

Business Process Reengineering

A review of recent literature

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Abstract

The purpose of this paper is to help demystify the confusion on Business Process Reengineering (BPR). This is achieved through a review of the literature covering the period from the late 1980s to 1998. Articles published in the leading business journals and the more popular business magazines were included in the review, as well as books published on the topic. The paper first discusses the need for reengineering and then reviews the literature under the following headings: definition of BPR, BPR tools and techniques, BPR and TQM co-existence, understanding organisational processes, the reengineering challenge, and organisational redesign using BPR. The review shows that considerable confusion exists as to exactly what constitutes BPR. Authors place different emphasis on the definition of BPR and the many outcomes possible with BPR. The paper concludes with suggestions for future research relating to BPR. © 1999 Elsevier Science Ltd. All rights reserved.

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1. Introduction

For almost a decade now there has been considerable discussion in the literature on Business Process Reengineering (BPR) and today there still remains considerable confusion, particularly amongst managers, as to exactly what constitutes BPR and how it is different from other change initiatives such as Total Quality Management. This paper presents a review of the existing literature on BPR and based on the literature review, proposes a number of topics that can be developed as potential research projects. The aim is to provide the reader with an understanding of what constitutes BPR and to assist in the better adoption of BPR amongst businesses. The review covered articles published in the leading academic journals and professional business magazines as well as covering books that are commercially available. The period covered was from the late 1980s to 1998.

A further aim of this paper is to identify areas for future research. Over 100 references are cited and listed at the end of this paper. In reviewing the literature, we

identified six major issues worthy of discussion in this paper. These are:

1. *The definition of BPR.* This section examines a number of definitions of BPR and the kinds of companies that undertake reengineering projects.
2. *BPR tools and techniques.* This section identifies the common tools and techniques used in reengineering business processes.
3. *BPR and TQM co-existence.* This section examines the similarities between BPR and TQM and their co-existence in an organisation.
4. *Understanding organisational processes.* This section discusses the importance of understanding the whole process.
5. *The reengineering challenge.* This section identifies the major management challenges relating to BPR.
6. *Organisational design using BPR.* This section discusses the redesign of processes and some of the risks perceived in embarking on a BPR programme.

Before discussing the above issues, the paper first discusses the radical changes that are taking place in businesses and in the market place. The need for a different approach to process management and the need for reengineering are also discussed. The paper ends with some

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concluding remarks and identifies potential research topics relating to BPR. It is clear from this review that more empirical research is necessary. Based on the literature review presented here, we identify a number of areas for future research relating to BPR.

2. The need for reengineering

To be a truly world-class organisation, the company needs to work as a team and all the functional areas of the business need to be properly integrated, with each understanding the importance of cross functional processes. As the basis of competition changes from cost and quality to flexibility and responsiveness, the value of process management is now being recognised. The role that process management can play in creating sustainable competitive advantage was termed Business Process Reengineering (BPR), and was first introduced by Hammer (1990); Davenport and Short (1990). These authors outlined a new approach to the management of processes, which, it was claimed, was producing radical improvements in performance. The three driving forces behind this radical change are an extension of Porter's (Porter, 1980, 1985, 1990) work on competitive advantage, and were summarised by Hammer and Champy (1993) as:

- customers who can now be very diverse, segmented, and are expectant of consultation,
- competition that has intensified to meet the needs of customers in every niche, and
- change that has become pervasive, persistent, faster and in some markets a pre-requisite.

Customers, competition, and change have created a New World for business, such that organisations designed to operate in one environment are inadequately equipped to operate well in another. Companies created to thrive on mass production stability, and growth cannot be simply improved to succeed in a world where customers, competition, and change demand flexibility and quick response. This is also what Drucker (1969) termed the "Age of Discontinuity" or the challenge to the traditional assumptions of business.

In today's marketplaces, it is no longer a question of caveat emptor, but rather caveat factor. Customers today are characterised by their relentless demands in quality, service, and price; by their willingness to act on default of contract and by their disloyalty. In fact, the new power and freedom of the customer has destroyed many of the managerial assumptions of the early Management Revolution (Drucker, 1954). There is no longer unearned brand loyalties, no more complicity among rivals in the same markets; no more passing on of rising wages and benefits in the form of higher prices; no more easy reliance on high entry costs to keep out upstart competi-

tors; and reducing protection by national governments. Still, as far as managers are concerned, the most powerful of the new stakeholders is the customer. The reward for managers who can earn their respect is not only repeat business but also willing investors. The aim of reengineering in this environment should be to facilitate the match between market opportunities and corporate capabilities, and in so doing, ensure corporate growth. To achieve these goals, downsizing and outsourcing will be by-products of reengineering, but they do not define reengineering, nor are they the purpose of reengineering.

Internally reengineering functional hierarchies into teams to facilitate work processes will lead to the elimination of most management layers and will teach managers to do far more with much less. Drucker's (Drucker, 1993) view, and one which we support, is that reengineering represents a radical shift away from the tradition in which performance was primarily rewarded by advancement into managerial ranks, that is, the future holds very few "control" positions. In the ideal, hierarchy should disappear from the reengineered company, and be replaced by the idea of purposeful value added interaction. A change of this magnitude raises many challenges for those managers left to develop, motivate, reward, and affirm employees.

Hammer and Champy (1993) have found within struggling US companies the long held belief that all would be all right if only they had the correct product and service at the right time. This thinking in a *change* environment is obsolete due to the limited life span of products. The decision to be made is whether to adopt a radical reengineering approach to change or a more gradual continuous improvement approach based on Total Quality Management (TQM). The choice depends on the magnitude of the needed change, the feasibility of it, and the resources required to accomplish it (Davenport, 1993a, b). Both reengineering and TQM approaches share certain principles and adopt a process perspective, so it is possible to make some general propositions on managing change that will enable a company to reinvent its competitive advantage (Jaworski and Kohli, 1993). They are:

- strategy that is not only linked to vision, but one that continuously questions what is being done, why it is being done, and how can it be done differently,
- top management commitment, to vision, strategy and objectives both at the organisational and functional levels,
- where change is necessary, clear goals, with projects broken down into manageable parts,
- promotion of cross-functional activities, shared objectives, and externally oriented thinking, and
- the decentralisation of decision making to a point as close to the customer as possible.

