The Role of IT in Business Process Reengineering

CN Blewett, J Cansfield & L Gibson

Abstract

South African organisations are facing increasing demands stemming from growing competition, fast changing technologies and global trends and pressures. The methods and management structures enabled these organisations to make effective use of information technology (IT) during the 70s and 80s, are currently proving to be inadequate. IT has extended into the organisation and beyond the IS department's control, and is accordingly expected to support entire business processes.

As such an increasing number of organisations have decided to use Business Process Reengineering (BPR) as the primary vehicle for organisational transformation. Because of the complexity of the BPR process, a failure can be very costly in terms of time and money. BPR literature is full of success and failure stories that identify various critical success factors. However most studies do not identify the correct use of IT as a critical success factor.

In this paper, we present our research findings on the identified critical success factors and the important role of IT, within BPR. Next we present the key critical success factors as identified by current BPR literature. We then present the results of our survey of South African businesses and their evaluation of the identified critical success factors, and especially the role IT should play in the BPR process. Finally we present a framework which focuses on the role of IT in BPR.
1.0 Introduction

Business Process Reengineering (BPR) is a radical Information Technology (IT) based redesign of work flows and processes within and between organisations [Shabana, 1996]. In many organisations BPR has not only been a success but also a failure, according to the CSC Index in 1992 up to 70% of all BPR projects fail. The rate of failures is a growing concern and as such it has become necessary to develop a framework for BPR projects in order to ensure the effective application of BPR.

Several frameworks have been developed which highlight a strategic path and specific role for IT to play in BPR. Although the research differs on the actual role of IT and IT’s impact on BPR, each framework recognises IT’s facilitating role in some reengineering areas and its leading role in other areas.

In this paper we firstly define what BPR is, and what it is not. Having established this we then set out to discuss the role that Information Technology plays in BPR. We then discuss the results of our questionnaire. The aim of the questionnaire being to determine the opinions of South African (SA) managers on the identified critical success factors of BPR projects from management literature. Based on the results of the questionnaire and based on other researchers frameworks we then develop a revised framework for BPR. The aim of this framework is to provide a guide to implementing BPR and to highlight the critical success factors in BPR which enable managers to facilitate a successful project. The framework provides steps to follow during BPR and highlights the specific role of IT in each step.

The role of IT in BPR has been clearly highlighted in the research done by Hall, Rosenthal and Wade [Hall et al, 1996]. Hall et al based research on more than 100 companies and found that BPR projects must impact on six crucial organisational levers: roles and responsibilities, measurements and incentives, organisational structure, information technology, shared values, and skills [Hall et al, 1996]. The redesign must penetrate to these core fundamental organisational elements in order to ensure a successful BPR project. Their framework however emphasizes that IT is not the only facilitator for process improvement and reengineering. Successful BPR projects therefore do not treat IT as either the sole driver or the magic bullet for providing the distinctive strategic advantage. Successful BPR leverages IT to create an appropriate organisational arrangement to support the new redesigned processes [Venkatraman, 1994].

However, BPR will not reach its full potential if IT is not being used for the right reasons. If it is deployed just because it exists and not for its specific capabilities, BPR will fail [Dixon et al, 1994]. In many cases IT has been used to hasten office work by automating it, rather than transforming the processes [Davenport, 1990]. IT’s potential to fundamentally reshape the way business is done must be recognised and used in BPR to transform processes. The role of IT within a BPR framework therefore needs to be developed in order to ensure its correct use and thus ensure the success of the BPR project.
2.0 What is Business Process Reengineering?

In this section we will set out to define what BPR is, and the aim that BPR is trying to achieve.

Business Process Reengineering is the critical analysis and radical redesign of existing business processes to achieve breakthrough improvements in performance measures [Teng, Grover and Fiedler, 1994]. This improvement is not just concerned with efficiency, it is also concerned with speed, quality, competitive advantage, value to the organisation and flexibility. BPR focuses on the details of the process, such as why the work is done, who does it, where it is done and when. By focusing on examining the process of producing the output, it is an examination of the processes ability to add value to the business [Davenport, 1990].

