INFORMATION TO USERS

AN EXAMINATION OF THE ROLE OF INFORMATION TECHNOLOGY AS AN ENABLER OF BUSINESS PROCESS REENGINEERING

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ABSTRACT

An Examination of the Role of Information Technology

as an Enabler of Business Process Reengineering

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Several change agents, including globalization and increasingly sophisticated information technologies, both hardware and software, are causing organizations to review the essence of doing business. An information-technology-enabled reengineering of business process is one response to the cry for quality improvement initiatives during the past few decades. A review of the literature reveals an integrated approach for effective business process reengineering is desirable. A revised model is suggested to envisage a BPR initiative as a holistic treatment of Information Technology, Corporate Strategy, Senior Management Commitment and Leadership, Human Resource functions, and Organizational Support features. To explore the construct validity of the model, this study undertakes a multiple case study consisting of three cases, in three industries: a national police service, an aerospace manufacturer, and an intimate-apparel manufacturer. Categorization according to the Venkatraman model is suggested, as well as suggestions for further research in this area.

ACKNOWLEDGMENTS

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III. INTRODUCTION

Quality improvement has been a focal point of interest within the business world and academia for several decades. Recent work on service quality (Waldman & Gopalakrishnan, 1995), on top-management commitment (Waldman, 1993), on an international comparison of total quality management (Galperin & Lituchy, 1994), and quality management in Canadian health care (Kaltsounakis, 1995) are part of a growing list of studies that include notable quality gurus as Deming (1986), Juran (1986), and reengineering gurus as Hammer and Champy (1993) and Davenport (1993). Several change agents are at work, forcing nations and their businesses to improve in order to become more competitive.

Indeed, globalization, the competitor's ability to reduce lead-time, and the abilities and decision-making authority of empowered employees who produce quality service and products, are forcing companies to re-examine their corporate and business strategies. Likewise, mergers and takeovers are creating giants that dominate the smaller competitors. Currid (1994) indicates that privatization of government agencies is also forcing related companies to be more competitive. Prahalad (1990) explains that the nature of competition has been shifting toward competitor ability to create new product and new business.

The gurus of change and the quality gurus, whether industry leaders or academics, have suggested different approaches. The initiatives to improve quality include Total Quality

Management (TQM), (Ayers, 1993; Niven, 1993; Sashkin & Kiser, 1993), ISO 9000 (Arnold, 1994; Bradley, 1994; Corrigan, 1994), and Business Process Reengineering (BPR). This study will focus on BPR as a radical and dramatic change initiative that generates quantum leaps in measures of quality and customer satisfaction, efficiency, market share, or dramatic reductions in cycle-time, or costs. Specifically a model will be developed and tested that suggests that information technology is a prime driver of reengineering but that corollary drivers must complement technology in the model.

IV. LITERATURE REVIEW AND BACKGROUND

A. *Call for change*

Johansson, McHugh, Pendlebury and Wheeler (1993) demonstrate that in the past four decades Western and Eastern countries have been in competition for market share. During the 1950s, Western firms increasingly enjoyed high-production years. With this "market driven" philosophy Western firms began to pull away from the rest in the global competition for market share. In order to increase market share, and eventually catch up and pass the Western firms in the global market, firms from Japan and other Pacific Rim countries began to seek "process excellence" to improve the quality of their products and their bottom line. (See Table VI-5 and Figure IV-1.)

Table IV-1   Japanese vs. Western Focus

	JAPANESE		WESTERN	
	SYSTEM	DRIVER	SYSTEM	DRIVER
1950	Functional focus	Production driven	Functional focus	Production driven
1950's				Market driven
1960's	Beginning of a Process focus			
1973	Process focus			
1978				Production driven
1980		Market driven (Tactical level)	Process focus	
1990		Market driven (Strategic focus)		Market driven (Tactical level)

Figure IV-1   Japanese vs. Western Focus
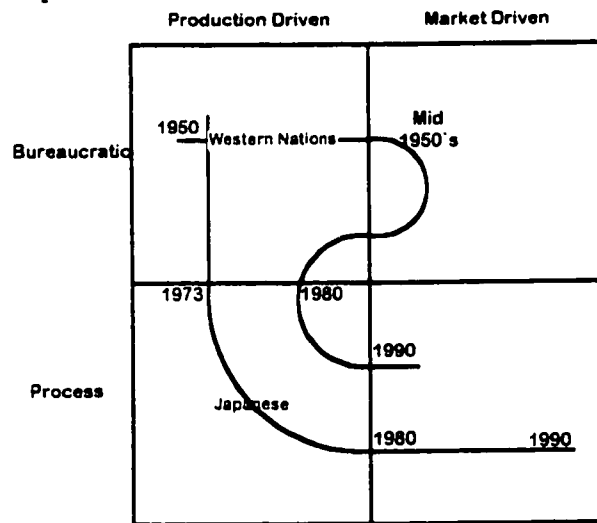
Figure 1 1

Source: Johansson, McHugh, Pendleburry, Wheeler, (1993)

As Western leaders realized the results of the shift, they began a call for change in the fear of falling far behind the Pacific Rim countries (Dertouzos, Lester & Solow, 1989; Farnum, 1994). Market-driven productivity with its "push-type" manufacturing was replaced with sane production-driven control and "pull- type" operations.   Still   facing   tough

competition, Western firms finally in 1980, some seven years after the similar move by the Japanese, began to shift from a function focus to a process focus. The strategic alliances that the West has now begun to realize, began earlier with the East (Johansson et al. 1993).

It is in this context that North American leaders from business, government and academia, perceiving the evidence among different industries and institutions of declining productivity and of an eroding morale began to call for change. Many individuals considered some North American products to be inferior to foreign goods; North American factories to be inefficient; the work force to be indifferent or ill trained; and managers to have little vision and concerned only with the short term (Deutouzos et al. 1989). Belmonte and Murray (1993) indicate that corporate America faced "unparalleled challenges to its once unsurpassed prosperity".

In a similar way, Stewart (1992) warns that although America's workers are the world's most productive, the lead is eroding and unless the U.S. fixes some serious weaknesses, its standard of living is at risk. Sheridan (1991) proposes that the underlying problem is company culture steeped in a *production mentality*. He states that top managers must not only change themselves, they must help change the culture of the organization. Hammer and Champy (1993, p.30) state, "America's business problem is that we are entering the 21st century with businesses designed in the 19th century to work well in the 20th century." Mintzberg (1979) indicates that managerial activities, notwithstanding increasing technology, for the most part have not changed substantially for more than a century.

Furthermore, Prahalad (1990) suggests that while management in America has devoted time and energy on operational efficiency, it has become fundamentally necessary to re-think the reasons for the decline in American business; and to develop a willingness to accept a paradigm shift in the way large companies are managed. Johansson, McHugh, Pendlebury and Wheeler (1993) suggest that beyond the customer demands, there are other demands including: cost, competition, technology shifts, and shareholders. "Competitive advantage" is now to be gained by a firm's ability to (i) change cost structures, and (ii) be innovative regarding products and process, and, (iii) provide quality of service and product (Conklin, 1994).

In parallel to the shifts in productivity management, we find shifts in technology management that condition the need for facing change. Boynton and Zmud (1987 p.60) give us a brief indication of how information technology (IT) management had shifted during the past few decades:

> *(1) From 1965-75, IT management was characterized by efforts to integrate core business functions with information technology. The influential IS function began to emerge via four activities: systems development, operations, technical support services, and administration.*
> *(2) From 1975-85, IT increasingly supported managers and professional staff, and began acting as a business within a business.*
> *(3) For the past years, subunits within organizations have been positioning themselves closer to information resources. Essentially managers throughout the organization are influencing their company's use of IT.*

Virtually all current writers state that the change required for business is that there needs to be a focus on the customer. Competition amongst businesses to satisfy customers will force companies to efficiently and effectively speed up product development, remain

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flexible, build in quality, while reducing costs (Frame, 1994; Waldman & Gopalakrishnan, 1995).

Several agents, other than the customer, are forcing change. Among these we can include: competition, costs, technology, and shareholders. It might be noted that competition can be local, national, or global. Many might argue that with the arrival of ever-improving communication technology, there is little difference between global and local competition. The competitor on the other side of the globe is virtually down the street. Furthermore, "Politics, economics, legislation, and regulations often make the rethinking (change) more urgent " (Johansson et al. 1993, p.5).

The need for change suggests that classical business structure (job specialization within fragmented processes according to functions or departments) is, according to Sheridan (1991), self-perpetuating. Adam Smith's approach and Frederick Winslow Taylor's "scientific management" system are out; it is time for change (Hammer & Champy, 1993; Davenport, 1993). Hammer and Champy (1993) posit that the Smith-influenced, task-oriented job, characteristic of the classical business structure of specialized work and fragmented processes, stifles innovation and creativity in an organization.

Stalk, Evans, and Shulman (1992) caution that in various industries, established competitors are being overtaken by new rivals who are part of a shift in corporate strategy. They identify this new strategy as a capabilities[1]-based competition, which

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[1] A capability is a set of business processes strategically understood (Stalk et al. 1992).

establishes *where* a company chooses to compete as opposed to *how* it intends to compete. Hamel and Prahalad (1994) refer to this as core-competence, "the combination of individual technologies and production skills that underlie a company's myriad product lines". The bottom line suggests that, which capabilities a firm chooses for itself is the essential quality of their corporate strategy.

Hammer and Champy (1993) call for the new competitive firm to be one that is lean, nimble, flexible, responsive, competitive, innovative, efficient, customer focused, and profitable. "If a company cannot stand shoulder to shoulder with the world's best in a competitive category, it soon has no place to stand at all", they say (p. 21). It has become abundantly obvious that firms today must become relentless in their attempts to delight their customers, to dominate the market in a specific niche, and to ensure (increase) profitability.

