BUSINESS PROCESS REENGINEERING AND ITS APPLICATIONS

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ABSTRACT

IT innovations rise to change organizational and business strategies. The organizations have to restructure and redefine their business strategies to cope with these changes. Organizational development is a continuous process but the pace of change has increased in manifolds. In a volatile global world, organizations enhance competitive advantage through Business Process Re-engineering (BPR) by radically redesigning selected processes. As many organizations undertake BPR, issues in implementing BPR become a major concern and how the severity of these problems relates to BPR success. This paper explores the concepts and application related BPR in various sectors like IT, Technology development, Human Resource, Healthcare and financial intuitions. The study also identifies the criticism against the BPR implementation and causes of failures.

Key words: Business Process Reengineering, radical, implementation, DMAIC, TQM.

INTRODUCTION

The rapid change of information technology into commercial arena has given rise to organizational changes. The organizations have to restructure and redefine their business strategies to cope with these changes. Business Process Reengineering (BPR) is a modern tool available for managing the changes. The goal of business process re-engineering is to redesign and change the existing business practices or process to achieve dramatic improvement in organizational performance. Organizational development is a continuous process but the pace of change has increased in manifolds. In a volatile global world, organizations enhance competitive advantage through Business Process Re-engineering (BPR) by radically redesigning selected processes. Business process entails set of logically related tasks performed to achieve a defined business output or outcome. It involves a wide spectrum of activities procurement, order fulfillment, product development, customer service and sale (Sharma 2006).

Thus, Business Process Re-engineering becomes an offshoot of Business Process. It believes in continuous process improvement, re-engineering assumes that current process is irrelevant and there is need to commence another one. Such a clean slate perspective enables the designers of business process to focus on new process. Business Process Re-engineering in
the actual sense, have mixed successes therefore, business process reengineering projects aimed at transforming inefficient work process. Henceforth, organisations such as banks and other financial institutions need to optimize results from this model in real business situations.

Meaning and Definition

Hammer and Champy (2001) have revolutionized the idea of reengineering. They define BPR as,

“the fundamental rethinking and radical redesign of business systems to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed.”

In this definition you can find four important key words:

1. **Fundamental**: "Why do we do what we do?" and "Why do we do it the way we do?"

Reengineering ignores what is and concentrates on what should be.

2. **radical**: Disregarding all existing structures and procedures and inventing completely new ways of accomplishing work

3. **dramatic**: Used for quantum leaps in performance, not used for small jumps

4. **process**: the most important key word, Collection of activities taking multiple inputs to create an output that is of value to the customer

Need of the Organisation undertakes reengineering:

A. Organisation which are already in deep trouble, If the company cost's are higher than competitors, if the customer service is really bad and the customers are already against it, if the product failure is much higher as the competition's

B. Organisation which are not in trouble yet If the financial situation is still good but problems might appear in the future such as new competitors, changing customer requirements and an altered economic environment

C. Organisations which are in a peal condition, The Company is in a healthy condition and not even in the future problems might appear. But the management of such companies are ambitious and aggressive. These companies want to improve their own level in order to stay in lead over their competitors.

**BASIC CONCEPTS OF BPR**

- Business process (What/why actions to produce outputs from inputs)
- Value added (Add value to organizational customers via values added to products/services)
- Business Process Reengineering (BPR)
- Fundamental changes to people and culture, organizational structure, policies/procedures, and technology
Demand chain
Pressures to produce products or provide services
Supply chain
Flow of materials, information, and services from raw material suppliers through factories & warehouses to the end customers (also includes organizations and processes that create and delivery those products, information, and services to the end customers)
Supply chain management
Planning, organizing, coordinating all supply chain activities to reduce uncertainty and risks and positively affect inventory levels, cycle time, business processes, and customer service
Extended supply chain
Combination of the push of the supply chain and the pull of the demand chain
Networked organization
Linking functional components of the organization via Intranets, Internet, LAN, and WAN
Organizational transformation

