementation
- Close monitoring after implementation
- Change management and transition management
- Develop users' project ownership
- In-depth, up front project planning
- Project management skills
- Project sponsor from top management
- Clearly identified objectives
- Specified measures of success
- Ways to manage risk
- Detailed tracking of actionable items by internal audit
- Monthly internal audit reports on project risk items to steering committee.

After an introduction to BPR in the previous section and to ERP in this section. One can think that there may a relationship between BPR and ERP. In the research of Genoulaz, Millet, and Grabot [21] the importance of business processes was considered as a critical step of the implementation process. Processing mining is introduced as a preliminary step of ERP implementation by Chiplunkar,

Deshmukh, and Chattopadhyay [22], they also suggest the capture of complete business environment in a BPR project with the help of information technology. Daneva [23] considers that reusing business processes and data requirements is a major issue of implementation. Soffer, Golany, and Dori [24] suggest a reverse engineering process for obtaining an ERP model, which can be aligned with the needs of the enterprise. Daneva [23] defines the problem of process alignment in terms of composition and reconciliation: a general set of business processes and data requirements is established, then standard ERP functionalities are explored to see how closely it matches the organization's process and data needs. Luo and Strong [25] see the alignment in terms of customization of the standard ERP processes, while an elicitation-based method is suggested by Kato et al. [26] for comparing user requirements to existing packages

IV. CASE STUDY

This case study consists of two ERP implementations. In fact, this a monographic study of two distinct firms. Firms are from Turkey and pharmaceutical sector. The purpose of the case study is to examine the effect of BPR on ERP implementation.

Both enterprises implemented the same ERP with same modules as it can be seen from Table I. The author participated to both of the projects as a BPR and ERP consultant. Therefore, data collected from the original source. In case of confidentiality the enterprises would take place as Firm A and Firm B.

TABLE I
ERP MODULES USED IN FIRMS

ERP Module	Firm A	Firm B
FI Financial Accounting	X	X
CO Controlling	X	X
TR Treasury	X	X
IM Investment Management	X	X
PP Production Planning	X	X
MM Materials Management	X	X
SD Sales and Distribution	X	X
QM Quality Management	X	X
WM Warehouse Management	X	X
PM Plant Maintenance	X	X
CS Customer Service	X	X
PS Project System	X	X
HR Human Resources	X	X

Firm A, had a BPR stage before ERP implementation and it had taken almost 5 months. That BPR application used Harrison's model which consists of determining customer requirements and goals, map and measure the existing process, analyzing and modifying existing process, design a reengineered process and implementing the reengineered process. All the processes from order taking to shipment had been analyzed.   After this BPR implementation, some improvements realized in the major processes, such as cycle time, inventory turnover, order fulfillment as seen in Table II. This performance indicators are for a specific kind of product which commonly produced and distributed in both Firm A and Firm B.After the BPR stage in Firm A, ERP implementation started. It took 11 months. All the modules in the Table I successfully implemented. After 3 months again the basic performance indicators measured and calculates as put in Table II. It is seen easily that there is also an extra improvement after the ERP implementation especially in order fulfillment and inventory turnover.

TABLE II
IMPROVEMENT IN SELECTED PERFORMANCE INDICATORS
AFTER BPR and ERP in FIRM A

Performance Indicators	After BPR	After ERP	TOTAL
Cycle Time	-21%	-9%	-28%
Order Fulfillment Time	-15%	-13%	-26%
Inventory Level	-8%X	-14%	-21%
Inventory Turnover	35%	18%	59%
Order to Cash Rate	3%X	2%	5%

According to Table II, the change revealed by BPR is more than the change revealed by ERP for every performance indicator except inventory level. Especially in inventory turnover and cycle time BPR effect is almost double times bigger than the ERP one

Firm B is also from the same sector with Firm A. Firm B did not have BPR, It has directly implemented ERP with the same modules like Firm A. Firm B used big bang project type as Firm A did. In both projects the consultants were same and they take care of the critical success factor that Umble, Haft and Umble [27] had declared as:

- Clear understanding of strategic goals
- Commitment by top management
- Excellent project management
- Organizational change management
- A great implementation team
- Data accuracy
- Extensive education and training
- Focused performance measures
- Multi-site issues

TABLE III
IMPROVEMENT IN SELECTED PERFORMANCE INDICATORS
AFTER ERP in FIRM B

Performance Indicators	After ERP
Cycle Time	-15%
Order Fulfillment Time	-22%
Inventory Level	-29%
Inventory Turnover	46%
Order to Cash Rate	3%

In Table III, there is only the effect of ERP. The change in performance indicator is not as much the total Firm A case. The change revealed by ERP in Firm B is is more than the one in Firm A. This may be because of the improvement from the BPR in Firm A.

V. CONCLUSION

In this research, the effect of BPR on ERP implementation was stated by a comparative case study. The improvement obtained by BPR is more than the improvement by ERP for a single case. On the other hand, the firm which directly implemented ERP has lower values in selected performance indicators than the firm implemented first BPR then ERP. The limitation of the study is, using a common product and its distribution as a reference. In the further research product group also may be compared and an aggregated comparison could take place. Even for a common product and limited performance indicators, it could be seen that BPR and ERP are complements rather than substitutes..

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