Heeding these warnings and facing stiff new competition for its products and services, Western managers have begun to apply newly developed approaches to management. Several authors have suggested that business leaders should move their firms in the new directions of quality management, through continuous improvement, or even through radically[2] innovative change (Deming, 1986; Juran, 1989; Hammer & Champy, 1993; Davenport, 1993, Arnold, 1994). Examining Canadian businesses, Conklin (1994)

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[2] "Radical" refers to getting to the root of things (ignoring the superficial) and in a business sense it refers to reinvention as opposed to improving, enhancing, or modifying. (Hammer & Champy 1993). Belmonte and Murray (1993), indicate Business Process Reengineering (BPR) is radical because it challenges the assumption of status quo and the need to perform a process.

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indicates that in order for Canadian firms to compete globally, they will have to be prepared to restructure as part of their reaction to the market. He further indicates that NAFTA is creating new opportunities for Canadian firms to take competitive advantage through a sense of entrepreneurship within a process of reengineering both in business and in government.

B. Business Process Reengineering: Response

Business Process Reengineering is a new approach to attaining quality improvement in products and/or, service. Yet, the leaders have yet to arrive at a consensus as to the terminology and the principal components. According to Reeves and Bednar (1994, p. 420), "The literature linking quality to outcomes such as market share, cost, and profits has yielded conflicting results that are largely attributable to definitional difficulties. Increased understanding of these important relationships will occur only when the quality construct is more precisely defined."

Reengineering, advanced only for the past five years, has undoubtedly been affected by such definitional difficulties. There have been few empirical studies published on this BPR topic and because of the lag in publishing between the time of submission and the time of publication (Daft & Lewin, 1994), scientific studies have only recently begun to reach the market.

The term Business Process Reengineering (BPR) has as many descriptions as there are writers. One might consider it simply, as did Johansson, McHugh, Pendlebury and Wheeler (1993), as a dramatic attempt to enhance organizational accomplishment by

improving the efficiency, the effectiveness, and the attunement of key business processes with the objective of sustaining or improving competitive position

Many firms have indicated that they have accomplished reengineering using measurements in certain key performance areas, measures that will be explored later in this work. APPENDIX A lists examples of such firms. As a recently developed management method, BPR is still going through growing pains and a certain confusion exists as to what it really is. Management changes done in some firms, without being classified as "reengineering", nevertheless meet all the characteristics of, and thus should be accepted as, reengineering projects. This is inferred by Earl (1994), also. On the other hand, there may be firms which indicate that they are reengineering but who in reality are only streamlining or restructuring.

Is BPR new or is it repackaging an old product? Johansson, McHugh, Pendlebury and Wheeler (1993, p. 6) suggest, "BPR escalates the efforts of JIT and TQM to make process orientation a strategic tool and a core competence of an organization. It uses the techniques of these as enablers." Earl (1994) indicates that focusing on processes, seeking radical and transformational performance-improvements, and embracing IT in combination add up to a new recipe which seems to work for some industries. Bergeron and Falardeau (1994) indicate that BPR originated in the mid 1980s as a customer-focused-competitive strategy that emanated from information technologies. In analyzing what is new about BPR, they suggest (1) that *process* becomes a unit of focus, and, (2) that organizational activities are reestablished in a multi-discipline context.

C.   Defining BPR

There are several definitions or explanations of reengineering that vary slightly one from the other. As well, much confusion exists about what it is and how it works. This is to be expected in a new area. BPR is a re-evaluation of the routine an enterprise uses to develop and deliver its services and products. However it is not simply restructuring, or merely streamlining, or downsizing, or even just redesigning a work flow.

The authors of a Dun and Bradstreet White Paper indicate that by bandying the word "Reengineering" around so much, a vital concept can be dismissed as hype before it is given a chance (Burke, Donahue, Gibson, & Page, 1992). Davenport and Stoddard (1994) and Earl (1994) indicate that there is considerable confusion as to what BPR is and how it works and this, notwithstanding the considerable enthusiasm of the last five years. Parker (1993), indicates that it is healthy for us to have more than a little cynicism about what BPR is and how it can impact the organization.

The formal definition that we frequently see in the popular writing comes from Hammer and Champy. "Reengineering is the fundamental rethinking and the radical redesign of business to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service, and speed" (Hammer & Champy, 1993, p.32). According to Davenport (1993), the 1984 manufacturing objectives of quality performance, price, and overall product performance, are now taken for granted. The 1993 objectives are time, service, and flexibility. To CIGNA Corporation, business reengineering means, "breakthrough innovation focused on customer needs - a vehicle to

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realign strategy, operations, and systems" (Caron, Jarvenpaa & Stoddard, 1994, p. 234).

Their definition (p.236) refers to reengineering as a "methodology based on a holistic

approach involving a simultaneous review of the business strategy, business operations

and IT structure."

D. Characteristics of BPR

Earlier there was reference to the fact that BPR incorporates many of the characteristics of

previous quality approaches. The characteristics of one BPR model might be described as

combining attributes that are more contemporary with those that are more traditional in

business management. (See Figure IV-2.) Earl (1994) suggests that BPR is not totally

new but is a result of an evolution in business quality programs. He uses the following

star diagram to highlight the characteristics of the two contributing sets of attributes:

Figure IV-2 New Model vs. Old Model (Earl)
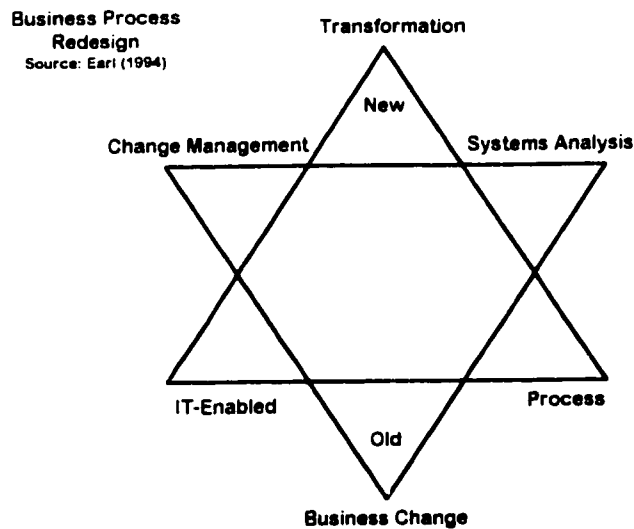
Earl's (1994) three contemporary (new) characteristics include:

- *Transformation* which suggests that reengineering is the desire of a company to move away from the usual way of doing business. This encourages a *quantum leap* in performance as measured by the four repeatedly suggested metrics of cost, quality, time and satisfaction.

- *Process* which is a horizontal organization of the tasks and roles that people formerly undertook in departments, with the objective of a better performance for the internal or external customer. Although a process focus is also a characteristic of TQM, in BPR, there is a greater emphasis on cross-functional process change, hence requiring some restructuring. A focus on process also encourages teamwork.

- *IT-Enabled* which, as most contributors suggest, is a crucial attribute.

Earl's (1994) three traditional (old) views of business, that BPR borrows, include these characteristics:

- *Business Change* involves a fundamental shift in organizational culture. This includes sociotechnical systems-thinking.

- *Change Management* which is affected by various topics and skills from organizational behaviour e.g., leadership, motivation, personality, decision making, team building, values, attitudes, job satisfaction, communication, conflict resolution, power & politics, and stress.

- *Systems Analyst* which adds many tools used by industrial engineering, information systems development, and by those engaged in software engineering and modeling software.

Thus, (Earl 1994, p.19) would suggest, "There would appear to be a revival of operations research, modeling, and industrial engineering."

According to Hammer and Champy, (1993) functional departments per se are not reengineered. Rather it is what these functional departments *do* that is reengineered.

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They list several commonalties of recurring BPR projects:

- several jobs are combined, integrated, or compressed into one (restructuring),
- workers make decisions, (empowered)
- steps in a process are performed in a natural order, (concurrent vs. sequential)
- processes have multiple versions.

Successful reengineering must meet several requirements (Hammer & Champy, 1993).

(See Table IV-2.)

Table IV-2   Successful BPR Requirements

• It must be customer driven	• The goals must pursue significant not gradual improvement
• Cross functional teams should drive each phase	• It must address business process as well as structure
• Management at all levels must be absolutely committed	• Employees at all levels must be consulted
• Responsibility must drop to the lowest practical level	• Must not be done to simply downsize

E.   Why reengineer?

Among the reasons commonly suggested as to why organizations might find it necessary to choose to reengineer, we find: a) customer satisfaction, b) to be more efficient, or, c) to save on costs. There is nothing distinctive, however, about these responses since these are reasons why one might choose TQM, or, ISO 9000. One major impetus for BPR might be, "to survive as a firm". Thus, a sense of urgency exists.

An organization's survival could be measured as market share. A *reduced* market share in itself might be a sign that a radical solution may be necessary. If the reduced share is part of a continuing pattern, then there could be a problem. On the other hand, a reduced

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share may be an exceptional situation. Bell Canada, prior to deregulation, enjoyed a monopoly. However, following deregulation, the firm's market share dropped to approximately 75%. Although substantially reduced, the decrease was caused by a specific set of circumstances and not by a decline in the quality of service. Nevertheless, Bell Canada had to re-examine how they carried out business in order to remain competitive (McLennan, 1995).

Another major impetus for a BPR initiative may be the need for drastic improvement instead of a continuous improvement. In the literature the intensity of the improvement results is a key difference between TQM or Continuous Improvement (CI) or incremental improvement and BPR. The level of radical change targeted should be greater than 50%. Ten percent (10%) equates with incremental or streamlining; while a hundred percent (100%) equates with radical or innovative and creativity (Davenport 1993). The second of the two figures below would respect those who suggest that BPR may be part of a quality program that involves TQM before and after a BPR initiative.