BENEFITS OF BPR

Business Process Reengineering (BPR) can be defined as the elemental rethinking and radical redesigning of the business processes in order to achieve remarkable improvements in critical measures of performance like cost, service, quality, and speed. An organization where application of BPR is being done is process-oriented, where all processes are identified and given specific names. Each individual is aware of the particular process in which he or she is involved and complete process measurement such as monitoring and control is performed. Business Process Reengineering or BPR is also known by other names like Business Process Redesign, Business Process Change Management or Business Transformation. BPR brings numerous benefits to organizations and companies in which it is implemented. Some of the common benefits of BPR are:

1. Increase Effectiveness: As all employees are aware of the processes to which they belong, they have a greater sense of responsibility. All processes are completely monitored under the strict control of the management. The net result of this is that employees deliver high quality products to their customers helps to improve efficiency. Proper management and control of all business processes reduces the time lag between different processes, which otherwise is quite high causing delays. This in turn reduces the time to market the product to the target customers and gives quicker response to buyers.

2. Reduces cost: With the proper management of processes, improved efficiency and quick delivery of products to the buyers, the overall product costs are reduced resulting in cost saving for the organization in the long run.

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3. **Meaningful job for employees:** As the time lag of product processing between different departments gets reduced due to the application of business process reengineering, there are more meaningful tasks to be performed by employees. This leads to increase their levels of motivation and the desire to perform well.

4. **Improvement in organizational approach:** According to the traditional approach of managing an organization there is no flexibility or adaptability to change. The management formulated strict rules for employees of the organization. Whereas now, when most organizations have implemented business process reengineering there is an increase in flexibility and adaptability for change. This has created better environment for people to work, thus leading to employee satisfaction.

5. **Growth of business:** Implementation of BPR results in the growth of the present business thus enabling the emergence of new businesses within the same organization. Although BPR is very effective in controlling cost and improving efficiency, its implementation is a hard nut to crack. Employees are very resistant to this kind of change thus, it is important to have extensive support from the top management.

**PROCESS OF BPR**

Business process re-engineering (BPR) began as a private sector technique to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. A key stimulus for re-engineering has been the continuing development and deployment of sophisticated information systems and networks. Leading organizations are becoming bolder in using this technology to support innovative business processes, rather than refining current ways of doing work.

![Fig. 1. Process of Business process Reengineering](image)

Reengineering guidance and relationship of Mission and Work Processes to Information Technology. Business Process Re-engineering (BPR) is basically the fundamental re-thinking and radical re-design, made to an organization's existing resources. It is more than just business improvising. It is an approach for redesigning the way work is done to better support...
the organization's mission and reduce costs. Reengineering starts with a high-level assessment of the organization's mission, strategic goals, and customer needs. Basic questions are asked, such as "Does our mission need to be redefined? Are our strategic goals aligned with our mission? Who are our customers?" An organization may find that it is operating on questionable assumptions, particularly in terms of the wants and needs of its customers. Only after the organization rethinks what it should be doing, does it go on to decide how best to do it.

Within the framework of this basic assessment of mission and goals, re-engineering focuses on the organization's business processes—the steps and procedures that govern how resources are used to create products and services that meet the needs of particular customers or markets. As a structured ordering of work steps across time and place, a business process can be decomposed into specific activities, measured, modeled, and improved. It can also be completely redesigned or eliminated altogether. Re-engineering identifies, analyzes, and redesigns an organization's core business processes with the aim of achieving dramatic improvements in critical performance measures, such as cost, quality, service, and speed.

Re-engineering recognizes that an organization's business processes are usually fragmented into sub processes and tasks that are carried out by several specialized functional areas within the organization. Often, no one is responsible for the overall performance of the entire process. Re-engineering maintains that optimizing the performance of sub processes can result in some benefits, but cannot yield dramatic improvements if the process itself is fundamentally inefficient and outmoded. For that reason, re-engineering focuses on redesigning the process as a whole in order to achieve the greatest possible benefits to the organization and their customers. This drive for realizing dramatic improvements by fundamentally re-thinking how the organization's work should be done distinguishes re-engineering from process improvement efforts that focus on functional or incremental improvement.