Above all it is the value adding processes that enable long-term success for an organisation. Achieving these

ends requires radical bottom-up redesign input, and effective, unwavering top-down leadership. A TQM methodology has typically delivered discontinuous process improvements on a small scale to several strategic business units within a company. Such an approach while able to keep abreast of technological improvements, competitive pressures and customer requirements, fails in its ability to take into account step changes in technology, or to drive changes across divisional boundaries, and as such is incapable of making significant bottom line improvements. Exemplar cases include:

- Ford's accounts payable with respect to Mazda (Hammer, 1990),
- Xerox's inefficient office systems with respect to Canon (Davenport and Short, 1990), and
- IBM Credit's inefficient approval process (Hammer and Champy, 1993).

All of these cases demonstrate that while improvements can be made to catch up or maintain best practice, to get ahead requires radical breakthroughs in performance, i.e. the reengineering of business processes (Earl and Khan, 1994).

The common theme running through reengineered or breakthrough improvements is technology, in particular information technology (IT). IT represents an all encompassing term for computer workstations linked to computer networks, open systems, client-server architecture, database groupware, and electronic commerce (EC). Together they have opened up the possibilities for the integrated automation of manual-paper based-business processes. The advent of computer assisted software engineering (CASE), and object-oriented programming has helped simplify systems design around office processes (Baets, 1993; Petrozzo and Stepper, 1994), enabling further cost reductions, and the rapid growth of a new industry (Venkatraman, 1994).

History is replete with technological advances such as the steam engine, the internal combustion engine, the telephone, the transistor, and the computer that made possible large step changes in both manufacturing and business processes. So too, IT is enabling both manufacturing and office processes to be automated and fundamentally restructured to take advantage of enormous efficiencies in information gathering, storage, processing, retrieval and presentation. Technology in itself, however, does not offer all the answers, i.e. automation frequently fails to produce the gains expected. The IT intensive banking and insurance industries, widely reported to be going through many major BPR exercises, has been shown to be making very little use of the latest IT solutions (Watkins, 1994; Zucco, 1996). Many companies putting in major new computer systems have achieved only the automation of existing processes. Others have not overhauled their existing IT hardware, but have expected the new systems to integrate with the old

(Watkins et al., 1993). Davenport (1994) warned that IT systems, the hard side of the organisation, need to match the soft requirements of the users. Also, many managers do not rely solely on computer based information to make decisions, and merely changing an IT system will not change a company's culture, strategy or structure.

Studies such as the 1994 CSC Index Survey of US and European companies (Champy, 1995) have confirmed that up to 70 percent of BPR programmes fail because reengineering programmes have been used as a substitute for strategic thinking. That is, companies undertaking BPR have used IT strategy as a substitute for an integrated corporate change strategy. The results are typically disastrous, with different functions within the same organisation left with IT systems that are incompatible with each other, and not being used to gain or improve cross structural benefits. Yet it is in the areas of cross functional, cross-divisional, and cross-company processes that the big improvement gains through IT are to be achieved (Duffy, 1994). A strategic overview is thus essential to reengineered process design and the subsequent selection and installation of the hard and soft systems. It is only with this approach that it becomes possible to automate cross structural processes (Short and Venkatraman, 1992; Taylor and Williams, 1994).

Unlike US companies, which have flocked to take on reengineering as a way to demonstrate they are taking action in their quarterly reports, the experience in other parts of the world (e.g. Australia) suggests companies are slower to reengineer, and as such have a lower rate of failure (Zampetakis, 1994). There is also much discussion within the literature as to what exactly constitutes business process reengineering, and how the concept of reengineering is integrated within the strategic and operational management processes of organisations.

3. Literature review

As mentioned in the introduction, the literature review is presented in six parts as follows.

3.1. Defining BPR

Several authors have provided their own interpretation of the changes being applied to organisations, for example Davenport and Short (1990) have described BPR as the analysis and design of work flows and processes within and between organisations. Hammer and Champy (1993) have promoted 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. Other authors such as Talwar (1993) have focused on the rethinking, restructuring and streamlining of the business structure, processes, methods of working, man-

agement systems and external relationships through which value is created and delivered.

Petrozzo and Stepper (1994) on the other hand, believe that BPR involves the concurrent redesign of processes, organisations, and their supporting information systems to achieve radical improvement in time, cost, quality, and customers' regard for the company's products and services. While Lowenthal (1994) describes the fundamental rethinking and redesign of operating processes and organisational structure, the focus is on the organisation's core competencies, to achieve dramatic improvements in organisational performance, as BPR's essential components.

Although the definition by Davenport and Short (1990) is much narrower, their description of the concept is as far-reaching. In practice, both TQM and BPR have focused on the definition and operation of business processes to produce products and services within a defined business scope. However, neither TQM nor BPR have focused on strategic business direction setting or planning, but of course these may be necessary components in achieving this vision. Also each methodology, in its own right, does not have the intention or the capability of reinventing business or industry. More importantly only one of these definitions refers to information systems. It can thus be said that BPR is not necessarily dependent on IT solutions. There is general agreement that IT can be a powerful enabler, with the *radical improvements sought more a function of organisational process redesign, rather than IT implementation* (Gadd and Oakland, 1995; Hammer and Champy, 1993). While IT specialists insist that new systems are central to BPR, the challenge is increasingly one of the implementation of organisational change and the visioning involved in that change, rather than the technology itself (Wastell et al., 1994).