Figure IV-3   Rate of Improvement

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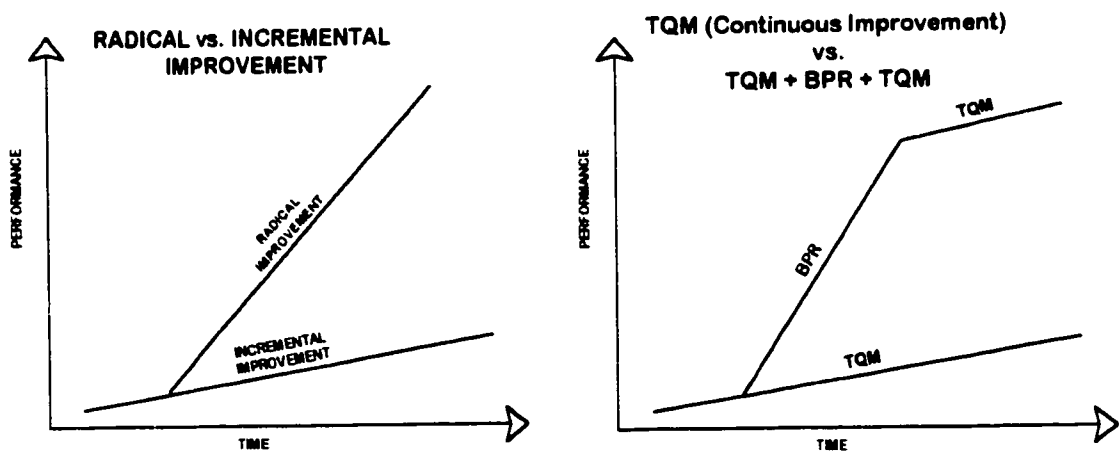
The change agents:

- *Explosion in development of technology*

- *An organization based increasingly on knowledge (system and employee level)*

- *Economic shifts and crises that may be classified as "shock" levels*

- *Social trends whereby customers have expressed greater, clearer, and more demanding needs*

- *Workgroups including a focus on team work*

- *The virtual corporation that changes the scope of the firm*

- *World politics effecting new rules and opening of trade possibilities*

- *Competition, particularly resulting from deregulation*

- *Globalization of competitive forces*

- *Reduced product life cycles and rapid new product development*

are forcing companies to consider reengineering. The most important response to a question of survival is to be competitive. Reengineering may allow this. Steve Soffran, an industrial engineer who successfully led OSRAM SYLVANIA's project says, "Reengineering forces you to look at the big picture. To be a world class competitor, we need to think that way in order to satisfy our customers faster and with higher quality than our competition. It is the only way to survive in the global economy of the future" (Bambarger, 1993 p. 18).

The response to the question of why reengineering, lies in the reality of global competition. Firms must survive and occasionally in order to do so some will have to reengineer their processes. Through reengineering, these firms will then respond by creating their niche, delighting customers, being quick to market, offering fair value for the price, (Johansson et al. 1993). (See Table IV-3.)

Table IV-3   Survival Niche

Firms will survive if they find the clever niche for, or the correct methods of:
• delighting customers (implies more than satisfying them),
• being quick to market (efficient, flexible and short lead-time, and variety of products),
• fair value for the price (possible result of reduced costs).

F.   Integrated Models

This work explores how several authors, from different disciplines, have suggested some form of integration as a solution to successful change management. The disciplines include quality management, strategic management, management, information technology, and organizational behavior. Collectively the literature demonstrates that a complex and fully integrated or holistic approach to implement BPR is required.

A holistic approach to change suggests that if a firm decides to adopt a new technology, that in order to afford major change, this new technology is only one variable among several. Leavitt (1964) proposed that change management in organizations required an integrated consideration using four variables: technology, structure, people, and task. (See Figure IV-4.) This integrated model is discussed in Scott-Morton (1991) and Earl (1994). The latter posits that one cannot attempt BPR without considering the challenge of involving change management.

Hammer and Champy (1993) likewise posit that BPR is the result of an integration of various elements. Their model suggests that IT enabled reengineering of a process requires changes in job design, and job preparation, providing a flatter organization with empowered workers. Similarly, they indicate that a shift in culture will occur as values

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and beliefs change. Likewise, managers become coaches and performance measures shift from activities to results. (See Figure IV-5.)

Figure IV-4   Leavitt Model of Organization

Leavitt's (1964) View of
Organizations
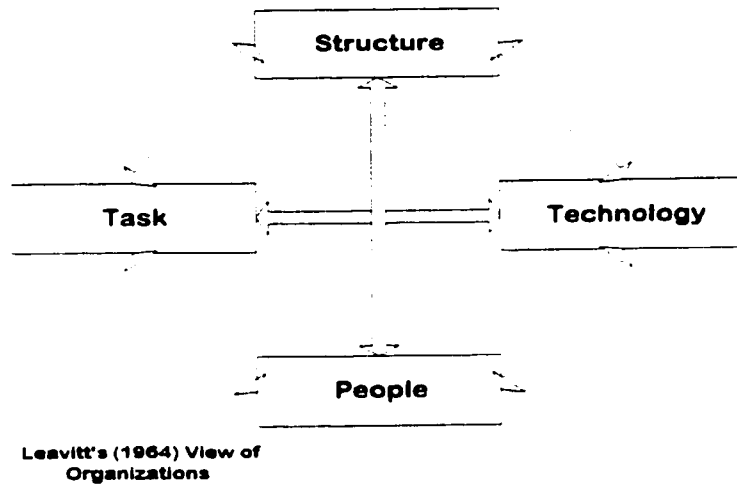
Figure IV-5   Hammer & Champy Integrated Model
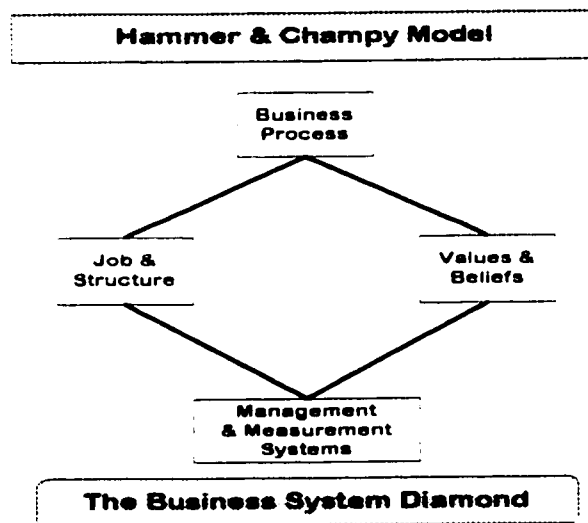
Davenport (1993) likewise proposes an integrated approach in his elaboration of "process innovation (PI)", his term for BPR. He suggests PI encompasses (i) the envisioning of

new work strategies, (ii) the actual process design activity, and, (iii) the implementation of the change in all its complex, technical, human, and organizational dimensions. Furthermore, he establishes as the goal for his process innovation: the combining of process thinking with the effective use of technological and human enablers to catch — or even surpass — global competitors. In addition to competition, he points to the following as drivers of process innovation: customer expectations, need for improved financial performance, mergers, outsourcing, and IT changeover. By including these as drivers, it is clear that strategic alliances become part of the holistic approach to change.

Grover, Teng and Fiedler (1993) explain that an information-technology-enabled business process redesign requires an integrated approach. (See Figure IV-6.) In their model, they

Figure IV-6   Integrated BPR Model

BPR PLANNING :   THE INTEGRATED APPOACH
(Grover, Teng Fiedler, 1993)
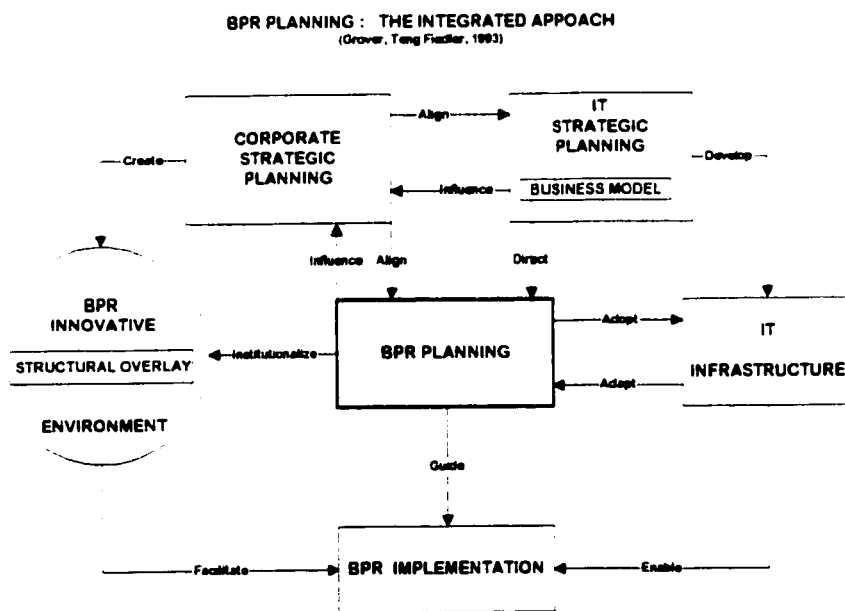
posit that it is necessary to align the corporate strategy with the firm's IT strategy. This done, a BPR planning process can institutionalize the appropriate environment

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to BPR implementation. The IT strategic planning will cause an IT infrastructure to be developed, and the latter, adapted to the BPR planning, will enable the BPR implementation.

G. *Holistic Model*

The literature reveals that the primary enabler of change within BPR is information technology. The literature likewise, in a more limited way, indicates that technology must be accompanied by other business forces to enable BPR. This is the intention of any reference to an *integrated* approach. Complementary enablers mentioned in the literature in addition to technology, might include various types of strategy, leadership, different human resource activities, and diverse elements within organizational culture.