BPR radically departs from other popular business practices like total quality management, continuous improvement or downsizing [Dixon et al, 1994]. It involves a complete change of direction which therefore involves changing the organisations goals. True BPR will achieve dramatic improvements and in the process greater profitability and most importantly improved, faster and more efficient customer service [Martinez, 1995]. BPR is therefore characterized by a change of the organisation’s goals in order to seek major improvement. Improving existing processes is far less dramatic than creating new ones. To achieve these dramatic improvements it is necessary to leverage IT to destroy what exists and rebuild by starting from scratch. There is a need for an IT partnership in BPR in order to ensure the success of the project. IT consists of hardware, software, telecommunications and data management and also includes the IS organisation. The IS organisation has the skills to identify applicable technologies, design, implement and manage technology-based solutions [Martinez, 1995].

Davenport describes the relationship between BPR and IT as recursive [Davenport, 1994]. It should be considered in terms of how it can support business processes and business processes should be considered in terms how they can be transformed using IT. Each is the key to thinking about the other [Davenport, 1994]. A process can be defined as a set of logically related tasks performed to achieve a defined business outcome. A set of processes forms a business system which carries out its business. Processes have two important characteristics: they have defined business outcomes and there are recipients of the outcomes. Secondly processes cross organizational boundaries. That is they occur across or between organizational sub units [Davenport, 1994].

Typically, maximum performance gains are achieved with the reorganizing of a process where these related tasks are performed by personnel from several different functional units [Teng et al 1994]. In the past the majority of computer systems merely automated or supported existing business procedures. Efficiency improved but within each functional unit in the organisation but the lack of cooperation between different functions remained. The 1990’s are characterized by unprecedented uncertainty which is forcing organisations to reconsider the lack of co-operation between functional units. Internal integration should not be the result of automating inefficient processes [Venkatraman, 1994]. The power of BPR lies in its ability to increase value across the entire organisation. Many organisations are now attempting to leverage IT to facilitate co-operation and thus increase the organisations flexibility and responsiveness. Although some processes may operate within one functional unit, most important business processes cross departmental boundaries [Teng et al, 1994].

Common examples of processes meeting these criteria include developing a new product, ordering goods from a supplier, creating a marketing plan, processing and paying an insurance claim and writing a proposal for a government contract. Other examples are accounts payable changes, reorganization focusing on the customer and organisational transformation [Dixon et al, 1994]. BPR therefore involves the reorganization of an organisations existing processes and the development of new processes. The aim being to dramatically improve critical measures of performance, such as quality, service and speed.
3.0 What BPR is not

Having defined what BPR is and its aim, this next section deals with what BPR is not and what BPR should not be confused with.

BPR can and has often been confused with other improvement projects because it is not a fundamentally new approach to performance improvement. It has been confused with Total Quality Management (TQM) which involves the incremental change to an existing process. Reengineering, however, involves the radical change of existing processes. It focuses on the desired results from a process and aims to create value. BPR in some cases requires starting with a "clean sheet of paper" [Dixon et al, 1994].

BPR is not reengineering software, unless it is done in support of a radical change in the way a business process is conducted. It is not the reorganization of people in charge of departments or a reduction in their headcount. BPR does not involve the reengineering of the IS department or any other department. Often these factors will be a result of BPR but they are not part of BPR activities [The Butler Group, 1996]. It is important to distinguish BPR from those activities and from the array of other improvement alternatives available to managers.

BPR offers a combination of emerging technological capabilities and management approaches to cope with the demands of the changing South African market place. As such it offers dramatic improvements and many organisations are taking advantage of BPR to enable them for the changing market place. Successful BPR therefore depends on a working definition to guide organisations and therefore enable them to gain the full advantage of BPR.

4.0 The Role of Information Technology in Business Process Reengineering

Having concluded what BPR is and what it is not, the following section now deals with the role that IT should play in BPR.

In the past the productivity gains from IT have been disappointing and as such a new role for IT in business needs to be developed. BPR provides the mechanism for IT to be deployed successfully. Through BPR an organisation's structure can be redesigned and by deploying IT, the full advantages can be realised [Venkatraman, 1994]. IT provides BPR with two primary methods for managing the implementation of BPR. It firstly provides project management discipline and experience and secondly it provides the technological vision and expertise which BPR demands [Venkatraman, 1995]. These two factors were found to be crucial to the success of a BPR project conducted at Breezy Services Company in 1992. The role of IT needs throughout the process needs to be delineated before the BPR project gets under way.