Where there is confusion, it is in both the interpretation and the scope of the organisational change concept. Hammer (1990) referred to business process reengineering, while Davenport and Short (1990) to business process redesign. However, there are still many other authors with variations on these terms, all referring to process changes large and small. For example:

- Business process improvement (Harrington, 1991a),
- Core process redesign (Kaplan and Murdoch, 1991),
- Process innovation (Davenport and Short, 1990),
- Business process transformation (Burke and Pappard, 1993),
- Breakpoint business process redesign (Johanssen et al., 1993),
- Organisational reengineering (Lowenthal, 1994),
- Business process management (Duffy, 1994),
- Business scope redefinition (Venkatraman, 1994),
- Organisational change ecology (Earl et al., 1995), and
- Structured analysis and improvement (Zairi, 1997).

While some of these terms are clearly referring to a generic business process improvement model on a large scale, other authors (Watkins et al., 1993; Earl and Khan, 1994) point out that reengineering can be performed at a variety of different levels within the organisation. This is exemplified in IBM's reengineered finance process, which yielded large percentage improvements in costs, time, and quality, but had little effect on overall performance, because it was not a core process central to the strategy of the company (Currid, 1994). Put into strategic context, BPR becomes a means of aligning work processes with customer requirements in an interactive way, in order to achieve long-term corporate objectives. To achieve this, Senge (1990); Deming (1993) advocate a systems outlook involving customers, suppliers, and the future. Gulden and Reck (1991) support this view by showing that the secrets to designing a process lie not so much in intimately understanding the way it is performed today, but rather in thinking about how to reshape it for tomorrow.

Hammer and Champy (1993) went further to identify three kinds of companies that undertake reengineering:

- companies that find themselves in deep trouble. They have no choice. If a company's costs are an order of magnitude higher than the competition's or than its business model will allow, if its customer service is so abysmal that customers openly rail against it, if its product failure rate is higher than the competition's, if in other words, it needs order-of-magnitude improvement, that company clearly needs business reengineering,
- companies that are not in trouble but whose management can see trouble coming,
- companies that are in peak condition and see an opportunity to develop a lead over their competitors.

3.2. BPR tools and techniques

The various definitions of BPR suggests that the radical improvement of processes is the goal of BPR. They do not, however, refer specifically to the tools and techniques used in reengineering business processes. The result of this void is that authors and consultants alike have pursued the use of many different tools in the search for the best reengineering application. These tools and techniques include the following.

- *Process visualisation.* While many authors refer to the need to develop an ideal "end state" for processes to be re-engineered, Barrett (1994) suggests that the key to successful reengineering lies in the development of a vision of the process.
- *Process mapping/operational method study.* Cypress (1994) suggests that the tools of operational method studies are ideally suited to the reengineering task, but

that they are often neglected. Recent evidence suggests that these concepts have been incorporated into tools such as IDEF0 (Integrated Definition Method), DFD (Data Flow Diagrams), OOA (Object Oriented Analysis) (Yu and Wright, 1997), and Prince2 (Process based Project Management, see internet reference: Prince2).

- *Change management.* Several authors concentrate on the need to take account of the human side of reengineering, in particular the management of organisational change. Some authors (e.g. Mumford and Beekma, 1994; Bruss and Roos, 1993) suggest that the management of change is the largest task in reengineering. Kennedy (1994) on the other hand, incorporate the human element of reengineering due to the perceived threat it has on work methods and jobs.
- *Benchmarking.* Several authors suggest that benchmarking forms an integral part of reengineering, since it allows the visualisation and development of processes which are known to be in operation in other organisations (Harrison and Pratt, 1992; Chang, 1994; Furey, 1993).
- *Process and customer focus.* The primary aim of BPR, according to some authors, is to redesign processes with regard to improving performance from the customer's perspective (Chang, 1994; Vantrappen, 1992). This provides a strong link with the process improvement methodologies suggested by authors from the quality field, such as Harrington (1991a). In some cases, notably Chang (1994), the terminology is almost identical to that used by quality practitioners in the improvement of processes. The major difference, as outlined earlier, appears to be one of scale.

It should be noted that few authors refer to any single technique when discussing BPR. Most incorporate a mixture of tools, although the nature of the mix depends on the application, whether it be hard (technological) such as proposed by Teng et al. (1994) or soft (management of people), as seen from Mumford and Beekma (1994). While the exact methodologies to be used are the source of some discussion, it can be seen that BPR, as a strategic, cross-functional activity, must be integrated with other aspects of management if it is to succeed. This is particularly true since it is not the methodologies themselves, but rather the way that they are used which is unique in BPR (Earl and Khan, 1994). Of particular interest are the links between BPR and TQM.

In summary, therefore, BPR can be seen to represent a range of activities concerned with the improvement of processes. While some authors appear to suggest that tools and techniques are the key, most authors suggest that a strategic approach to BPR, and the development of a BPR strategy is the key to success (Guha et al., 1993; Bruss and Roos, 1993). There seems little doubt

in either the literature or in practice that efforts on the scale of BPR must be strategically driven and supported by senior management if they are to succeed (Gadd and Oakland, 1996; Barrett, 1994; O'Neill and Sohal, 1998).

3.3. BPR and TQM coexistence

TQM is "an approach to improving the competitiveness, effectiveness and flexibility of a whole organisation. It is essentially a way of planning, organising and understanding each activity, and depends on each individual at each level" (Oakland, 1993). TQM involves placing the customer as the focal point of operations. Its aim is to continuously improve process performance in order to satisfy customer requirements (Bennis, 1992). It involves the bottom-down communication and deployment of objectives, and the bottom-up implementation of continuous improvement activities. At the centre of TQM is the concept of the management of processes, and the existence of internal suppliers and customers within organisations. Organisations which have adopted TQM are likely to have developed an understanding of the processes which are operated, and attempt to make the customer the target of improvement activities (Oakland, 1993).