The Implementation of Business Process Reengineering

As more organizations undertake business process reengineering (BPR), issues in implementing BPR projects become a major concern. This field research seeks empirically to explore the problems of implementing reengineering projects and how the severity of these problems relates to BPR project success. Based on past theories and research related to the implementation of organizational change as well as field experience of reengineering experts, a comprehensive list of sixty-four BPR implementation problems was identified. Resolutions of problems in other areas as technological competence and project planning were also determined to be necessary, but not sufficient, conditions for reengineering success. Further, problems that are more directly related to the conduct of a project such as process delineation, project management, and tactical planning were perceived as less difficult, yet highly related to project success. This situation was also true for human resource problems such as training personnel for the redesigned process. These findings suggest that reengineering project implementation is complex, involving many factors. To succeed, it is essential that change are more contextual (e.g., management support and technological competence) as well as
factors that pertain directly to the conduct of the project (e.g., project management and process delineation). As one of the first pieces of empirical evidence based on a field study, this research emphasizes the importance of addressing BPR implementation within the broader context of organizational change in a complex sociotechnical environment.

**BPR towards Information Technology**

Information technology (IT) plays a crucial role in business reengineering and is an essential enabler. However, most people misuse the technology. They look at the technology through the lens of their existing tasks, i.e. they only computerize the old existing tasks. Consider the case in IBM Credit. It might have tried to digitalize the request application and to send it to different departments by a computer network. Such computerization would have accelerated the time that required to move pieces of paper from one department to another, but it also would have increased the queuing time in each departments. Hence, it would have done nothing to the overall process. The structure of the old process was still unchanged. In contrast, the company attained more than 90% improvement through reengineering. State of the art information technology allows to break conventional rules/assumptions of processes. These rules were designed when the processes were created. Therefore, the rules may be no longer valid nowadays. As the preceding example has been showed, IBM Credit used the sophisticated computer system to break the assumption that every request has to be examined by different specialists.

IT should not be involved in redesign process. Redesigning process is like programming. When solving a problem, we first outline and design the solution at the top level, then implement it by a suitable language, e.g. C or Prolog. The language itself should never be constrained the design. It is the same idea that a specific IT should not be constrained the redesign in reengineering. After the redesign, we then should seek for the best technology to implement it. Similarly, past investments in IT should not be allowed to constrain the redesign. Reengineering is about to reinvent processes. IT is just a tool.

**BPR towards Technology Development**

These major changes in markets, technologies and degree of competition, imply the need for enterprises to change their organizational and managerial arrangements. Organizational theorists from Burns and Stalker (1961), Woodward (1965) and onwards have noted that the old conditions of mass production are best met by mechanistic, command-and-control bureaucracies that emphasize stability and efficiency. These new conditions of mass-customization (or whatever terms one might choose to describe the situation described above) require more organic organizational forms which are adaptable and encourage innovation. If enterprises could change their organizational and managerial arrangements easily, smoothly and incrementally in line with changes in their market and technological conditions there would be no need for radical step-changes proposed in BPR. But alongside Burns/Stalker, Woodward and others who have emphasized the contingent nature of organizational arrangements is a complementary line of organizational theorists, such as Stinchcombe (1965), Hannan and Freeman (1989), and other institutional sociologists, who emphasize the stickiness and “irrationality” of organizational change.
BPR towards Consumer Preferences

A major trigger for BPR is increased affluence and more discriminating consumer tastes. It is the phenomenon highlighted by Piore and Sabel in 1984 (Piore & Sabel, 1984). Gross domestic product (GDP) in Britain, and Europe as a whole, has increased in real terms by well over 50% in the last twenty years. Rising affluence is even more marked in richer households - data published recently by HMSO (Households Below Average Income, HMSO 1995 and reported in the Financial Times of 13 June 1995) showed that the real income of the top 10% of households had increased by 62% after housing costs since 1979, and the increase for the next 10% was 48%. People do not spend this additional income on extra basic commodities but on discretionary items which are characterized by their variety and, to some extent, the frequency with which they are updated.

Four areas of consumption provide striking examples of this:

1. The range of products on the shelves of the largest super-stores today, compared to the range available in town-centre supermarkets two decades ago, is one illustration.

2. Consumer electronics - hi-fi players, personal stereos, CDs, Nicam stereo surround-sound TV/video centres, and camcorders - is another.

3. Cars are a third; the Harvard and MIT studies of product development strategies in the auto industry show Japanese companies nearly doubling their product ranges and updating them twice as often as Western firms, arguing that this gives them a significant competitive advantage.