The literature further proposes that that there are several units that can be measured to analyze the extent of improvement. The proposed model suggests the following could be units of performance measure:

- Satisfied Customer
- Better Quality
- Lower Cost
- Shorter Lead Time
- Increased Market share
- New Product development
- Improved employee satisfaction
- Improved efficiency

Hence, this study proposes a revised holistic model that may be inferred from the literature. The model differs from previous models in several ways. The proposed model indicates not only the different variables that together enable reengineering, but indicates

as well the role these variables serve and the relationship of the primary enabler via-à-vis the complementary enablers.

The primary enabler IT is identified as the independent variable of the model that causes the dependent variable, the effects or benefits of the reengineered process. The complementary enablers are identified as moderating variables in that, the way they are implemented will influence the primary effects sought by technology. These enablers are:

- Corporate Strategic Decisions
- Human Resource functions
- Organization Structure
- Senior Management Commitment (SMC) and Leadership

Although the model suggests IT is the primary enabler, it is *primary* in the sense of *vital* or *key*. As noted earlier, technology is only one of a list of change agents. It very well may occur that senior management, having first strategically decided that change is necessary, might then realize a technology that will permit the change.

Furthermore, the model suggests that IT will *facilitate* the enabling potential of the moderating variables. Personnel in any one of these areas would benefit from a strategic use of new technologies as levers to change. Examples might include:

- senior management located in different geographic areas could share data, received via EDI or video-conferencing, in order to foster new strategic policy, or,

- personnel using office technology to perform tasks that were previously handed off to another party, thus forcing a change in job design and organizational structure.

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Figure II-7   Proposed Holistic Model

THE HOLISTIC APPROACH TO ENABLING
BUSINESS PROCESS REENGINEERING

Dependent
Variable

REENGINEERED
BUSINESS
PROCESSES

Satisfied Customer
Better Quality
Lower Cost
Shorter Lead Time
Increased Market share
New Product
  development
Improved employee
  satisfaction
Improved efficiency

Moderating
Variable

HUMAN RESOURCES
Performance measurement,
Hiring, Job definition,
Reward, Training, Control

ORGANIZATION
Structure, Culture,
Empowered employees,
Workgroups, Work flows
Virtual-teams/corporation

Moderating
Variable

enables

enables

facilitates

ENABLES

facilitates

Moderating
Variable

STRATEGY
Corporate, Info. tech.,
Operational,
Socio-Technical,

SMC/LEADERSHIP
Shareholders, Financial,
Top Management,
Customers, Suppliers,
Procedures, Policies

Moderating
Variable

enables

enables

facilitates

facilitates

Independent
Variable

**INFORMATION
SYSTEMS &
TECHNOLOGY**

End user computing
User friendly software
Client-server Architecture
EDI & Networking
Mobile & wireless comp.
Application Development
Database Management
Multimedia, Scanners
Groupware, Imaging
Expert systems
+ many others

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V. RESEARCH OBJECTIVES

The main purpose of this study is to determine the extent to which the model deduced from the literature is descriptive of BPR initiatives. Specifically, a first objective is an attempt to determine that radical improvement, is only possible when the organization reengineers itself using information technology as the vital enabler. The second objective attempts to determine that complementary enablers facilitated by technology are also required. The first and second objectives are incorporated into the model. A third objective is an attempt to classify some initiatives according to the Venkatraman model (Venkatraman, 1994; Caron, Jarvenpaa & Stoddard, 1994).

The first objective would be met if organizations, having benefited from significant gains in the various units of analysis of a reengineered process, were able to demonstrate that the improvements are only possible because of recently available technologies. Furthermore, the second objective would be met if the organizations also demonstrated that several other conditions were necessary for the reengineering process. These other conditions that are part of the model would themselves be enablers of BPR and would include the moderating variables.

VI. VARIABLES

The literature reveals many variable elements would affect a BPR initiative. This study proposes that these variable elements be clustered into the six variables used in the

proposed model. While the variable elements that are relevant for this study are identified as 3-letter codes, the clustered variables have a 2-letter code. The list of clustered variables with their respective elements appears in APPENDIX B.

A.   The Independent Variable: Information Technology (IT)

There are two overall aspects to this IT variable. The first pertains to the strategic use of technology (*ITS*); the second involves use of state of the art technology, both in hardware and software (*ITU*). Technologically-facilitated business strategies cross geographic borders in such a way that the marketplace has no border. Information technology advancements permit an ever shrinking globalization of business. There is an iterative effect in that globalization then drives technological adoption to help firms become more competitive (Currid, 1994). Currid also posits that companies strategically must use information technology to reply to the challenges of globalization, and through the intelligent use of technology, serve the customer better and beat out the competition (*ITS*).

The strategic use of information technology in business has been discussed by many writers who portray the value and potential effects (i) of planning for IT deployment; and, (ii) of senior management's role in integrating IT strategies with the business strategies. Only recently have the terms "reengineering" and "process innovation" been part of the terminology of change, (Boynton, Zmud & Jacobs, 1994; Dixon & John, 1989; Henderson & Sifonis, 1988; Boynton & Zmud, 1987).

1.   Technology as a facilitator of change

Technology developments serve a dual role   within the business world.   On the one

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hand, the evolution of new technologies enables firms to accomplish what was not possible in the past. Change is technologically caused. On the other hand, the evolution of technology is facilitating the adjusting to these changes. New technologies make learning easier and more readily available. This is supported by Currid (1994) who suggests that major technology contributions in recent years are at the base of the double role of both enabling the change process and facilitating an adaptation to the change.

Davenport (1993) emphasizes the influence of technology. He indicates that IT is the *key* enabler of innovation. He suggests a number of major contributions that have blazed a path for innovation. (See Table VI-1.)

Table VI-1   IT Contributions

MAJOR INFORMATION TECHNOLOGY CONTRIBUTIONS OF THE 1980s AND 1990s.	
• End-User Computing	• UPC scanners
• Multiprocessing	• Groupware
• EDI	• Imaging
	• Expert systems
• Networking (telephone systems and intelligent networks)	
• Client-Server Architecture (the Division of Labor)	
• Multimedia Computing (Voice, Data, Video, Images)	
• Executive-Ready (kid-proof) software	
• Computer-aided manufacturing	
• Mobile and Wireless Computing	

APPENDIX C contains Davenport's (1993) compilation of technologies that enable business process innovation.

2.   Vital Role Proponents

How essential is the IT enabler to the BPR endeavor? A principal objective of this

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work, and which is to be explored later in the case studies, suggests that IT is *vital*. This would imply sine qua non. The literature supports this. Gulden and Reck (1992) state that IT is *fundamental*, enabling organizations (i) to break the old rules and conventions that dictated the design of business processes, and, (ii) to achieve the aggressive improvement targets of reengineering. Venkatraman (1994, p.73), too, refers to IT as a 'fundamental enabler in creating and maintaining a flexible business network'. Wastell, White and Kawalek, (1994) call IT 'the vital ingredient of this restorative' of improving business performance. Hammer and Champy (1993) posit IT as playing a *crucial* role, an *essential* enabler, that *permits* companies to BPR.

A few authors suggest on the other hand that IT is less than an essential enabler. Ayers (1993) states that IT, although of *significant importance*, cannot stand alone but must be coupled with an evaluation of, and changes in, the broader organizational environment. Parra (1994) indicates that it is not always necessary to introduce IT to reengineer. Parra claims that most processes can be reengineered by simplifying them or changing the order of their activities.

However, Belmonte and Murray (1993) suggest that innovation is difficult to achieve without leveraging the potential of IT and that in many cases a business process cannot be restructured without it. Further, they state that to redesign a process without considering the *critical* role of IT will lead to marginal improvements and that it is nearly impossible to reach stretch goals without effectively using information technologies.

According to Guha, Kettinger and Teng, (1993) new technical capabilities are moving IT

to the forefront in its potential to induce business configuration, accelerating the pace of change at corporations by establishing new organizational forms and performance standards. Some clarification is given by Parker (1993), in that "technology" itself is undergoing both rapid and radical change, and it is this factor that makes BPR fundamentally a new approach. He also states that five years ago existing technology could not provide the necessary flexibility.

Davenport and Short (1993), believe that industrial engineers of the future will focus increasingly on IT-enabled redesign of business processes. Further, they state that individuals and companies that can master redesigning processes around IT will be well equipped to succeed in the new decade - and the new century. Caron, Jarvenpaa and Stoddard (1994) suggest that a "Second Wave" of reengineering is coming about. one that would attempt to strategically position the firm for future growth and for new business rather than focusing on improving operational excellence. They suggest that this "Second Wave" is close to what Venkatraman (1994) posits.

Venkatraman (1994) argues that IT's role within organizations has evolved from a predominant focus on efficiency enhancements to that of *fundamental* enabler. He suggests five (5) levels of information-technology-based transformations. (See Table VI-2.) He proposes that the range of potential benefit to a firm is directly related to the degree of business transformation. (See Figure VI-1.) Subsequent to an analysis of the data collected from the case studies, this current work uses Venkatraman's categories to classify the degree of IT-enabled transformation within the three firms.