BPR also emphasises focus on the process. However, authors such as Klein (1993) suggest that BPR is much more radical than TQM, while others, notably Davenport (1993a); Harrison and Pratt (1992) suggest that TQM and BPR can and should form an integrated strategic management system within organisations. Davenport (1993c) suggests there is a need to undertake process analysis in order to identify which processes should be reengineered, and which should be managed on the basis of continuous improvement. The situation is in reality less clear-cut than reengineering versus continuous improvement, since improvement activities form a continuum from small incremental improvements to wholesale radical restructuring of an operation (Gadd and Oakland, 1996).

There have been an increasing number of articles calling for the need for both continuous and discontinuous improvement. For example, Hammer (1990) suggested that they should both fit under the umbrella of process management, while authors such as Chang (1994); Furey (1993); Taylor (1993) described programmes that integrate TQM and BPR as management tools. Hammer (1991) described sequential performance improvements using the two techniques and warned against using the two approaches concurrently.

Several authors of papers on BPR appear to consider continuous improvement of processes to be the only link to TQM. However, other aspects of the management of processes are considered equally important in both TQM and BPR, including:

- benchmarking (D'Aveni, 1995; Harrison and Pratt, 1992),
- culture change (Barrett, 1994; Batlett and Ghosal, 1995; Ghosal, 1995) and
- performance measurement (Hagel, 1993; Guha et al., 1993).

While improvements usually happen through small steps, Kano (1993) contends that the continuous accumulation of these can lead to radical breakthroughs. Juran (1964) goes even further to state that quality improvement teams can move directly to major innovations of a “breakthrough” kind. Hill and Wilkinson (1995) have also made clear that, while the BPR critique misunderstands the nature of TQM, it is possible that the practice of TQM in many organisations may have contributed to the misperception. Some TQM implementations are used to generate only incremental improvements and thus are a partial form of TQM that operates primarily among low-level employees, where small-scale incrementalism is likely. In this case BPR proponents have criticised the practice of organisations with partial quality management, rather than TQM itself. This may render more acceptable the failure of Hammer and Champy and others to come to grips with TQM. However Hall et al. (1993) have argued that BPR initiatives have also tended to be too narrow or partial because they take place within functions and departments rather than across the organisation. That is, they lack effective managerial stewardship, and they are not integrated with the holism of organisational change (Hill and Wilkinson, 1995).

It could appear that BPR is less likely to succeed outside TQM, since it uses the methods, process, and customer orientations of TQM to deliver step changes. If it does so on an ad hoc basis, without the training, experience, and organisational infrastructure that TQM takes for granted, it might be anticipated that organisational resistance would be greater than in a culture where planned quality change is taken for granted. Could this help explain the high failure rate among first time BPR projects? No, as argued by Zairi and Sinclair in their 1995 study of UK organisations (Zairi and Sinclair, 1995), very little distinction exists between TQ and non-TQ organisations, and the successful integration with BPR.

Cole (1994) concludes that an extraordinary amount of overlap exists between the quality and reengineering movements, and that the two initiatives complement each other. He believes that each component of the “quality house” is a building block onto which subsequent change programmes should build. Similarly, Thomas (1994), writes about the “aesthetic of manufacturing”, that simultaneously achieves mastery over current processes, promotes continuous improvement in those processes, and prepares for transformational

change. Most authors would seem to agree that if BPR helps focus attention on transformational change, without damaging core competencies and continuous improvement, it could effectively contribute to a total quality framework that will benefit the whole organisation. Looked at in this way, Gadd and Oakland (1996) argue further that TQM and BPR can be considered as two distinct and different approaches capable of coexisting in the same organisation, but used at different times to achieve different levels of performance improvement.

3.4. Understanding organisational processes

Both Deming (1993); Senge (1990) have written about the importance of *systems thinking* in understanding workflow, business processes, and the impact of feedback. In any system, events will occur that have an effect elsewhere in the system, and possibly on the event itself. In order to have a full understanding of the effects of what is being done, it is necessary to understand the whole process and how it fits into the organisational system.

IT has the capability of providing the means to achieve breakthrough performances in organisational systems. The vision, however, must come from understanding both the current and potential processes. This reality requires a more holistic view than that taken in traditional TQM programmes (Chang, 1994; Petrozzo and Stepper, 1994). The changes documented by Hammer (1990) at Ford, and by Davenport and Short (1990) at Xerox, involved radical redesign of the processes concerned. Cranswick (1994) reports that many Australian companies have undergone similar radical redesigns, such as the following examples.

- FAI Insurance's extensive use of IT is only a small part of its total reengineering process. It is used primarily to facilitate the cross-functional thinking that is needed for successful reorganisation.
- Ansett Australia purchased an off-the-shelf revenue management system, knowing full well that other airlines were buying the same product. Their strategic advantage came from the overall integration of system design into the human fabric of both organisation and client, rather than from the system itself.
- Penfolds and Seppelt identified that consistency, flexibility and availability of information emerged as issues that needed to be tackled if the company was to maintain a competitive framework. After much internal consultation, their IT staff number was cut from 32 to 16, and the company implemented a programme to roll out electronic data interchange services to its suppliers.
- Defence Acquisition Organisation (DAO) began the Government-endorsed Defence Reform Program 1

July 1997, with all aspects expected to be completed within 4 years. The DAO's business processes are to be re-engineered to achieve substantial efficiencies and greater effectiveness focusing on:

1. the consolidation of support and administrative function, reduction in committees and senior officers (staff reductions of approximately 20%), and
2. the collocation and reorganisation of acquisition functions, into groups focusing on common industry sectors or equipment types.

The total expected annual savings of \$50 million will be directed to enhancing military capabilities and combat elements (see DAO internet reference).