4. The fourth is the service sector example of product proliferation in financial services; mortgages, private pension and other savings plans, and insurance schemes.

The increased range of choice across all these product sectors is partly a response to the increased size of this market because of increased consumer affluence. A variety of terms have been used to describe this shift in consumer preference and consequent development in the product-market strategies of companies.

BPR towards Management Techniques

BPR is best considered as an umbrella term of management techniques and approaches. A number of management techniques exist which could be used to transform or re-engineers the enterprises they are applied to. Many of these come from the manufacturing sector, e.g., industrial engineering, work study, cellular manufacturing, MRP and MRP II, Just-In-Time manufacture, etc. These other approaches have been critically reviewed (McSwinney, 1995) and none were found to have BPR’s specific emphasis on processes. The most notable exception to this must be total quality management (TQM) which enjoyed great popularity during the 1980s.

Both BPR and TQM focus on processes as the primary unit of analysis (Davenport, 1993b). As a result, TQM and BPR are often compared, but there are significant differences between them.
TQM is normally sponsored by those with manufacturing or quality control responsibilities; whereas BPR is often sponsored by the IT function.

TQM is based on the Japanese philosophy of Kaizen or continuous improvement, whereas BPR is often viewed as involving much more radical change.

This has led some to question the compatibility of the two approaches. Even the 1980’s most ardent adherents of quality are finding that TQM does not readily blend with wave after wave of re-structuring, down-sizing and re-engineering. And the challenge of developing new products and bringing them to market ever more swiftly, in industries where prices are tumbling, such as computers, adds to the strain on TQM (Anonymous, 1995). Davenport believes that the two are compatible and recommends an approach which combines them both. Others believe that legitimating incremental change, by emphasizing the importance of TQM at the start of a BPR application, means that this is all you will get.

One of the main themes of TQM is employee involvement. TQM programmes usually involve training in problem solving techniques for staff from all levels of the enterprise and suggestions for improvements are generated from the bottom up. BPR is more commonly viewed as a top-down solution imposed by management, through the use of a BPR project team who develop the radical new processes. The new processes developed through BPR typically require far fewer staff in order to achieve the same, or increased, output.

**BPR towards Financial Institution**

A recent business process reengineering effort at a large financial institution saw the wisdom of leveraging DMAIC (DMAIC refers to a data-driven quality strategy for improving processes, and is an integral part of the company's Six Sigma Quality Initiative. DMAIC is an acronym for five interconnected phases: Define, Measure, Analyze, Improve, and Control.) within the company's BPR effort. The company had an existing DMAIC approach to project execution when the root cause is unknown and coupled that with the BPR principal of evaluating end-to-end key processes from the customer initiation point, through the organization. The organization made the following observations:

- Processes are a "top down" view and cross-functional and cross-organizational lines
- Processes are cross-product and cross-business lines
- High-level site processing strategies and variances have been noted
- Processes will overlap with field offices given overlap in service touch-points
- Processes will utilize all existing work performed as part of current initiatives
- Initiatives should focus on key processes, utilizing the 80/20 rule, and will start at a strategy level
- Initiatives are process-based, not technology-based, and assume that the current technology will be used, incorporating and utilizing planned technology upgrades
The primary definitions of success for this reengineering program were two-fold - improve customer satisfaction performance and absorb business growth without a corresponding linear growth in expenses. BPR and Six Sigma would claim that improving customer satisfaction performance begins with measuring and meeting both customer- and market-driven service level agreements, including quality and timeliness. This requires the development and implementation of customer service metrics to measure the customer's experience, risk and continuous process improvement. The reengineering process also should increase external customer satisfaction measurements through surveys and other feedback metrics.

The companies over-arching goal of absorbing business growth without a corresponding linear growth in expenses is accomplished through reengineering the process based on both voice of customer (VOC) and business strategy alignment service models. This includes implementing cross-organization initiatives to reduce group-wide expenses and assimilate technical changes into the new process design. Focus first on high-priority/high-impact change projects while planning for - and beginning to implement - longer-term change. Use current unit costs for benchmarking, and implement recommendations that lower those unit costs.