5.0 The Questionnaire

In order to determine SA managers opinions we developed a questionnaire to determine what SA managers thought were the critical success factors in a BPR project, and if in fact they perceived IT as having a critical role to play in BPR.

The questionnaire consisted of 13 questions which aimed at obtaining a ranking of critical success factors. The factors were ranked by respondents as highly critical to not important to the BPR process. Each factor was ranked from 1 to 5, 1 being the least important and 5 being the most important. The results were then added to obtain a overall ranking of the respondents opinions.

The questionnaire was mailed via e-mail to South African Computer Society members, selected members of the Durban Chamber of Commerce and other addresses of people involved in BPR.
6.0 Results of South African Survey

This research study sought to rank the 13 identified critical success factors in BPR. The study involved e-mailing a questionnaire to 30 managers in a varied section of industries. The study was based in part on the identified critical success factors in the literature. An additional section was included to rank the role of IT in BPR. The intention was to obtain a wide cross section of managers' opinions on the factors which are the critical enablers of BPR and especially to highlight the role of IT in BPR.

6.1 Analysis of the Data

The demographic questions were based on a financial mail survey and aimed to classify respondents fields of work, size of organisation and when and if BPR had been attempted. The following table indicates the fields of work of the respondents.

<table>
<thead>
<tr>
<th>Table 1: Demographics of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Technology</td>
</tr>
<tr>
<td>Finance</td>
</tr>
<tr>
<td>Manufacturing</td>
</tr>
<tr>
<td>Services</td>
</tr>
<tr>
<td>Academic</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>Accounting/Auditing</td>
</tr>
<tr>
<td>Retail</td>
</tr>
</tbody>
</table>

Over 80% of the respondents were from organisations with over 100 people. This indicates BPR's applicability in mainly large organisations rather than in smaller organisations. Fifty seven percent of the sample had attempted BPR with 75% having attempted BPR in the last 2 years. This indicates BPR's increase in popularity and the possible need of organisations to change to keep up with the changes occurring in South Africa.

The following table indicates the view of IT and non-IT respondents on the success rate of BPR. The number of perceived failures were the same in both groups. The non-IT group perceive BPR to be more of a success than the IT group.

<table>
<thead>
<tr>
<th>Table 2: Respondents in fields of work who have attempted BPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Job</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>Non-IT</td>
</tr>
<tr>
<td>IT</td>
</tr>
</tbody>
</table>
The majority of respondents were from middle management. Overall 75% felt BPR was a success and 24% considered BPR a failure. However the results also indicate that the majority of respondents, 81%, considered BPR to be a moderate success to complete failure. This shows that most respondents are not completely satisfied with the results of BPR.

Respondents were asked to rank BPR in terms of their perception of its success and failure. The following table indicates the perceived success rate of BPR by those respondents who have attempted BPR. The majority of respondents saw BPR as more of a complete failure than a complete success.

<table>
<thead>
<tr>
<th>Total Failure</th>
<th>6%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure</td>
<td>24%</td>
</tr>
<tr>
<td>Moderate Success</td>
<td>53%</td>
</tr>
<tr>
<td>Success</td>
<td>18%</td>
</tr>
<tr>
<td>Total Success</td>
<td>0%</td>
</tr>
</tbody>
</table>

The following table indicates the opinions of managers on the identified critical success factors. The ranking of the critical success factors were from highly critical to of no importance to the BPR process. The more critical factor scored 5 points and the least critical 1 point.

| 1   | The support of top management | 93% |
| 2   | The strategic alignment of reengineering project goals to the organisations goals | 87% |
| 3   | The support of the people directly involved in the process being reengineered | 87% |
| 4   | Organisational and political commitment for the BPR process | 86% |
| 5   | The development of a formal human resources strategy | 83% |
| 6   | A plan to measure and track performance of the BPR project | 83% |
| 7   | The use of teams in the BPR project | 80% |
| 8   | The identification and prioritization of processes to be reengineered | 82% |
| 9   | Highlighting an area for IT within each business vision and process objectives | 77% |
| 10  | Consider IT early on in BPR and contemplate IT's capabilities during redesign | 78% |
| 11  | The length of time taken to complete BPR | 70% |
| 12  | The allocation of an entire step to IT during process redesign | 67% |
| 13  | The use of IT as a redesign tool as in CASE tools | 59% |
6.2 Discussion of results