Table VI-2   Venkatraman Classification Levels

Venkatraman's Five Levels of Transformation	
Level 1:	localized exploitation of technology to existing business processes
Level 2:	internal integration of information technology (IT) capabilities across an entire existing business process
Level 3:	use of IT as a lever for designing an organization's core business process
Level 4:	exploitation of IT to redesign process extending beyond one organization to a network of organizations
Level 5:	use of IT to redefine the organization's business scope

Figure VI-1   Venkatraman's Five levels of IT-Enabled Business Transformation
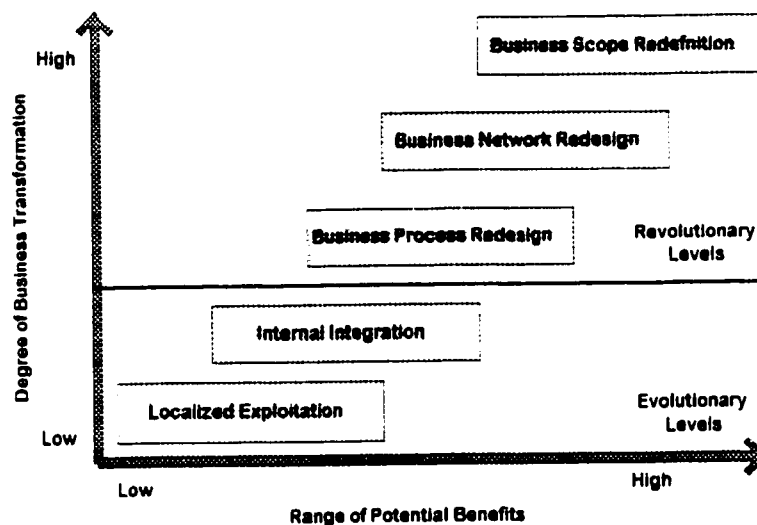
Having examined the independent variable of the proposed model, this work now examines the various moderating variables.

B. Moderating Variables

A holistic treatment suggests that each variable should be studied as a part of a whole, rather than studying the whole in terms of its related parts[3]. This suggests an important inter-connection function of the variables.

The literature supports the following four variables which in the proposed model are *moderating* variables: Strategy (*ST*), Senior Management Commitment and Leadership (*CL*), Human Resource (*HR*), Organizational Support (*OR*). According to Davis and Cosenza (1993, p. 124), "A moderating variable is one that has a strong contingent effect on an independent-dependent variable relationship." It is contingent upon a holistic model that such strong inter-relationships exist among the variables.

As organizations redesign or innovate process, several enablers must be involved. Hammer and Champy (1993) suggest that organizations of the future will base themselves on three management principles: (i) there will be self-managing work-teams (*ORT*), and empowered employees (*CLE*) will perform in a "high-involvement workplace", (ii) there will be an emphasis on managing business process rather than an emphasis on functional departments (*ORP*), and, (iii) information technology will continue to evolve, thus allowing knowledge, accountability, and results to be distributed rapidly anywhere in the organization (*CLC*). Several authors support these notions (Davenport, 1993; Benjamin & Levinson, 1993; Venkatraman, 1994).

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[3] This idea is similar to Russell Ackoff's definition of system (Ackoff. 1972).

1. Strategy (*ST*)

Davenport (1993) indicates that where IT is not taken seriously as an enabler of competitive advantage (*STC*), it will not be taken seriously as an enabler of process innovation (*ORP*). In the literature, the "strategy" enabler includes several types of strategy: (i) corporate strategy, from which flows (ii) business strategy, which includes (iii) operational strategy, which includes (iv) information technology strategy, and, (v) the people factors of socio-technical strategy. These different strategies influence strategic decision and planning (*STP*). As well, strategy conditions other enablers such as personnel training (*HRT*) and assignment (*HRJ*), new task descriptions (*HRJ*), modified organizational structure (*ORS*) and culture (*ORC*), strategic and advantageous use of information technology (*ITS*), and it helps determine leadership style (*CLL*). This reflects the earlier statement, "Parts are explained in terms of the whole."

Senior management can use IT to maintain or develop the firm's competitive strategy by integrating the technology into the firm's business or operations strategy through the use of strategic thrusts. Strategic thrusts might be accepted as devices for connecting business strategy and information technology. Thrusts (*STF*) include *cost* and *differentiation* (Porter, 1987) and *innovation, growth* and *alliance* (Rackoff, Wiseman & Ulrich, 1987).

The decision by a firm to implement a quality program should be taken as part of a strategic business policy (*STP*). Quality programs require significant amounts of time, cost, and effort, and thus they necessitate organizational backing, especially when the pressure is on (*CLS*). Johansson, McHugh, Pendlebury and Wheeler (1993, p.6) state,

"BPR broadens the process vision, driving corporate vision to focus on external measures of success including improved market share." Davenport (1993) suggests that radical change is only possible with a company vision that is part of the clear direction of a well-defined strategy (STV); and that process change without this seldom goes beyond streamlining. As a firm develops a vision within its over all strategy it must examine the critical success factors (CSF - the things they must do right). These CSFs involve people, technology, and product (STF).

Business should focus on strategic management (STP). Frame (1994) suggests that the new business environment has forced firms to re-think how they should do business. The new way of thinking calls for operational strategies to drive business strategy (Johansson et al. 1994). They also indicate that process innovation is meaningful only if it improves a business in ways that are consistent with its strategy.

A decision to include an upstream or a downstream partner as an intimate link in the supply chain represents a strategic decision on the part of the organization (STA). Several possible benefits can accrue from such arrangements including: shared development expenses, shared facilities, shared distribution expenses as well as allowing the firms to compete more strongly on the open market. There is a major trend towards such arrangements in all industries (Currid, 1994).

2. Senior Management Commitment (SMC) and Leadership (CL)

It is essential for successful BPR that senior management be involved to support the process from the initiation of a project to its completion (Belmonte & Murray, 1993).

Hammer and Champy (1993) indicate that several roles must be served in the implementation of a BPR project. (See Table VI-3.)

Table VI-3   BPR Leadership Roles

Process Owner:	the manager responsible for a process and effort focus, oversees application
Reengineering Czar:	develops reengineering techniques and tools with company facilitator (enabling, supporting, coordinating)
Reengineering Team:	individuals dedicated to a process - diagnose existing operation and oversee the redesign of the new process
Senior executive:	authorizes, motivates with appropriate systems, demonstrates commitment
Steering Committee	senior managers who develop reengineering strategy and who monitor progress

Among these roles is the steering committee, composed of senior managers, which would be responsible for corporate strategy and the integration into this strategy of other strategies concerned with operations or IT usage. The literature indicates that senior management, with appropriate financial backing and supported by shareholders and suppliers, can enact policy and procedure to drive the organization towards improved benefits for the customers. The latter then become the focus of reengineering.

a)   Leadership Involvement (CLL)

Who should lead or be the owner of a redesign effort? This current problem has organizations asking such questions as: Should the team leader be a process leader, a functional leader, or a supervisor? It would appear, that notwithstanding the importance of IT, that the IT leader may not be the ideal candidate for BPR leadership (Belmonte &

Murray, 1993; Currid, 1994). Belmonte and Murray (1993) see BPR and IT deployment as mutually supportive and synergistic.

Generally, the opinions expressed indicate that *transformation* is a strategic decision implication that requires leadership led by business management, and not by the IS/T department. Notwithstanding their potential contributions, IS personnel are seen as too focused on IT and too technically oriented to lead the transformation initiative. On the other hand, they should definitely be part of the team and failure to allow their participation may mean a failed or less than optimal project (Earl, 1994; Davenport, 1993; Currid, 1994).

While this decentralization of information services may be contested by some IS personnel, companies have an opportunity here not to necessarily restructure the IS department out of existence, but to use IS people as part of cross-functional teams. In this way, the IS specialist can use his/her expertise to help a process as a member of the team, be responsible to the team or process leader during this event, but resort back to IS when the process activity is completed. Furthermore, the IS people can participate in the training of business people to comfortably utilize networking, database, and specific applications (Currid, 1994).

b) Accountability (CLA)

Some companies, in order to demonstrate the new cooperative decision-sharing roles among what was formerly *boss-subordinate* relationships, have now begun to use the term *associates* instead of *employees*. The *bosses* and *staff people* are now referred to as *front-*

line associates, and *facilitators* respectively. With this approach, all the individuals working for the firm are expected to adopt a willingness to share knowledge within a climate of courtesy and common sense. The knowledgeable worker may accordingly be a more productive worker (*CLA*). Drucker (1992) proposes that knowledge is the primary resource for individuals and for the economy. The quid pro quo requires that everyone likewise shares the responsibility for quality improvement. It is no longer just up to management to be responsible for decisions (Schonberger, 1994).

3. Human Resource (*HR*)

IT is rarely effective for process innovation without simultaneous human innovation i.e., a carefully considered combination of both technical and human enablers (Davenport 1993). The socio-technical-based focus of change requires reengineering initiatives to include consideration for redefined jobs, with appropriate changes in performance measurement and reward. This is particularly important if the use of teams is instituted at the firm.

Redefined jobs also mean a new emphasis for hiring the right individuals, for on the job training, and for revised subordinate control. There is an abundance of literature on these topics of HR. New technologies are making it possible to redesign jobs, particularly the use of EDI and on-line databases which give front-line staff the information to make decisions.

a) Training (*HRT*)

In order for reengineering to be successful, those individuals involved must be trained in many facets of BPR, i.e., terminology, tools, communication, to name a few. The model

thus suggests that recent advancement in technology will facilitate the human resource operation to be an enabler. With regard to empowerment, training should focus (i) on employees, specifying how they should perform as empowered personnel, and, (ii) on executives, specifying how they should work with and encourage empowered personnel. Currid (1994, p.79) states that "out-of-the-box thinking, innovation, and creativity will allow people to participate and find their career strengths."

b) Reaction to Change (HRC)

In responding to a call for change, business leaders must remain conscious of the emotional responses to change on the part of individuals and groups. The two reactions to change, positive response or negative response, are examined in Currid (1994). Enriched or redesigned jobs would likewise cause reaction.

c) Job Design / Enrichment / Recruitment (HRJ)

Enriched jobs may be the consequence of BPR with wider roles that include the notion of empowerment. Companies have begun to realize the competitive advantages of having empowered employees and of stimulating employees to become involved with the corporate objectives (CLE). Firms and their unions have begun to enjoy new cooperative relationships (ORL), which help to improve work attitudes (Conklin, 1994).

Job redesign also includes the contemporary notion of the virtual function. The virtual corporation refers to the various possible combinations of remote or distance input into operations and decision making. Employees and the other partners do not have to be present in a central office to be a day-to-day participant in business operations. Electronic

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data interchange (EDI), as a form of communication technology, permits the virtual corporation (Healey, 1995; Vallerand, 1995). There should be little doubt that the effects will cause a continuous redefining of jobs (Healey, 1995).