Environmental pressure to cut cost and to increase productivity has given in a new face to TQM in the form of continuous quality improvement and total productivity management (TPM). In the implementation of TPM, Business Process Reengineering (BPR) plays a core role. Globalisation has forced different types of production industries to resort to BPR for reducing the operating cost and maintaining production cost to a level where it remains competitive.

**BPR towards Healthcare Sector**

Exponential rise in the cost of delivery of healthcare services, price competition, market realignment are the major factors that are forcing hospitals to scrutinize their business processes and to redesign them in a manner that would not only help to keep the prices competitive but also help in delivering quality care to the patients. In early eighties, service environment design and service process design were more focused on clinical effectiveness and technical efficiency. In late nineties, the focus included patient customer service excellence along with clinical components. The methodology of healthcare purchase is gradually shifting from cash and carry model to third party payments through insurance companies and reimbursement schemes.

In such an environment, BPR is a problem-solving approach that emphasizes radical redesign of business process to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed. The elements of BPR are to be constrained by total service experience and also should focus on seamless service to patients across various functional areas in hospital. The process of BPR is effective to obtain gradual, incremental improvement. In the healthcare industry, the most dynamic change is technology. With each change in technology, the methodology of service delivery changes. For example, the process of gastro intestinal surgeries has shown a major change by the introduction of endoscopy. In the healthcare industry, new technology acquisition always brings new
capabilities to business, thereby raising the competitive bar and the need to improve business processes becomes mandatory.

BPR towards Leader and Manager

Many articles point out that BPR must have the full support of top management to succeed. If resistance is encountered, the leader must be willing to "drive" change, even to the point of ruthlessness. Managers in a company undergoing reorganization must work to quell the fears of employees and resistance to change (despite the fact that they may have their own apprehensions).

- According to one executive with BPR experience, "Once the [reengineering] plan is in place, they have got to pull out the stops and execute it. One cannot live in limbo between what you used to do and what you're going to do." Otherwise, the dramatic results are sacrificed, people lose their focus, and "reengineering slips into process improvement."

- Employees may be enthusiastic about reengineering during the initial phases if they view it as a "win-win" situation. Some companies experience resistance in later stages when employees begin to harbor doubts about the impact of reengineering, and managers are forced to adopt a more "insistent" policy.

CSC Index points (consulting firm called Index (later CSC Index) to poverty of ambition as a reason why BPR projects fail. "Companies that just flirt with [reengineering] suffer the pains without the gains Reengineering advocates urge management to pull out all the stops and implement change on a grand scale. Managers in the organizations after reengineering are compared to coaches. They do not order; they guide. They do not direct the work of others; they coordinate, facilitate and empower.

BPR towards Human Resource Management

Hammer and Champy recognize the importance of the human resource when they state "companies are not asset portfolios, but people working together to invent, sell and provide service." However, they fail to demonstrate how to reengineer the human resource in conjunction with reengineering processes. Of the four cases presented in Reengineering the Corporation, only the case of Capital Holding addresses this area. Capital Holding performed a "cultural audit" which revealed that the unwritten code of conduct encouraged information hoarding and barely acknowledged the customer. In order to combat these tendencies, senior management provided a constant flow of information throughout the company regarding reengineering expectations and successes, and revised the performance appraisal system to emphasize the new values of team work and cooperation.

Although Hammer and Champy provide a long list of why reengineering fails, nowhere do they include the prerequisite that no reengineering effort will succeed without first reeducating and retraining the people who will ultimately work with the new process. CSC Index identifies principle obstacles to BPR include the fear among employees that their jobs are endangered and that years of experience will account for nothing. To overcome these apprehensions, managers must constantly communicate their plans and expectations. Although companies which are seeking to reengineer may work on revamping the
performance appraisal system to support new values, this can be problematic. When bonuses are linked to profits or even the performance of a team, this may lead to a situation where the individual is judged on factors beyond his or her control.

**BPR towards Operations Management**

BPR is an excellent tool to use in inducing velocity within an operation. Process mapping can reveal the constraints and bottlenecks in an operation. This identification can facilitate the streamlining of processes, increasing both productivity and throughput. We suggest initially identifying and mapping the critical path processes to discover the bottlenecks that affect the total throughput time, and reengineering those first. Bottlenecks will shift from one operation to the next as each one is resolved. This is an application of basic constraint theory, and will get results that have greater impact on the company.