Table 4 indicates that the questionnaire revealed that the most critical aspect of BPR to South African managers were the management of the human side of BPR rather than the technical side of BPR. However despite this view most projects were not a complete success. This could be attributed to the fact that not enough emphasis is being placed on IT and therefore the projects are failing. "Without the constructive partnership, technical leadership, and focused endeavours of the IS organisation, a reengineering effort is doomed to fail" [Martinez, 1995]. The top 3 factors indicate that support from all those involved in BPR is the most critical aspect. Other research conducted came to similar conclusions. "In any redesign project, senior executives must overcome resistance and convince employees of the need for change. Ignored or ill-handled, the politics of redesign can doom an otherwise successful project" [Hall, Rosenthal and Wade, 1993]. Another possible reason for the emphasis on the people side of BPR in South Africa is because of the strong influence and power of trade unions. A radical reengineering of processes will almost always involve the loss of jobs and with South Africa's current rate of unemployment this would not be welcomed. Dixon et al in 1994 undertook an analysis of 23 reengineering projects and found that the major concern from project managers was continued top management support and commitment.

In our survey a large utilities organisation undertook BPR and found that the human resource aspect of change management was of critical importance when implementing BPR. A BPR project leader from a software development company felt that BPR is merely about politics and without support from the organisation's top management, the project will fail.

Table 4 indicates that the IT critical success factors scored the lowest in terms of their criticality to BPR. The conclusion from this is that while IT is an identified critical success factor it is not perceived as the key role in every BPR exercise. The same conclusion was reached by Coulsdon-Thomas in the COBRA(Constraints and Opportunities in Business Restructuring- an Analysis) in 1993. The project involved a pan-European study of BPR experience and practice. "The critical implementation issues tend to concern attitudes, beliefs and behaviour. Inter-personal communication and involvement are usually the limiting factors rather than the capability of technology"[Coulsdon-Thomas, 1993].

It therefore seems that we can deduce from the questionnaire that BPR is a multifaceted exercise which impacts on many different aspects of an organisation. As such it is necessary to focus on each of the identified critical success factors with differing intensity, depending on which step or part of BPR is being implemented. BPR will fail if even one of the factors is either ignored or not implemented correctly.

Although the human side of BPR was perceived to be critical to BPR, the overall results still lead to the fact that most BPR projects fail. The results also indicated that IT's involvement in BPR is perceived as the least important factor in the process. This could be attributed to the fact that IT is not being used properly in the BPR process and therefore because people perceive it as being unimportant the process fails. "We believe that there is a potential for greater IT influence in BPR but only when the organisations adopt a change in mind set concerning the role of the IT function" [Dixon et al, 1994]. Thus IT needs to play a greater role in BPR before the success rate will improve. In order to ensure this we have developed a framework which highlights the role of IT in BPR and provides a practical guideline to ensuring BPR success.
7.0 A Framework for IT in BPR

The results of the questionnaire support the literature [CSC Index, 1992] which indicates that the majority of BPR projects fail. Combined with this is a poor perception of the role IT should be playing in BPR. In the light of this we present a revised framework for BPR which highlights the important role of IT. The framework will be based on Davenport and Short’s initial industrial engineering framework which focused largely on IT as a critical enabler of BPR [Davenport, 1990]. The objective of the framework is to provide a general guide to the facilitators of the BPR process and to ensure the emphasis of critical success factors.

7.1 Developing a business vision and process objectives.

The first step in the framework is to develop a business vision and process objectives. BPR is often initiated because management develops a vision for the organisation which cannot be supported by the current operating capabilities [Dixon et al., 1994]. Management may be reacting to a crisis imposed by outside competitive forces or may be taking a pro-active step in order to be prepared for future competition. Many organisations who attempt business process reengineering are leaders in their field and are looking to improve their current position [Dixon et al., 1994]. Whatever the reasons for attempting BPR, a business vision for BPR and for the organisation must be developed. A business vision can be defined as a broad strategic vision into which the process redesign activity fits [Davenport, 1990]. Davenport identifies this as a critical success factor. At Xerox for example this vision involved taking the perspective of the customer. At Westinghouse, the vision consisted largely of improving product quality [Davenport, 1990]. Each vision implied a specific objective for the process redesign. Likely objectives are cost reduction, time reduction, output quality and quality of work life. These objectives should be specific to the point of quantification. The setting of goals encourages the organisation to aspire to a set and known objective [Davenport, 1990].