Some of the reengineering literature advises starting with a blank sheet of paper and redesigning the process anew. The problems inherent in this approach are:

- the danger of designing another inefficient system,
- ignoring the embedded system knowledge accumulated over many years, and
- not appreciating the scope of the problem (Petrozzo and Stepper, 1994; O'Neill and Sohal, 1998).

Therefore, many authorities (Klein, 1994; Grover and Malhotra, 1997; Stoddard and Jarvenpaa, 1995) recommend a thorough understanding of current processes before embarking on a reengineering project. Current processes can be understood and documented by flow-charting and process mapping. As processes are documented, their interrelationships become clear and a map of the organisation emerges. The aim of BPR is to make discontinuous, major improvements. This invariably means organisational change, the extent of which depends on the scope of the process reengineered.

As these cross-functional processes are reengineered to improve added-value output and efficiency, many organisations are now questioning the need or even the relevance of traditional functional structures, and are beginning to organise around core processes. In essence these are the processes that control the flow of real and virtual resources within an organisation (Kaplan and Murdoch, 1991).

3.5. The reengineering challenge

A study of "The State of Reengineering" was conducted in early 1994 by Champy (1995), and included 621 companies, representing a sample of 6000 of the largest corporations in North America and Europe. The study showed that 69% of the 497 American companies, and 75% of the 124 European companies responding were already engaged in one or more reengineering projects, and that half of the remaining companies were thinking about such projects.

However Champy (1995) found that substantial reengineering payoffs appear to have fallen well short of the potential goals Reengineering the Corporation had set:

- 70 percent decreases in cycle time,
- 40 percent decreases in costs,
- 40 percent increases in customer satisfaction, quality, and revenue, and
- 25 percent growth in market share.

Although little information is available on the 71 percent of the ongoing North American reengineering efforts in the sample, overall, the study showed that participants had failed to attain these benchmarks by as much as 30 percent. This leads to the conclusion that the thoroughly reengineered corporation is as yet a rarity. The problem, it would seem, is that reengineering of the corporation is *not extending to actual management practice*. This is typified by three vice presidents (for sales, service, and order-fulfilment) at a major US computer company, who were thrilled that reengineered work processes promised to cut product introduction time in half, raise customer retention rates by 20 percent, and slice 30 percent from administrative costs in their areas. They were not thrilled enough, however, to willingly give up control of their functional areas and collaborate. As a result, the reengineering effort died a year after its inception. In this case, senior management's leadership was not strong enough to implement a change in the pattern of shared values, beliefs and rules for behaviour—their culture (Davis, 1984).

Reengineering horizontal processes such as order fulfilment, new product development, and service delivery, so they become distinctive competencies that competitors cannot readily match is very different from managing a vertical function in a traditional hierarchical organisation. Day (1994) notes three distinctive tenets that must be understood by senior management before reengineering is undertaken:

- the change to process management emphasises external objectives. These objectives may involve customers' satisfaction with the outcome of the process,
- coordinating the activities of a complex horizontal process, will require boundaries and horizontal connections to be made—culture change, and
- unfiltered information that is readily available to all team members, so as to facilitate the learning process (Senge, 1990).

The loan approval process within IBM Credit illustrates both the problems and benefits of managing a process so it becomes a distinctive capability rather than simply a sequential series of necessary activities. Often this process is obscured from top management view because it links activities that take place routinely as sales forecasts are made, orders are received and scheduled, products are shipped, and services are provided (Shapiro et al., 1992). In another example, Marriott Hotels is able to consistently receive the best ratings from business travellers and meeting planners for high-quality service. They are certainly as capable as Hyatt, Hilton, and others at

selecting good sites, opening new hotels smoothly, and marketing them well (Irvin and Michaels, 1989). What consistently sets them apart and reveals a distinctive service core competency is a “fanatical eye for detail”. This begins with a hiring process that systematically recruits, screens, and selects from as many as 40 applicants for each position and continues through every hotel operation; for example, maids follow a 66-point guide to making up bedrooms. The effective management of these linked processes, within an organisational culture that values thoroughness and customer responsiveness, creates a distinctive capability that gives Marriott employees clear guidance on how to take the initiative to provide excellent customer service.

3.6. Organisational redesign using BPR

BPR is not intended to preserve the status quo, but to fundamentally and radically change what is done; it is dynamic. Therefore, it is essential for a BPR effort to focus on outcomes rather than tasks, and the required outcome will determine the scope of the BPR exercise.

Schaffer and Thomson (1992) highlighted how focusing on results rather than just activities makes the difference between success and failure in change programmes. The measures used, however, are crucial. At every level of reengineering, a focus on outcome gives direction and measurability; whether it be cost reduction, head count reduction, increase in efficiency, customer focus, identification of core processes and non-value-adding components, or strategic alignment of business processes. Benchmarking is a powerful tool for BPR and is the trigger for many BPR projects, as in Ford's accounts payable process. The value of benchmarking does not lie in what can be copied, but in its ability to identify goals (Richman and Koontz, 1993; Earl and Khan, 1994). If used well, benchmarking can shape strategy and identify a potential competitive advantage (Zairi and Leonard, 1994).

Hamel and Prahalad (1989, 1990, 1991) established that strategic direction via intent rather than portfolio analysis should be the key to an organisation's core competencies, and that through expeditionary marketing this should lead on to developing the skills required to achieve the intent. Establishing its core processes focuses a company on what it does, how it does it, and how it should do it. Core process redesign can thus channel an organisation's competencies into an outcome that gives it strategic competitive advantage (Kaplan and Murdoch, 1991). The key element is visioning that outcome (Goss et al., 1993).