Redesigned jobs and enriched jobs affect initial recruitment procedures. As Davenport (1993) points out, firms would ensure at the outset to hire capable, flexible individuals and make every effort to keep their skills current and adaptable to the needs of the new process. Training associates would also require them to learn the skills and tools for process analysis.

There is a change in what constitutes a "job" that goes beyond its task description. Hammer and Champy (1993) suggest that there now is a different kind of job, one that involves multi-dimensional work rather than simple tasks. This allows the worker an appreciation for the process. The result they suggest is the development of jobs that are more rewarding, more challenging and difficult, providing opportunities for growth and learning. In turn, this then permits workers to be empowered to make decisions thus reducing the need for supervisor intrusion.

The upshot of such a system thus requires a consideration for characteristics upon job entry of a worker who is a self-starter, disciplined, and motivated. Furthermore, the "consensus model" of organizational behavior studies, indicates that employee motivation is fostered by skill variety, task identity, task significance, autonomy, and feedback (Johns, 1992).

4.   Organizational Support (OR)

Reengineering initiatives are affected by redesigned structures that are more appropriate for empowered employees, workgroups or teams, and employees working within the "virtual" designs of some modern firms. Hence, organizational issues (both structural (ORS) and cultural (ORC)) as well as human resource (HR) issues that come with these changes, assume significance (Davenport, 1993).

While technology plays a key role in BPR, behavioral changes must occur within a process as a component of reengineering. Several technologies can facilitate the changes to the structure and operations of the organization. Included would be such technologies as groupware for team decision-making, decision-analysis software, and on-line databases.

a)   Teams (ORT)

A commonly suggested characteristic of BPR indicates how teams play a significant role in the design and the implementation of BPR projects. Three types of teams, i.e., cross-functional teams, self-managing teams, and virtual teams, are emerging during the 90s. Each affects organizations in different ways, and each would add its own complexity to the information needs of the organization. In the design of a BPR campaign, the team exists to find a way to reconstruct the way business is done (Belmonte & Murray, 1993).

Schonberger (1994) describes how teams could be classified as (i) fulfilling a single function (limited scope, hemmed in, low potential), or, (ii) be multifunctional (broad scope of powers, high potential). The latter, furthermore, could a be project team (the team fulfills its mandate and disbands) or a work-flow team (product-focused work cell).

The BPR emphasis on process has also advanced the notion of case-workers and case-teams. Successful case management includes: (i) closed loop work process, (ii) role expansion and empowerment, (iii) access to information, and, (iv) organizational structure matrix departments (Hammer & Champy 1993). These case-workers/teams allow the front line worker to view the entire organization as he/she deals with a customer.

b) **Organizational Structure (ORS)**

A contemporary view regarding the dynamics of different aspects of organizational structure enables business process reengineering. Robbins (1993) compares the contemporary view with a traditional view of the structure dynamics of organizations. He describes the contemporary structure as flatter, less formalized and decentralized, a structure where employee duties are adaptable, and where communication is informal and relationships collaborative. (See Table VI-4.)

Table VI-4   Dynamics of Organizational Structure

STRUCTURE DYNAMICS	Traditional view:	Contemporary view:
Horizontal differentiation:	High	Low
Relationships:	Rigid, hierarchical	Collaborative (vertical & horizontal)
Duties:	Fixed	Adaptable
Formalization:	High	Low
Communication channels:	Formalized	Informal
Decision Authority:	Centralized	Decentralized

Frame (1994) mentions that an interesting outcome of employee empowerment is the effect on the role of manager. Formerly, the role was *director of activities*. Now, as

a result of flattening of organizations, the manager has taken on a *support* role or *coach*. The organizational pyramid has been inverted. The function of manager undergoes a change in BPR (Hammer & Champy, 1993). Whereas they traditionally were considered "bosses" who design, allocate, monitor, and control work; they are now coaches who facilitate, enable, and have become developers of people. Since control has been shifted to the person performing in the process, the ratio of manager to worker has undergone a significant change, from a 1/7 ratio to a 1/30 ratio. This, in turn, allows a flatter organization.

In redesigned structures, the above dynamics are affected by contemporary views regarding (i) span of control, (ii) authority and responsibility, (iii) unity of command, and (iv) and division of labor. The use of breakthrough technology (Hammer & Champy, 1993), particularly EDI, Groupware. or Decision Support Systems, permits the contemporary view to take place. Robbins (1993) describes a contemporary view of structure. (See Table VI-5.)

Davenport (1993) proposes that *stovepiped* systems cannot support a process view of the organization; as they imprison the data within the *stovepipes* (functions). Davenport (1993, p.275) states, "Managers, unwilling to accept more structure in the form of a process orientation, will be unable to take advantage of information technology and other change enablers to become more efficient and effective."

Table VI-5　Design of Structures

SPAN OF CONTROL	Classical View:	Contemporary View:
Number of subordinates a manager can efficiently & effectively direct	• small spans — no more than six subordinates	• reduce layers in an organization and accept large spans
AUTHORITY/ RESPONSIBILITY	**Classical View:**	**Contemporary View:**
Authority: right to give orders and be obeyed. Responsibility: the obligation to perform	• authority is in the position • authority must go hand in hand with responsibility • strict chain of command • line & staff tasks are delineated	• participation, teams, etc. are effective • increase line responsibility at the expense of staff responsibility
UNITY OF COMMAND	**Classical View:**	**Contemporary View:**
A subordinate should only have one boss	• one and only one superior	• can restrict flexibility
DIVISION OF LABOR	**Classical View:**	**Contemporary View:**
Breaking a job into small steps which require little or no training	• strong proponents	• can be demotivating & wastes worker capabilities

Certainly being part of a cross-functional team, being empowered to make decisions. and generally being part of process innovation will help deliver motivation,[4] (Davenport, 1993). A contemporary view regarding the dynamics of different aspects of organizational structure enables business process reengineering. Robbins (1993) provides such a contemporary view of departmentalization. (See Table VI-6.)

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[4] Since flattened structures remove upward mobility from career planning. process-oriented career paths (workload rotation) would become a long-term enabler of process innovation (Davenport. 1993).

Table VI-6   Changing Departmentalization

DEPARTMENTALIZATION	Classical View:	Contemporary View:
Grouping of activities by specialty according to: • function • product line • customer groups • geography • process	• utilize narrow specialized departments • multiple hand-offs • protect turf	• re-organize departments to service customers & product lines • trend towards process & customer focus

Benjamin and Morton graphically represent the cross-functional process model. (See Figure VI-2.)

Figure VI-2   Cross-Functional Process

No one Organization is Empowered or Given Resources to Change for the Common Good
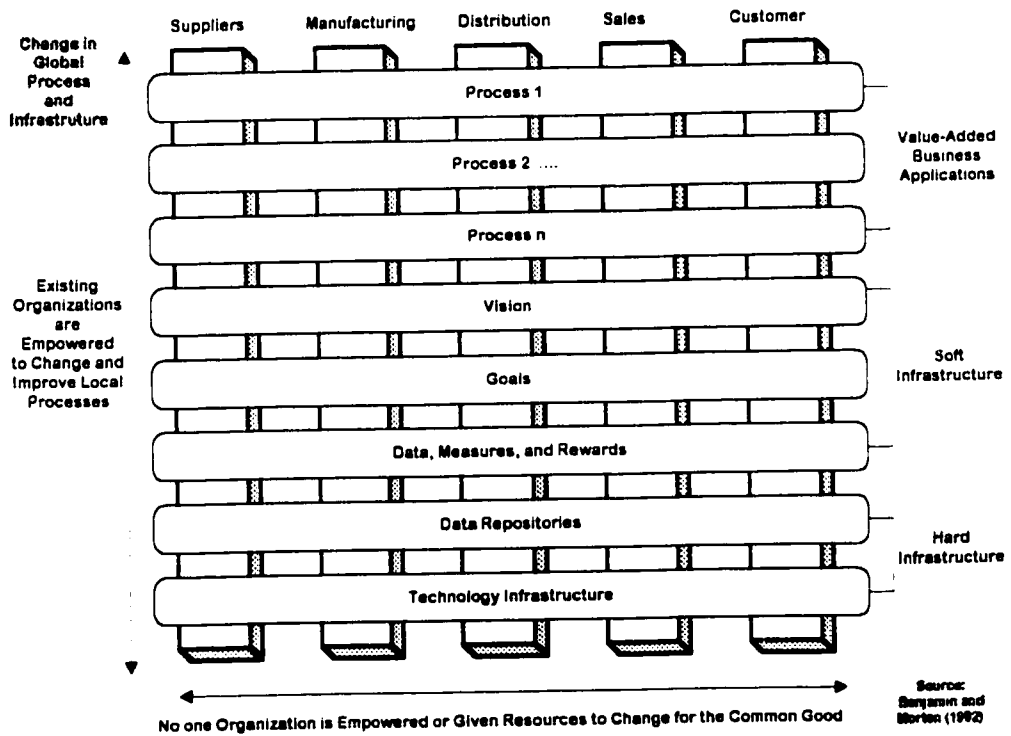
Notwithstanding the above, most Western companies today still remain highly

bureaucratic with departments acting individually and handing off everything (especially problems) to the next department. Turf is jealously guarded. Renewal will be internally driven but externally focused (Johansson et al. 1993).

c)   Culture (ORC)

An organization, in order to be identified as one which is conducive to using information technologies for process change, must encourage or support a technological mindset within the organizational culture. The mindset would subsequently influence managers to become knowledgeable of, and experienced in, the use of IT. Consequently this would influence strategic discussions of the organization leading the firm to be amenable to IT-influenced process change. This is supported by Boynton, Zmud and Jacobs (1994), who suggest that once there exists an IT climate, said climate influences knowledge and process effectiveness. In order to handle the changes that BPR effects, organizations must be adaptable to, and capable of, change. A mindset for changes that BPR causes must be established. Currid (1994, p. 60) suggests a five-step plan for a reengineering change mindset. (See Table VI-7.)