According to the questionnaire the development of a business vision for BPR which is strategically aligned was the second most critical success factor. The development of a business vision should be developed by the business management during this phase and IS should play a support role [Martinez, 1995]. The SA questionnaire indicated that the consistent support of top management throughout the BPR process was the most critical out of the 13 critical success factors. Top management can therefore become involved by firstly assisting in developing a business vision and process objectives for the project.

When Banca di America e di Italia (BIA) reengineered its banking system it was driven by the CEO’s goal of creating a paperless bank [Hall et al., 1993]. Their business vision was to improve customer service levels whilst reducing cost per branch as well as improving front-office efficiency. The process objectives were to decrease cost per branch and to increase efficiency [Hall et al., 1993].

Thus the organisation needs to determine the needed organisational changes and then identify the level of transformation or reengineering necessary to enable the organisation to change. Venkatraman suggests a five level model where organisations must firstly determine which level of transformation is necessary to achieve the specific business vision. The organisations business vision will depend on whether the organisation is trying to rectify current deficiencies which is defined as “seeking efficiency” or the organisation is attempting to create capabilities for the future which is defined as enhancing capabilities. Most business visions in BPR are concerned with the first option, which involves a redesign effort only within the organisations boundaries. Once this has been determined managers can choose an appropriate degree of business transformation. Organisations attempting to enhance their capabilities will enter the level of transformation at business network redesign. This level represents the redesign of the organisation and all of the organisations interconnections with external business, such as suppliers and buyers [Venkatraman, 1994]. Once a business vision has been formulated this needs to be translated into technical reality. Venkatraman suggests IT provide a support role whilst BPR leaders develop the business vision. Once the new business vision has been developed, IS should lead by analysing the vision and then determining the technical implications for the new processes.
7.2 Identify processes to be redesigned

Once a clear business vision and the scope of the project has been determined, the candidate processes can be identified. This phase is known as the diagnostic phase of BPR and can be described as one of the most critical stages in BPR [Hall, Rosenthal and Wade, 1993]. This is because it is possible to reengineer the wrong processes and thus not meet the business vision which was developed in the first phase of BPR. The questionnaire revealed that the identification of processes is the eighth most important critical success factors in BPR, out of 13 factors.

This phase involves the BPR team surveying the businesses processes steps from initial customer contact through to the collection of funds [Hall et al, 1993]. Different frameworks each have specific methods to identify and prioritize processes which need to be redesigned. Davenport [1990] found the means by which the processes are identified to be a key issue during this phase.

Every process in a business should not however be reengineered. The importance of this phase is to understand the rationale of the current business processes and thus determine their strengths and limitations [Venkatraman, 1994]. The scope of the project, which was defined during the planning phase of BPR, should be used to limit the magnitude of the processes to be reengineered. Hall, Rosenthal and Wade found that for all organizations in their sample, expanding the dimensions of the redesign project was critical to success [Hall et al, 1993]. BPR projects which are too narrow and change only one or two aspects of the organisations depth levels are more likely to fail. Whilst reengineering single processes can be important for organisations with limited problems, this approach will not achieve the kind of widespread results managers are aiming for.

7.3 Understanding and measuring existing processes

Subsequent to the selection of candidate processes each of the processes needs to be understood and measured. This is firstly to gain an understanding of the problems with the existing process so they are not repeated. Secondly it is to serve as a baseline, so when new processes are measured they can be compared and thus the projects success measured and monitored. [Davenport, 1990]

Hall, Rosenthal and Wade found in their detailed study of 20 BPR projects that firstly the BPR team diagnosed by documenting all existing processes [Hall et al, 1993]. This was achieved by surveying all the process steps from initial customer contact to collection of funds. Interviews were conducted and all the relevant forms used in the process and all the controls were revealed. Each process was divided up into the number of existing activities and paperwork required to complete the process. Once a detailed picture of the process was gained it could be redesigned from scratch. The processes were then measured in terms of number of customers and the amount of support it provided. Examples are customer responsiveness and service efficiency. These would serve as benchmarks for the new process to be compared against.