3.6.1. The redesign process

Central to BPR is an objective overview of the processes to be redesigned. Whereas information needs to be obtained from the people directly involved in those

processes, it is never initiated by them. Even at its lowest level, BPR has a top-down approach (Hammer and Champy, 1993). Therefore, most BPR efforts take the form of a project (Earl and Khan, 1994). There are numerous methodologies being proposed, but all share common elements. Typically, the project takes the form of several discrete phases (Carr and Johansson, 1995).

People need to be equipped to assess, reengineer, and support—with the appropriate technology—the key processes that contribute to customer satisfaction and corporate objectives (Coulson-Thomas, 1993). Therefore, BPR efforts can involve substantial investment (Petrozzo and Stepper, 1994), but they also require considerable top management support and commitment. Critical to the success of the redesign is the make-up of the reengineering team. Most authors suggest that the team should comprise the following:

- senior manager as sponsor
- steering committee of senior managers to oversee overall reengineering strategy
- process owner
- team leader
- redesign team

This structure varies depending on the author. For example, Harrington (1991b) referred to executive improvement teams and process improvement teams rather than steering committees and reengineering teams. Champions (team leaders) and czars (sponsors) were also referred to, and, depending on the scope of the reengineering effort, the sponsor, process owner, and leader may be one or more people (Hammer and Champy, 1993). The process owner is someone given the responsibility for the overall reengineering of a specific process.

The project approach to BPR suggests a one-off approach. When the project is over, the team is disbanded and business returns to normal, albeit a radically different normal. It is generally recommended that an organisation does not attempt to reengineer more than one major process at a time, because of the disruption and stress caused. Therefore, in major reengineering efforts of more than one process, as one team is disbanded, another is formed to redesign yet another process. Considering that Ford took 5 years to redesign its accounts payable process (Davenport, 1993c), BPR on a large scale is a long-term commitment. In a rapidly changing business environment, it is becoming more likely that companies will reengineer one process after another. *Competitive advantage* is a dynamic goal—one that does not stand still (D'Aveni, 1995).

Once a process has been redesigned, most authors call for continuous improvement of the new process by the team of people working in the process. That is, organising work around people which fosters interaction, understanding, and responsibility. The dissemination of infor-

mation via IT further empowers the team to make decisions and inevitably results in a delayering of management structures.

3.7. Greatest risks perceived in embarking on a BPR programme

Carr and Johansson (1995) identified two types of risk in the implementation of BPR: Technical Risk, which is a fear that the process changes will not work, and Organisational Risk, by far the greatest risk, which is the possibility of corporate culture reaction against the changes.

It is also noteworthy that only 44 percent of respondents to the Carr and Johansson survey cited that they would accept more than a modest amount of risk during implementation. Thirty seven percent of respondents cited multiple communications with employees as a critical must do in order to minimise the risks in a reengineering effort. The message should be simple, involve top management, and must be communicated as early as possible so that understanding and buy-in is created at the start of the project. Another methodology cited by Carr and Johansson in the reduction of risk is to demonstrate the success of reengineering through the implementation of precisely targeted pilot programmes. They help communicate strategy, and can also reinforce management commitment and create user buy-in.

4. Conclusions and areas for future research

This paper has presented a review of the literature on Business Process Reengineering. It first discussed the need for reengineering and then presented a critique of the literature on the definition of BPR, BPR tools and techniques, BPR and TQM co-existence, understanding organisational processes, the reengineering challenge and organisational design using BPR. Clearly there is confusion in the literature as to what constitutes BPR. Although it has some commonality with Total Quality Management, for example the concept of continuous improvements, BPR is a radical redesign of business processes to achieve dramatic improvement. A range of tools and techniques can be used for process improvement including process visualisation and flowcharting, operational method studies, organisational change software packages, benchmarking, and process and customer focus groups.

BPR has achieved popularity amongst businesses in a very short period of time. Consultants have heavily promoted it, with very mixed results amongst companies that have implemented BPR. Empirical research in BPR has been lagging and it presents the academic community with a considerable opportunity. Based on the literature review presented in this paper, we identify

below a number of research topics that can be researched by the academic community.

1. BPR, corporate objectives and organisational structure—investigating the link between BPR and long-term corporate objectives and how these impact on the structure of the organisation.
2. The relationship between the adoption of BPR tools and techniques and business performance.
3. Best practices relating to the adoption of BPR tools and techniques.
4. The extent to which the different elements of TQM facilitate the success of BPR projects.
5. Best practices in managing BPR projects—lessons learnt from successful and unsuccessful BPR projects and identifying the factors critical to success.
6. The role of process owners (and customers and suppliers) in BPR projects.
7. Team work in BPR.
8. The role of top/senior management in successful BPR implementation.
9. Managing the risks involved in BPR.

Rigorous, empirically based research in the above areas can help in demystifying the confusion that exists concerning BPR. What is clear from the review presented in this paper is that BPR must be seen as a strategic, cross-functional activity that needs to be integrated with other aspects of management if it is to deliver benefits for the organisation. The key requirement is that managers understand in detail the current business processes before embarking on a BPR project. The application of IT can provide major improvements in the performance of business systems, and while considered a major part of the reengineering activity, must be integrated with the needs of all stakeholders in mind.

References

- Baets, W., 1993. IT for organisational learning: Beyond business process engineering. *Business Change and Reengineering* 2 (2), 32–40.
- Barrett, J.L., 1994. Process visualization: Getting the vision right is the key. *Information Systems Management* 11 (2), 14–23.
- Bartlett, C.A., Ghoshal, S., 1995. Rebuilding behavioural context: Turn process reengineering into people rejuvenation. *Sloan Management Review* 37 (1), 11–24.
- Bennis, W. (Ed.), 1992. *Leaders on Leadership: Interviews with Top Executives*. Harvard Business Review.
- Bennis, W., 1994. *On Becoming a Leader*. Addison-Wesley, Reading, MA.
- Bruss, L.R., Roos, H.T., 1993. Operations, readiness and culture: Don't reengineer without considering them. *Inform* 7 (4), 57–64.
- Burke, G., Peppard, J., 1993. Business process redesign: Research directions. *Business Change and Reengineering* 1 (1), 43–47.
- Carr, D., Johansson, H., 1995. *Best Practices in Reengineering*. McGraw-Hill, New York.
- Champy, J., 1995. *Reengineering Management*. Harper Collins, London.
- Chang, R.Y., 1994. Improve processes, reengineer them, or both? *Training and Development* 48 (3), 54–58.

