BUSINESS PROCESS REENGINEERING:

AN OVERVIEW

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Total Quality Management (TQM) has received much press in recent years. A relevated process-improvement approach, Business Process Reengineering (BPR), offers the potential for great rewards, but is not well understood. A telephone company executive remarked “If you want to get something funded around here - anything, even a new chair for your office - call it reengineering on your request for expenditure” (Stewart, 1993). But, reengineering is more than a buzzword. Management consultant Peter Drucker points out, “Reengineering is new, and it has to be done” (Stewart, 1993).

Unlike TQM, BPR is an all-or-nothing proposition. BPR promises a level of business improvement above 50%, but it is strong medicine and is not always needed or successful.

The purpose of this paper is provide an overview of BPR. More specifically, it address the following three issues:

1. A Comparison of TQM and BPR
2. The Role of IT in BPR
3. An Example of BPR in Action.

A Comparison of TQM and BPR: Process Improvement and Process Reengineering

To understand the nature of BPR, we need to understand what is a process and the relationship between TQM and BPR. Both are based on the concept of process, but differ in terms of their scope and rate of change. The following section provides this background.

Process vs. Functional Product Approaches. A process is simply a structured, measured set of activities designed to produce a specified output for a particular customer or market (Davenport, 1993). It implies a strong emphasis on how work is done within an organization, in contrast to an emphasis on what products can be produced. By the same token, a process approach to business also implies a relatively heavy emphasis on improving how work is done, in contrast to a focus on which specific products or services are delivered to customers.

Every organization can be considered as a set of business processes. Common business processes generic to business include product development, customer order fulfillment, and financial asset management (Davenport, 1993). Table 1 depicts a typical set of broad processes for a manufacturing firm.
Table 1. Typical Processes for a Manufacturing firm  
(Source: Davenport, 1993.)

<table>
<thead>
<tr>
<th>Operational</th>
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<tbody>
<tr>
<td>Product development</td>
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<tr>
<td>Customer acquisition</td>
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<tr>
<td>Customer requirements identification</td>
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<tr>
<td>Manufacturing</td>
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<tr>
<td>Integrated Logistics</td>
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<tr>
<td>Order management</td>
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<td>Post-sales service</td>
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<table>
<thead>
<tr>
<th>Management</th>
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<tr>
<td>Performance monitoring</td>
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<tr>
<td>Information management</td>
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<tr>
<td>Asset management</td>
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<tr>
<td>Human resource management</td>
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<tr>
<td>Planning and resource allocation</td>
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</tbody>
</table>

In a function-based organization, the business activities are managed around functional areas such as manufacturing, marketing, financial management, and so on. This organization is symbolized as an organization pyramid in Figure 1 after Anthony (1965).

![Figure 1. The Firm as a Pyramid. Adapted from Anthony (1965).](image)

In contrast, a process perspective implies a horizontal view of the business that cut across the organization, with product inputs at the beginning and outputs and customers at the end. Adopting a process-oriented structure generally means de-emphasizing the functional structure of the business. In other words, a process-orientation suggests a cross-functional structure, and so breaks with the conventional functional structure of most organizations. This
change makes the business activities become more dynamic and requires different perspectives to look at business operations.

![Figure 2. A Process Approach to the Firm. Adapted from Porter and Millar, 1985.](image)

Figure 2 shows that new product design is generated by research and development, tested for market acceptance by marketing, and evaluated for manufacturability by engineering or manufacturing. This way of thinking about product development is cross-function, following the Value Chain framework of Porter and Millar (1985). The whole process requires efforts from all the departments involved to contribute to a single project. This kind of perspective changes the way we look at business, and so enables us to create new methods to manage our business activities.