These methods serve as rough guidelines to understand the existing processes, however other methods provide a more technical and specific method for measurement. Teng et al [1994], developed a functional coupling framework of business processes so processes could be plotted on a two dimensional space according to their current levels of mediation and collaboration. The degree of collaboration is the frequency and intensity of information exchange and mutual adjustment when functions are participating in the same process. Once the processes have been plotted, a strategic path for reengineering can be selected from the various paths available.

However it is important not to over emphasize this step. Designers should consider past process problems and errors but work from a clean slate. This means that not all processes should be measured, only those with specific objectives which have been set should be measured. Simply fine tuning the existing outdated processes through current technological capabilities does not create the desired BPR results [Venkatraman, 1994].
There are basically two approaches to measuring processes which can be attempted: the exhaustive approach and the high impact approach. The exhaustive approach attempts to identify all the processes within an organisation and then prioritize them in order of which needs to be redesigned first [Davenport, 1990]. A technique which can be used in this approach is the value chain method by Porter and Millar 1985. This method traces “upstream” processes such as operations through to “downstream” processes such as marketing, sales and services. The method identifies the role of IT whilst tracing the processes throughout the organisation. Once all the processes have been identified each process can be evaluated as to it’s strategic relevance, using a strategic management method such as the critical success factors method [Teng et al., 1994]. The second approach is the high impact approach which attempts to identify only the most important processes or those most in conflict with the organisations business vision.

Davenport suggests that most organisations can sense which business areas or processes are most crucial to the firms success, and those which are inconsistent with the organisations business vision. These can also be extracted through the use of interviews or company surveys [Davenport, 1990]. Hall, Rosenthal and Wade [1993] found that the key to which process to reengineer is to identify which two or three elements comprise customer value as well as what defines the organisations competitive advantage. If an organisations competitive advantage lies in performing customer service as fast as possible then the relevant processes should be reengineered. At a US electronics equipment manufacturer, seven possible job titles in three different functions were involved in the nine steps required to provide hardware. In the redesign these steps were combined by eliminating five job titles and thus the speed of the process increased and the service improved dramatically. This enabled the organisation to gain competitive advantage [Hall et al., 1993].

Davenport [1990] found the second method of identifying processes to be sufficient as most organisations do not have the resources to redesign all processes. At most, businesses were able to support only 10 to 15 major processes per year.

Whichever approach is used organisations need to classify each redesigned process in terms of beginning and end points, interfaces, and organisational units which are involved in the process and particularly the customers involvement. If processes are considered in these terms it can broaden the scope of the process and therefore increase the impact of the BPR project. This is important as most processes in an organisation are interconnected which makes it difficult for managers to isolate particular processes. Classification enables mangers to clearly identify processes and thus enables mangers to reengineer complicated processes [Davenport, 1994].

Davenport [1990] developed a framework for classifying processes in order to determine the level of management attention required, the role of IT and the business consequence of each process. To effectively leverage IT in candidate processes, certain characteristics of a business process need to be altered by IT to achieve a dramatic improvement. Thus classifying processes allows a role for IT to be identified more clearly and it allows a role for management to be defined.
7.4 Identifying IT Levers

Most BPR approaches have not, until recently, considered IT capabilities until after a process had been designed. The conventional wisdom in IT usage has always been to first determine the business requirements of a function, process, or other business entity, and then to develop a system [Davenport, 1990]. Rather the role of IT in a process should be considered in the early stages of its redesign [Henderson and Venkatraman, 1989] An awareness of IT capabilities can and should influence process design [Davenport, 1990].

Venkatraman developed a model which depicts five levels of IT enabled business transformation which can be used in BPR. The first level, namely Localized Exploitation, involves leveraging IT functionality within a business. It is basically the level at which IT is used to automate existing processes within a business function. Typically managers initiate and deploy these systems to respond to operational problems or challenges. Venkatraman concludes that simply automating existing processes under leverages IT’s potential capabilities and fails to provide organisations with as many possible advantages if the organisation had attempted to change the business processes to leverage the technical functionality. The main weakness is that competitors can easily imitate standard technical applications with minimal changes to their underlying business processes to neutralize sources of strategic advantage.

The second level, Internal Integration, reflects a more systematic attempt to leverage IT capabilities throughout the entire business. This level involves two types of integration, namely, technical interconnectivity and business process interdependence. (dealing with the interdependence of organisational roles and responsibilities across distinct functional) Venkatraman concludes that neither type alone is sufficient and that most firms achieve technical interconnectivity, however few firms address the challenge of business process interdependence.