- Cole, R., 1994. Reengineering the corporation: A review essay. *Quality Management Journal* 1 (4), 77–85.
- Coulson-Thomas, C.J., 1993. Corporate transformation and business process engineering. *Executive Development* 6 (1), 14–20.
- Cranswick, K., 1994. Technology's place in business change. *Business Review Weekly*, 11 April.
- Currid, C., 1994. *The Reengineering Toolkit*. Prima Publishing, Rocklin.
- Cypress, M.L., 1994. Re-engineering. *OR/MS Today* 21 (1), 18–29.
- DAO, Defence Acquisition Organisation, <http://www.defence.gov.au/dao>
- D'Aveni, R.A., 1994. *HyperCompetition: Managing the Dynamics of Strategic Maneuvering*. Free Press, New York.
- Davenport, T.H., 1993a. Need radical innovation and continuous improvement? Integrate process reengineering and TQM. *Planning Review* 21 (3), 6–12.
- Davenport, T.H., 1993b. *Process Innovation: Reengineering Work Through Information Technology*. Harvard Business School Press, Boston.
- Davenport, T.H., 1993c. *Process Innovation*. Harvard Business School Press, Boston.
- Davenport, T.H., 1994. Saving IT's soul: Human-centred information management. *Harvard Business Review* March–April, 119–131.
- Davenport, T.H., Short, J.E., 1990. The new industrial engineering: Information technology and business process redesign. *Sloan Management Review* 31 (4), 11–27.
- Davis, S.M., 1984. *Managing Corporate Culture*. Ballinger Publishing Co., Cambridge, MA.
- Day, G.S., 1994. The capabilities of market-driven organisations. *Journal of Marketing* 58 (4), 37.
- Deming, W.E., 1993. *The New Economics: For Industry, Government, Education*. MIT Center for Advanced Engineering Study, Cambridge, MA.
- Drucker, P.F., 1954. *The Practice of Management*. Harper and Row, New York.
- Drucker, P.F., 1969. *Age of Discontinuity: Guidelines to our Changing Society*. Heinemann, Oxford.
- Drucker, P.F., 1993. *Post-Capitalist Society*. Butterworth-Heinemann, Oxford.
- Duffy, D., 1994. Managing the white space (cross-functional processes). *Management* April, 35–36.
- Earl, M., Khan, B., 1994. How new is business process redesign. *European Management Journal* 12 (1), 20–30.
- Earl, M.J., Sampler, J.L., Short, J.E., 1995. Strategies for business process reengineering: Evidence from field studies. *Journal of Management Information Systems* 12 (1), 31–57.
- Furey, T.R., 1993. A six-step guide to process reengineering. *Planning Review* 21 (2), 20–23.
- Gadd, K., Oakland, J., 1996. Chimera or culture? Business process re-engineering for total quality management. *Quality Management Journal* 3 (3), 20–38.
- Gadd, K.W., Oakland, J.S., 1995. Discontinuous change in a total quality environment. D2D Ltd: A case study. *Business Process Reengineering and Management Journal* 1 (2), 7–27.
- Goshal, S., Bartlett, C.A., 1996. Rebuilding behavioural context: A blueprint for corporate renewal. *Sloan Management Review* 37 (2), 23–37.
- Goss, T., Pascale, R., Athos, A., 1993. The reinvention roller coaster: Risking the present for a powerful future. *Harvard Business Review* November–December, 97–108.
- Grover, V., Malhotra, M.K., 1997. Business process reengineering: A tutorial on the concept, evolution, method, technology and application. *Journal of Operations Management* 15 (3), 193–213.
- Guha, S., Kettinger, W.J., Teng, J.T.C., 1993. Business process reengineering: Building a comprehensive methodology. *Information Systems Management* 10 (3), 13–22.
- Gulden, G.K., Reck, R.H., 1991. Combining quality and reengineering for operational superiority. *Perspectives on the Management of Information Technology* 8 (1), 1–12.
- Hagel III, J., 1993. Keeping CPR on track. *The McKinsey Quarterly* 4, 59–72.
- Hall, G., Rosenthal, J., Wade, J., 1993. How to make reengineering really work. *Harvard Business Review* November–December, 119–131.
- Hamel, G., Prahalad, C.K., 1989. Strategic intent. *Harvard Business Review* May–June, 63–76.
- Hamel, G., Prahalad, C.K., 1990. The core competence of the corporation. *Harvard Business Review* May–June, 70–91.
- Hamel, G., Prahalad, C.K., 1991. Corporate imagination and expeditionary marketing. *Harvard Business Review* July–August, 81–92.
- Hammer, M., 1990. Reengineering work: Don't automate, obliterate. *Harvard Business Review* July/August, 104–112.
- Hammer, M., 1991. Why we need both continuous and discontinuous improvement. *Perspectives on the Management of Information Technology* 8 (1), 6–7.
- Hammer, M., Champy, J., 1993. *Reengineering the Corporation: A Manifesto for Business Revolution*. Harper Business, New York.
- Harrington, H.J., 1991a. Improving business processes. *TQM Magazine* February, 39–44.
- Harrington, H.J., 1991b. *Business Process Improvement*. McGraw-Hill, New York.
- Harrison, D.B., Pratt, M.D., 1992. A methodology for reengineering businesses. *Planning Review* 21 (2), 6–11.
- Hill, S., Wilkinson, A., 1995. In search of TQM. *Employee Relations* 17 (3), 8–20.
- Irvin, R.A., Michaels III, E.G., 1989. Core skills: Doing the right things right. *The McKinley Quarterly* Summer, 4–19.
- Jaworski, B., Kohli, A.K., 1993. Market orientation: Antecedents and consequences. *Journal of Marketing* 57, 53–70.
- Johanssen, H.J., McHugh, P., Pendlebury, J., Wheeler III, W.A., 1993. *Business Process Reengineering: Breakpoint Strategies for Market Dominance*. John Wiley and Sons, New York.
- Juran, J., 1964. *Managerial Breakthrough*. McGraw-Hill, New York.
- Kano, N., 1993. A perspective on quality activities in American firms. *California Management Review* Spring, 12–31.
- Kaplan, R.S., Murdoch, L., 1991. Core process redesign. *The McKinsey Quarterly* 2, 27–43.
- Kennedy, C., 1994. Re-engineering: the human costs and benefits. *Long Range Planning* 27 (5), 64–72.
- Klein, M.M., 1993. IEs fill facilitator role in benchmarking operations to improve performance. *Industrial Engineering* 25 (9), 40–42.
- Klein, M.M., 1994. Reengineering methodologies and tools. *Information System Management* 11 (2), 30–35.
- Lowenthal, J.N., 1994. *Reengineering the Organization; A Step-By-Step Approach to Corporate Revitalization*. ASQC Quality Press, Milwaukee, USA.
- Mumford, E., 1994. New treatments or old remedies: Is business process reengineering really socio-technical design? *Journal of Strategic Information Systems* 3 (4), 313–326.
- Mumford, E., Beekma, G.J., 1994. *Tools for Change and Progress: A Socio-technical Approach to Business Process Re-engineering*. CG Publications, UK.
- Oakland, J., 1993. *Total Quality Management*, 2nd ed. Heinemann, London.
- O'Neill, P., Sohal, A., 1998. Business process reengineering: application and success—an Australian study. *International Journal of Operations and Production Management* 18 (9–10), 832–864.
- Petrozzo, D.P., Stepper, J.C., 1994. *Successful Reengineering*. Van Nostrand Reinhold, New York.
- Porter, M.E., 1980. *Competitive Strategy*. Free Press, New York.
- Porter, M.E., 1985. *Competitive Advantage*. Free Press, New York.
- Porter, M.E., 1990. The competitive advantage of nations. *Harvard Business Review* 68 (2), 73–92.