**Continuous vs. Radical Process Change.**

At the heart of reengineering is the notion of discontinuous thinking. Discontinuous thinking refers to recognizing and breaking away from outdated fundamental rules and assumptions that underlie operations. Reengineering expert Michael Hammer writes “It should come as no surprise that our business processes and structures are outmoded and obsolete: our work structures and processes have not kept pace with the changes in technology, demographics, and business objectives” (Hammer, 1990). Business process reengineering is the search for, and implementation of, radical change in business processes to achieve breakthrough results (Davenport, 1993).

This characteristic of radical change in business process distinguishes BPR from TQM. TQM offers a continuous improvement by seeking a more gradual and lower level of change. Table 2 summarizes the differences between process improvement (such as seen in TQM) and process redesign (as seen in BPR). The actual level of benefit from improving operations may fall across a continuum.

In contrast to TQM’s improvement of existing processes, BPR initiatives start with a relatively clean slate. Business executives need to ask themselves, “If we were a new company, how would we run this place.” The goal of TQM is ongoing and simultaneous improvement across multiple processes. In contrast, BPR is generally a discrete initiative.
<table>
<thead>
<tr>
<th>Level of Change</th>
<th>TQM</th>
<th>Reengineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting Point</td>
<td>Existing process</td>
<td>Clean slate</td>
</tr>
<tr>
<td>Frequency of Change</td>
<td>One-time/continuous</td>
<td>One-time</td>
</tr>
<tr>
<td>Time Required</td>
<td>Short</td>
<td>Long</td>
</tr>
<tr>
<td>Participation</td>
<td>Bottom-up</td>
<td>Top-down</td>
</tr>
<tr>
<td>Typical Scope</td>
<td>Narrow-within functions</td>
<td>Broad cross-functional</td>
</tr>
<tr>
<td>Risk</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Primary Enabler</td>
<td>Statistical control</td>
<td>Information technology</td>
</tr>
<tr>
<td>Type of Change</td>
<td>Cultural</td>
<td>Cultural/structural</td>
</tr>
</tbody>
</table>

Table 2
The Differences between Process Improvement and Process Redesign
(Source: Thomas H. Davenport, Process Innovation, 1993)

**Time Line.** Process improvement can begin soon after the need for change in a process is identified, and incremental benefits can be achieved within months. Because of the magnitude of organizational change involved, process reengineering often takes a much longer time than process improvement.

**Top-Down vs. Bottom-Up.** Bottom-up participation is a hallmark of TQM programs; employees are urged to examine and recommend changes in the work processes in which they participate (Demming, 1986). Process reengineering is typically more top-down, requiring strong direction from senior management. Because large firms’ structures typically do not reflect their cross-functional processes, only those in positions overlooking multiple functions may be able to see opportunities for reengineering.

The traditional wisdom is that technology improves productivity. What is the role and function information technology (IT) performs in business process reengineering? The next part of the paper explores this important issue.

**The IT Role in BPR**
Huff (1993) points out seven areas in which IT can enable a firm to reengineer itself:

1. Electronic Data Interchange (EDI),
2. Image Processing Technologies,
3. Groupware,
4. Computer-based communication technologies,
5. High-bandwidth systems,
6. Database Management Systems, and

In fact, the huge investment in IT has had little impact on productivity. An MIT study examined the data and concluded that “Expenditures on IT capital were less effective in improving productivity than any other type of expenditure considered” (Schnitt, 1993). We focus too much on the technology itself instead of on the ways it can be used. In Drucker’s terms, IT enables firms both to become more efficient (doing the thing right) and more effective (doing the right thing) (Drucker, 1988).

Companies tend to use IT to mechanize old ways of doing business, leaving the existing processes intact. They use computers simply to speed up old, wasteful processes. This is known as the “Paving over the Cow-Path” phenomenon. In other words, when IT profes-
sionals design or implement a new system, they design the system to fit into the existing organizational structure, operating procedures, practices, and tasks. Current system development methodologies were not designed to challenge the existing practices. Instead they form justifications for the way things are currently done. The system designed using our present analysis and design methodologies rivets the established way of doing business into place, making it difficult to change.