The third level is business process redesign. This level reflects a strong view that the benefits from IT functionality are not fully realized if superimposed on the current business process, however integrated they may be [Venkatraman, 1994]. The reason for this is that current business processes subscribe to a set of organizational principles that responded to the industrial revolution. Organizational concepts such as centralization versus decentralization, span of control, line versus staff, functional specialization, authority-responsibility balance, and administrative mechanisms for coordination and control are all derived from these general principles. Venkatraman argues that although these concepts are still valid, IT functionality can significantly alter some of these "first principles" of business process redesign. The fourth level, Business Scope Redefinition, represents the redesign of the nature of exchange among multiple participants in a business network through effective deployment of IT capabilities. Level five, Business Scope Redefinition, addresses the question, "What role, if any, does IT play in influencing business scope and the logic of business relationships within the extended business network?" Here Venkatraman believes that IT is able to redefine the scope of a business, opening up new markets for the business. Otis Elevator has leveraged IT enabled features like remote elevator monitoring (REM) as an additional source of revenue [Inbound/Outbound]. In looking at Venkatraman's model we can see that a business which has only reached level two in the framework has only levered IT in so far as improving efficiency. However in order for a business to achieve a competitive advantage it must reach level three, BPR. BPR is the platform which is necessary in order for a business to create strategic capabilities for future competition. Venkatraman concludes that IT is not simply a utility like power or telephone but a fundamental source of business scope reconfiguration to redefine the "rules of the game", through restructured business networks (level 4) as well as redesigned business processes (level 3). IT is important in BPR as it has the potential to provide and support new forms of relationships and new ways of working in the organisation. However in order for IT to play a successful role in BPR an awareness of its potential needs to be realized at an early stage. Only considering IT once the processes have been redesigned means that IT can only be used as a tool to automate those processes and thus not affording the business a competitive advantage. Research from MIT Management in the 1990's strongly indicated that IT functionality should not be simply overlaid on existing business processes but should be used as a lever for designing the new organisation and associated business processes [Venkatraman, 1994].

Salesit '96
7.5 Designing and building prototypes of the processes

The final step in the BPR process is to design the process. This is usually done by the same team that performed the previous steps. This would involve obtaining inputs from the users involved and through brainstorming workshops [Davenport, 1990]. Prototyping allows the designers to perform successive iterations as needed. The nature of prototyping has the advantage of allowing problems with the process design to be identified and corrected at an earlier stage than with using the conventional development life cycle method.

The benefits of using prototyping in the development of IT applications has already gained widespread acceptance [Davenport, 1990]. Dorothy Leonard-Barton believes that building prototypes of business process changes and organisational redesign initiatives can yield similar benefits. The implications of this extension are that process designs, after agreement by owners and stakeholders, would be implemented on a pilot basis in parallel with existing processes. The processes would be examined regularly for problems and objective achievement and modified when necessary. As the process approached final acceptance it would be phased into full implementation.

IT plays an important role in this step by acting as a design tool. CASE tools facilitate in the process of process design by proving capabilities to draw process models. This ability to draw models rapidly and make changes suggested by process owners speeds redesign and facilitates owner buy-in [Davenport, 1990]. Some CASE tools go a step further and can actually generate computer code for the IS application that will support the redesigned business process. By using such tools any later changes to the business process are easily and rapidly accommodated.

8.0 Conclusion

BPR is a highly complex process in which a multitude of factors need to be considered in order for it to have any chance of success. BPR critical success factors have been established and frameworks have been developed to guide organisations attempting BPR so that their projects may meet with success. However most of these BPR projects are still being perceived as failures.

Our survey indicated that most managers perceived IT as the least critical of the identified critical success factors, however it also showed that most BPR projects had not been a success. This could be attributed to the fact that not enough emphasis is being placed on the role of IT in the BPR process, which is also supported by Martinez [1995].

We suggested that IT should be levered throughout the BPR process. Although the technical aspect of IT is crucial in the redesigning of business processes, it is critical that the IS team, involved in the BPR project, have the necessary people and management skills to compliment their technical skills.

IT alone will not produce a successful BPR project however if the project has top managements support and the support of the users directly involved then the correct use of IT, as shown in our framework, can lead to a successful BPR process.
Bibliography


2) CSC Index, 1992, Insights Quarterly. Fall