**Critical Success Factors in BPR**

Some of the technical success factors in BPR include:

1. A clear and well-documented business case
2. Evidence that the BPR will indeed generate the expected benefits
3. IT technology or software and its performance may be a key to the success of the changes
4. Issues associated with availability, reliability, security, response times and support must be tackled
5. Appropriate change management, as described earlier, must be included

**CAUSE OF FAILURE OF BPR**

70% of the BPR projects fail. Biggest obstacles that reengineering faces are: (i) Lack of sustained management commitment and leadership; (ii) Unrealistic scope and expectations; and (iii) Resistance to Change.

Based on the BPR consultants' interviews, Bashein et al. (1994) outline the positive preconditions for BPR success as: Senior Management Commitment and Sponsorship; Realistic Expectations; Empowered and Collaborative Workers; Strategic Context of Growth and Expansion; Shared Vision; Sound Management Practices; Appropriate People Participating Full-Time (cf: CIGNA: BPR as a way of life); and Sufficient Budget. They also identify negative preconditions related to BPR as: The Wrong Sponsor; A "Do It to Me" Attitude; Cost-Cutting Focus; and, Narrow Technical Focus. The negative preconditions relating to the Organization include: Unsound Financial Condition; Too Many Projects Under Way; Fear and Lack of Optimism; and, Animosity Toward and By IS and HR Specialists. To turn around negative conditions, firms should: Do Something Smaller First (CIGNA's pilot); Conduct Personal Transformation (CIGNA's change of mindset); and Get IS and HR Involved (CIGNA's CIO initiated the change and HR factors were given due emphasis).

King (1994) views the primary reason of BPR failure as overemphasis on the tactical aspects and the strategic dimensions being compromised. He notes that most failures of reengineering are attributable to the process being viewed and applied at a tactical, rather than strategic,
levels. He discusses that there are important strategic dimensions to BPR, notably, Developing and Prioritizing Objectives; Defining the Process Structure and Assumptions; Identifying Trade-Offs Between Processes; Identifying New Product and Market Opportunities; Coordinating the Reengineering Effort; and, Developing a Human Resources Strategy. He concludes that the ultimate success of BPR depends on the people who do it and on how well they can be motivated to be creative and to apply their detailed knowledge to the redesign of business processes (Davenport & Stoddard 1994, Markus et al. 1994).

Factors responsible for unsuccessful BPR:

- Lack of cooperation from staff as process reengineering is viewed as job cutting.
- Insufficient staff training and skill development.
- Lack of enthusiasm and interest.
- Lack of access to information (e.g. benchmarking data).
- Lack of funding leads to problem in acquisition of technology and research in BPR.
- No top management support in trying to implement solutions generated by BPR initiatives.
- Low priority.
- Selection and training of employees in BPR process is time consuming.
- Internal control is not well defined under the new process-reengineering project.
- Personnel turnover is a major problem because new employee takes time to understand BPR process and also implementation becomes difficult.

CONCLUSION

Business process reengineering (BPR) consists of radically transforming organizational processes through the optimal use of information technologies (IT) to achieve major improvements in quality, performance, and productivity. In any organisation, good process management can provide with requisite cutting edge which can become a competitive advantage over other the market. Business process reengineering may not be necessarily cheap; it can be expensive also in the initial phases. In case of computerization of front office, the cost of installing facilities and implementing a package can be very high but at the same time BPR reduces processing time, saves manpower and also helps in strategic control (which may not be possible in manual system) which can help save money to the organisation.

REFERENCES


Caldwell, Bruce, Missteps, Miscues -- Business Reengineering Failures, InformationWeek, June 20, 1994; Pg. 50.


Cone, Edward, Technology Chief of the Year; All the Right Moves -- Tom Trainer of Reebok International Successfully Teamed Business Reengineering with Information Technology, InformationWeek, December 26, 1994; Pg. 35.


Ettrick, Barbara, Reengineering Tales from the Front, Management Review, January 1995; Pg. 13.

Furey, Tim R and Garlitz, Jennifer L. and Kelleher, Michael L., Applying Information Technology to Reengineering, Planning Review, November 1993; Pg. 22.