Table VI-7   BPR Mindset

REENGINEERING CHANGE MINDSET
• Cultivate a computer-literate workforce.
• Empower business people with information and authority.
• Reduce development time of information applications.
• Regularly reengineer business processes, and then reinforce them with technology.
• Consider information an asset.

In the previous sections, this work considered the independent and moderating variables. In the next section the dependent variable will be examined.

C.   The Dependent Variable

1.   Benefits of a BPR Initiative (BE)

Most companies might view BPR as an initiative to keep up with the global competition. However, a firm may envisage a more aggressive objective. Perhaps they wish to be recognized as the competition, to be the new benchmark. Such an objective would necessitate an extremely rigorous application of the total BPR process. "It may be that a firm wishes to go beyond even this level of being the benchmark" (Johansson et al. 1993, p.70). They speak of "rewriting the rules", of reengineering "breakpoint"[5] levels, whereby the firm "dominates the competition."

BPR proponents suggest that one of the factors distinguishing BPR from TQM is the level of improvement. As indicated earlier, for TQM the improvement is gradual and continuous while for BPR the improvement is dramatic. Here too, "dramatic" varies according to the author. Belmonte and Murray (1993) suggest that BPR dramatic improvement represents quantum gains of 500%-1000% versus incremental gains of 20%-30%. Guha, Kettinger and Teng (1993) report that a study of fifteen clients revealed average reductions of: (i) 48% in costs, (ii) 60% in defects, and, (iii) 80% in time.

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[5] Johansson et al. (1993. p. 113) define *breakpoint* as. "the achievement of excellence in one or more value metrics. (cost. quality. time. service). where the marketplace clearly recognizes the advantage. and where the ensuing result is a disproportionate and sustained increase in the supplier's market share."

Jacob (1992) reports that subsequent to a core-process redesign, (i) that Alcoa, a Tennessee mill, reduced order filling time by 60%, (ii) that Pepsi improved truck loading accuracy - up from 70% to over 90%, and, (iii) that Alberto-Culver's nine month profit ending June 30 was up 35% in a lame economy. McMullen (1992) indicates that at Sun Microsystems, over the period from 1987-1991, revenue grew at 58.8% annually, net income averaged 51.2% annually, and gross margins did better than 42% each year.

There is some discussion about the success of BPR. On the one hand, some authors suggest that there is little question that BPR is going to produce changes in policies, organization, human resource programs, culture, staffing, as well as processes (Hammer, 1990; Burke, Donahue, Gibson & Page, 1992; Janson, 1992). On the other hand, Ray Manganelli of Gateway Consulting warns that executives have been oversold on reengineering and that only 5% of all companies that embark on reengineering projects will actually succeed (McPartlin, 1993). Katherine Morrall (1994, p. 21) wrote, "Reengineering is risky business. There are a lot more reports of failures than there are successes."

There exists a remarkable range of successful rates for BPR projects from various authors. Belmonte and Murray (1993) state that less than 45% of companies that try BPR are successful at achieving their intended goals. At CIGNA Corporation, notwithstanding some impressive results, only 50% of reengineering efforts bring about the initially forecasted benefits (Caron, Jarvenpaa & Stoddard, 1994). One source of failure may be because the firm handed the BPR project over to the IT function who fail to appreciate the

approach necessary for BPR implementation. According to Belmonte and Murray (1993) BPR efforts that are led by IS/T personnel have a high failure rate because IS/T professionals often overlook strategy, policy, procedures and organizational issues. Support for a holistic approach may be found in Benjamin and Levinson (1993) who indicate that benefits of IT may not be realized because investment is heavily biased toward technology and not toward managing changes in process and organizational structure and culture.

Reengineering sets out to improve quality, the level of service, and reduce costs. It may also envisage the opportunities to increase revenue through penetration of new markets and new product development. Although downsizing may result, it should not be a primary goal (Hammer & Champy, 1993). In fact, there are some who suggest that a very successfully reengineered firm may indeed cause an increase in the number of employees (Pinsonneault & Kraemer, 1993). Further, contradictory evidence is found to suggest paradoxically that IT both increases and decreases the number of middle managers (Pinsonneault & Kraemer, 1993).

VII. METHODOLOGY

A. Research Design

Having defined in detail the independent and moderating variables, the next step is to validate the proposed holistic model. A case study approach is used to accomplish this goal. According to Yin (1994), a case study is appropriate when a topic is new and the researcher has no control over the events, but wishes to illuminate a set of decisions. The current study looks at three different cases to test the proposed model: a national police service, an aerospace manufacturer, and an intimate apparel manufacturer.

The study is concerned with "how" the three firms are implementing reengineering. The exploratory nature and descriptive phases of analysis of the research make case study research appropriate. Yin (1994) states that this is the preferred research strategy in this context.

Miles (1979) cautions that research projects that pretend to come to the study with no assumptions usually encounter much difficulty. He suggests at least a rough working, but flexible, framework at the beginning. Accordingly, the research proposal included research objectives and an intention to classify the data according to the Venkatraman (1994) model. Such a classification would permit an appreciation of the extent to which a firm might transform itself, and accrue organizational benefits. A holistic design rather than an embedded design (Yin 1994) is used to explore the overall reengineering effort of

each of the three cases. Accordingly, this case study methodology permitted in-depth evaluation of the organization.

B. Selection and Description of Cases

Yin (1994) suggests that qualitative case-study research should normally involve 4-10 cases. Few studies involving preliminary investigation of BPR efforts and the role that information technology plays, have been done in the past. Due to this and also a time factor, this work was limited to the three (3) firms which agreed to participate.

1. Case 1: Policing Service

The first case study is a national policing service, the Royal Canadian Mounted Police (RCMP). The headquarters of this service is in Ottawa where there are several directorates each responsible for administering the various aspects of the national body. There are detachments across Canada grouped into regional districts and divisions, the latter corresponding to provincial or territorial boundaries. The workforce is over 21,000 people, 16,000 of whom are sworn officers. The force was selected for its initiatives to substantially renew its focus and methods of operating, an admitted reengineering.

The Director of Project Renewal was initially contacted by telephone at his Ottawa office. The nature of the study and its significance were explained. Following tentative approval, a proposal was mailed to the director containing an introductory letter, an executive summary of the study proposal, the hypothesis and proposed data collection method, a sample of the interview questions (in both French and English), and a research protocol.

Use of a protocol helps assure reliability (Yin 1994). (See APPENDIX D - F.)

A follow-up telephone call established permission to proceed with an in-depth investigation into project renewal within the RCMP. A date was set for the key informant interview. The researcher met with the Project Renewal Director and one of his staff at headquarters in Ottawa. The existence of a focus group (albeit a small one) would thus attest to the reliability of any statements. Subsequently, interviews were arranged with four (4) other individuals involved in the project.

2. Case 2: An Aerospace manufacturer

The second case involved the Montreal site of a multinational firm whose business is aerospace equipment systems ($13 billion annual sales). The Montreal site represents only 750 employees, (down from several thousand several years ago) of the 100,000 employees worldwide. This firm was selected because of its initiative to improve its quality. It had been certified ISO 9000, had implemented TQM, as is in the process of reengineering certain operations.

The leader of Total Quality (TQ) at the Montreal site was contacted by telephone. During a long conversation, the extent of the improvement initiatives and an understanding of the company structure and mission were discussed. A subsequent call arranged for an in-depth interview. A pre-interview package, similar to the previous case, was mailed to the TQ Leader. A visit to the company offices permitted the researcher, (i) a tour of the plant, (ii) a very long in-depth interview, and (iii) procurement of secondary data sources. Such multiple sources of data collection ensure construct validity (Yin 1994).

3. Case 3: Manufacturer of intimate apparel

The third case, a successful Montreal manufacturer of women's clothing, is part of a multinational holdings' company with interests in several industries. This firm was selected because it was reengineering various processes including manufacturing supplies procurement, and final product distribution. During an initial contact with the Manager of Systems Reengineering the nature and significance of the research was explained and a meeting date was established. A pre-interview package similar to the first case was mailed to the manager.

The researcher met with the Manager of Systems Reengineering on two occasions. At these meetings initial key-informant interviews took place and some secondary documentation was examined. Arrangements for follow-up data collection interviews were then made.

C. Participants

The research approach required one (1) in-depth informant interview per firm, followed by interviews using open-ended questionnaires with several other individuals. For case 1, three (3) subsequent interviews took place at the Montreal headquarters of "C" Division and one (1) telephone interview was obtained with a constable from Division "J" in New Brunswick.. The firm in case 2 was unable to continue participation beyond the first interview due to time and organizational pressures. Planned complementary interviews could not take place. For the third firm, seven (7) complementary interviews occurred.

In cases one and three, a stratified sampling approach was used for the selection of

participants. Informants represented a cross section of involvement in the reengineering process. These informants came from senior management ranks (33% and 14% respectively), from middle management ranks (33% and 72% respectively), and front-line staff (33% and 14% respectively).

D.   Data Collection

This study used multiple sources of data collection. The use of multiple data collection methods serves to validate the findings of the research (construct validity) by substantiating examination of the variables under study (Eisenhardt, 1989; Yin, 1994). This research benefits from two sources of data: (i) primary source: *interviews and observation*, and (ii) secondary data source: *documentation*.

Face-to-face interviews represent a primary source of data collection (Davis & Cosensa, 1993). A key informant interview formed the basis of each of the three (3) cases. These 3 interviews, and the four (4) complementary interviews of Case 1, were individual, in-depth interrogations of individuals who were either front line personnel or managers who initiated the reengineering efforts. These interviews lasted from 45 minutes to 2 hours, with the average being 1 hour 20 minutes.