The role of IT in BPR and TQM is that of an enabler. The central change-agent for either approach must facilitate organizational learning, that is, the ability to benefit from experience (Argyris, 1990; Senge, 1990). Firms using either process improvement or process re-engineering must develop organizational structures, such as the matrix structure, capable of adapting to their experiences.

**An Example of BPR in Action**

Fortunately, some firms have successfully changed the way they do business. The most frequently cited example is the Ford Motor Company’s Account Payable Division (Treacy, 1990). In the early 1980s, with the American automotive industry in a depression, Ford’s top management put accounts payable, along with many other departments, under the microscope to find ways to cut costs. Accounts Payable in North America alone employed more than 500 people, using the process shown in Figure 3. Management predicted that by installing new computer systems, it could reduce the head count by some 20%.

![Figure 3. Ford’s Prior Accounts Payable System.](image)

Ford was enthusiastic about its plan to tighten accounts payable until it looked at Mazda. Ford aspired to a 400-person department; Mazda’s accounts payable organization consisted of just five people. The difference in absolute numbers was astounding, and even after adjusting for Mazda’s smaller size, Ford figured that its Accounts Payable organization was five times the size it should be.

Ford managers set up their goal: Accounts Payable would reduce staffing by not just one, but several hundred clerks. It then set out to achieve that goal. First, managers analyzed the existing system. When Ford’s purchasing department wrote a purchase order, it sent a copy to Accounts Payable. Later, when material control received the goods, it sent a copy of the receiving document to Accounts Payable. Meanwhile, the vendor sent an invoice to
Accounts Payable. It was up to Accounts Payable then to match the purchase order against the receiving document and the invoice. If they matched, the department issued payment.

The department spent most of its time on mismatches, instances where the purchase order, receiving document, and invoice disagreed. In these cases, an Accounts Payable clerk would investigate the discrepancy, hold up payment, generate documents, and all-in-all gum up the works.

![Diagram of the reengineered Accounts Payable system](image)

**Figure 4. Ford's Reengineered Accounts Payable System.**

One way to improve things might have been to help the Accounts Payable clerk investigate more efficiently, but a better choice was to prevent the mismatches in the first place. To this end, Ford instituted "Invoiceless Processing", shown in Figure 4. Now when the purchasing department initiates an order, it enters the information into an on-line database. It doesn't send a copy of the purchase order to anyone. When the goods arrive at the receiving dock, the receiving clerk checks the database to see if they correspond to an outstanding purchase order. If so, he or she accepts them and enters the transaction into the computer system. (If receiving can't find a database entry for the received goods, it simply returns the order).

Under the old procedures, the accounting department had to match fourteen data items between the receipt record, the purchase order, and the invoice before it could issue payment to the vendor. The new approach requires matching only three items between the purchase order and the receipt record: part number, unit of measure, and supplier code. The matching is done automatically, and the computer prepares the check, which Accounts Payable sends to the vendor. There are no invoices to worry about since Ford has asked its vendor not to send them. Most importantly, the traditional assumption that "float" is good was replaced with evidence regarding the effectiveness and cost-savings of the new process.

Ford didn't settle for the modest increases it first envisioned. It opted for radical change, and achieved dramatic improvement. Where it has instituted this new process, Ford has achieved a 75% reduction in head count, not the 20% it would have achieved with a conventional process improvement approach.

In most successful reengineering projects, the technology is viewed not as a solution, but as an enabler, and the IS staff play the role of a catalyst.
CONCLUSION

This paper has discussed the distinctions between TQM and BPR. IT enables firms to reengineer their processes. However, the impact of BPR is immense and affects all areas of business. BPR requires the firm to revise its career paths, recruitment and training programs, promotion policies, and many other management systems to support the new processes. Most importantly, "Our imagination must guide our decisions about technology—not the other way around" (Hammer, 1990).

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