- Prince2, <http://www.prince2.com/managementoverview.html/>
- Richman, T., Koontz, C., 1993. How benchmarking can improve business process reengineering. *Planning Review* 21 (6), 26–27.
- Senge, P.M., 1990. *The Fifth Discipline: The Art and Practice of the Learning Organisation*. Doubleday, New York.
- Schaffer, R.H., Thomson, H.A., 1992. Successful change programs begin with results. *Harvard Business Review* January–February, 80–89.
- Shapiro, B.P., Kasturi Rangan, V., Sviokla, J.J., 1992. Staple yourself to an order. *Harvard Business Review* July/August, 113–122.
- Short, J.E., Venkatraman, N., 1992. Beyond business process redesign: Redefining Baxter's business network. *Sloan Management Review* Fall, 7–21.
- Stoddard, D.B., Jarvenpaa, S.L., 1995. Business process redesign: Tactics for managing radical change. *Journal of Management Information Systems* 12 (1), 81–107.
- Talwar, R., 1993. Business re-engineering—A strategy-driven approach. *Long Range Planning* 26 (6), 22–40.
- Taylor, S., 1993. Eastman Chemical strives for better than world class. *Industrial Engineering* November, 28–34.
- Taylor, J.A., Williams, H., 1994. The 'transformation game': Information systems and process innovation in organisations. *New Technology, Work and Employment* 9 (1), 54–65.
- Teng, J.T.C., Grover, V., Fielder, D.K., 1994. Re-designing business processes using information technology. *Long Range Planning* 27 (1), 95–106.
- Thomas, R., 1994. *What Machines Can't Do*. University of California Press, Berkeley.
- Vantrappen, H., 1992. Creating customer value by streamlining business processes. *Long Range Planning* 25 (1), 53–62.
- Venkatraman, N., 1994. IT-enabled business transformation: From automation to business scope redefinition. *Sloan Management Review* Winter, 73–87.
- Wastell, D.G., White, P., Kawalek, P., 1994. A methodology, for business process redesign: Experiences and issues. *Journal of Strategic Information Systems* 3 (1), 23–40.
- Watkins, J., 1994. Business process redesign in the UK retail financial services sector. *Business Change and Re-engineering* 1 (4), 8–48.
- Watkins, J., Skinner, C., Pearson, J., 1993. Business process reengineering: Hype, hazard or heaven. *Business Change and Re-engineering* 1 (2), 41–46.
- Yu, B., Wright, D.T., 1997. Software tools supporting business process analysis and modelling. *Business Process Management Journal* 3 (2), 133–150.
- Zairi, M., 1997. Business process management: a boundaryless approach to modern competitiveness. *Business Process Management Journal* 3 (1), 64–80.
- Zairi, M., Leonard, P., 1994. *Practical Benchmarking—A Complete Guide*. Chapman and Hall, London.
- Zairi, M., Sinclair, D., 1995. Business process re-engineering and process management: A survey of current practice and future trends

- in integrated management. *Business Process Re-engineering and Management Journal* 1 (1), 8–30.
- Zampetakis, H., 1994. Survey re-engineering and rightsizing—Magic bullet often misses the target. *Financial Review*, 14 February 1994, p. 38.
- Zucco, N. (Ed.), 1996. *Re-engineering Australian Banks—Achieving a quantum leap in performance*. An Internal Study Paper, KPMG.



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