Additionally, there were seven complementary interviews for Case 3. Due to time availability and job pressures of the participants, these 7 complementary interviews did not get into the depth of interrogation as those of case 1 mentioned previously. These latter interviews averaged about 30 minutes, and the short answer format with little elaboration made a major difference in data content.

All the aforementioned interviews established the idiosyncrasies of the changes of the particular reengineering initiatives. This establishment of a chain of evidence aids to ensures construct validity (Yin, 1994). The interviews were designed to elicit the extent to which the three firms of the study, which claim to have implemented BPR, actually used the different enablers to effect the changes of BPR as described in our model. The intention was to perform "pattern matching". Yin (1994) indicates that this method was described by Campbell (1975), where several pieces of information from a case are related to a theoretical proposition based on a previous pattern for these same pieces of information.

E.   Procedure for Data Collection

1- Interviews: The names of potential interviewees were recommended by the key informant and interview times were arranged over the telephone by the researcher. Introductory letters explaining the parameters of the interview were sent. Interviewees were also given a sample of the questions in either French or English. See APPENDIX F.

The seven in-depth interviews for the three cases proceeded in a semi-structured format. Although there was a suggested set of questions given to the interviewee beforehand, supplementary questions, occasioned by the flow and content of the interview, were posed. Hence the interview questions were open-ended, yet focused. Use of a sample set of questions which include a series of open-ended questions ensures external validity (Yin, 1994).

The interviews were conducted by the interviewer and transcribed generally by a clerical

person who was in attendance for most of the RCMP interviews. Third party transcription helps to ensure unbiased recording of the interview data. The interviews were audio-taped thus allowing full data transcription. The presence of the transcriber at the interviews not only facilitated the work of transcription, but also helps establish reliability in the data. The interviewees were forwarded a copy of the transcript to ensure accuracy and to solicit their approval for anonymous citation. Having the participant review the data ensures construct validity (Yin 1994).

The seven complementary interviews with case 3 focused on the same questions that were used in case 1. However, the time allotted per interview was much shorter, and hence, the format was fully structured and no elaboration of the responses was possible.

2- Documentation: Documentation regarding the reengineering initiative was gathered during each of the 3 key-informant interviews and during a case 1 Montreal interview. The RCMP subsequently forwarded additional documentation. The type of documentation varied according to the firm. The RCMP documentation included copies of national and divisional newsmagazines related to the reengineering efforts. For case 2, training manuals for the improvement processes were loaned to the researcher; while for case 3, the reengineering coordination manual was loaned.

3- Observation visits: For cases 2 and 3, the researcher was given an opportunity to visit the plant. This provided a first hand view of the operation in progress and thus facilitated an understanding of the reengineering process. This would also help provide a richness in the data analysis.

Collectively, the components of data collection, some of which are described later in this paper, are summarized as a data-matrix in Table VII-1. Several components may help to ensure reliability (Yin, 1994).

Table VII-1   Data-Source Matrix

Case	Key Informant Interview	Complementary Interviews	Documents	Site Visit
1	✓	✓	✓	
2	✓		✓	✓
3	✓	✓	✓	✓

F.   Questionnaires

Two different questionnaires were used. Questionnaire A was designed for the key informant who coordinated the reengineering initiative. (See APPENDIX E.) This questionnaire focused particularly on background data for the initiative. The questionnaire for the complementary interview focuses more on the leadership displayed in the initiative. (See APPENDIX F.)

Generally, however, both questionnaires sought to determine (i) the different processes that were reengineered, (ii) the interviewee's role in the initiative, and, (iii) the role, attitude, and behavior of management and any external influences. The role of the various enablers was an important focus. While investigating management role in the BPR initiative, the researcher attempted to explore the role of: (i) technology, (ii) strategy, (iii) various examples of leadership commitment, (iv) the organizational support that was

forthcoming, and, (v) any human resource initiative that supported the BPR initiative.

G. Data Analysis

Each of the three cases will be described in accordance with the steps developed by Wolcott (1995). He proposes that qualitative reports should follow a three-step pattern: description, analysis, interpretation. The description that follows in the RESULTS section (Chapter VIII) contains salient points emanating from the interviews and the documentation, as these points relate to the variables of the proposed model.

The analysis of the data used the qualitative data analysis methodology of Miles and Huberman (1994). This included interview data reduction sheets, data accounting sheets, secondary data summary forms. The data gathered from the cases were compared, where possible, with the situation prior to reengineering, the pattern-matching proposed by Yin (1994). These forms will be developed in the RESULTS section to follow.

As such, the data collected was reduced to an analyzable form. The contact summary of Miles and Huberman, (1994 p.54) served as a model for such reduction. (See APPENDIX G.) This process allowed the researcher to match notions from the interviews with the variables in the holistic model derived from the literature. Such data reduction facilitates a global understanding of the data particularly in how the data relates to the objectives of this study.

Furthermore, two analysts working independently, coded the hard-copy interview sheets using the variables, listed in APPENDIX B. Analysts working independently and then

comparing notes, reliably ensures that data reduction has indeed properly coded the data. The two analysts performed a count of the concepts from the interviews related to the variables of the model. Inter-rater reliability was determined and both the count and the rate of reliability was displayed on the accounting sheet form, as suggested by Miles and Huberman (1994, p. 82). (See Table VIII-2.) Similarly an accounting sheet was prepared to display the frequency of mention of the variables during an interview. (See Table VIII-3.)

H. Validity and Reliability

The degree of objectivity can be assessed by the level of reliability and validity of the findings. Several tactics (Miles and Huberman, 1994; Yin, 1994), were mentioned earlier, and are summarized below, in Table VII-2. The study attempted to respect research reliability and the three types of validity (construct, internal, and external) that Yin (1994) indicates must be present in qualitative work.

	Test	Explanation in Yin (1994)
Con.	*Construct validity*	occurs when the researcher establishes correct operational measures for the concepts involved in the study.
Int	*Internal validity*	requires that an explanation of cause be clearly determined by the identified factor.
Ext	*External validity*	requires that the study's findings are generalizable beyond the current cases. The investigation attempts to support the generalization that IT is the vital enabler, within an integrated set of enablers, of BPR.
Rel	*reliability*	the investigator must attempt to assure that a subsequent investigation using the same procedure would arrive at similar results. In addition, during the analysis of the data inter-rater reliability was done.

Table VII-2   Measures of Validity and Reliability

Test	Step	Case-Study Tactics (Yin 1994)	Research Phase	Current Study
a) Con.	1	use multiple sources of evidence	data collection	• Use key informant interviews with 3 firms • Use interviews with other individuals of the firm • Use observation where possible • Use secondary source documentation
	2	establish chain of evidence	data collection	• Key informant interview highlighted the steps and idiosyncrasies of change system.
	3	have key informants review draft	composition & write up	• Have informants review the transcripts of the interviews • Forward copy of final report
b) Int.	1	do pattern matching	data analysis	• Use available performance measures, as indicated by the KI, before and after reengineering
	2	do explanation building	data analysis	• Analyze the description of the reengineering effort to assure cause and effect
	3	do time series analysis	data analysis	• Attempt to match the units of measure in a before & after pattern match
c) Ext.	1	use replication logic in multiple cases	research design	• The design included a sample set of questions to be posed to each key informant for each case. (See APPENDIX E.) • The design included a series of open-ended questions to be answered by individuals involved in the reengineering project. (See APPENDIX F.)
d) Rel.	1	use case study protocol	data collection	• A protocol was forwarded to each firm at the initial request. (See APPENDIX D.)
	2	develop a case study matrix	data collection	• See matrix in Table VII-1

VIII. RESULTS

The results of the investigations will be related to the variables gleamed from the literature and presented above. Additionally, the results will relate to the proposed model. First, each case is presented separately using anecdotal data that were collected through the interviews. These data are related to each of the variables in the model. Subsequently, a word count and a concept count (Miles & Huberman, 1994) are presented.

A. Case 1

This first case is a national police service, the Royal Canadian Mounted Police (RCMP). The force is in the process of enormous redesign from coast to coast. Five in-depth interviews and secondary data sources provide a significant amount of data for each of the variables.

1. Six variables for Case 1

Each of the variables of the model is supported by data amassed from the interviews. In the exploration of each of the variables, this study will include concept and word mention counts (Miles & Huberman, 1994). Furthermore, inter-rater reliability was determined.

a) Strategy (ST)

Strategy might include corporate strategy and business strategies such as strategic planning for information technology, for operations, or to establish a social technical-atmosphere. Late in 1993, senior management set out to renew the mission of the force through consultation and empowerment. The need for renewal (catalyst for change, *STC*)

had been festering for several years through out the ranks. Said one director, "Around the early 1990's, we started to talk about things like going back to the fundamental principles of policing, of providing more contact with the public, getting better service, being more efficient in how we deliver the service, developing new ideas." Said another interviewee, "In the mid 80's the commissioner started talking about renewal"

Not only were there seeds of change implanted, but a new federal budget required that over a three year period the RCMP cut its operating budget by $75 million. Accordingly, several catalysts for change were present (as outlined in the Project Renewal training document). (See Table VIII-1.) A sense of urgency had been created.

Table VIII-1 RCMP Catalysts for Change

Catalysts for Change		
Budget Cuts	Mandate Challenges	Competition
Globalization	Government Environment	Policies
Bureaucracy	Public Accountancy	Desire for Excellence

These catalysts served to encourage a **project-renewal mission statement**: (*STM*)

> *"Before fiscal year 1997/98 through the extension of Community Policing, to review the organization and reduce the cost of doing business to become the police organization of choice"*

It should be noted that although objectives (*STF*) such as reviewing an organization's methodology and cutting costs are common (almost to be expected), the notion of competition, i.e., "police organization of choice" is novel. The reason for this inclusion in the mission statement is because in certain parts of this nation the RCMP is, in fact, in

competition for policing service. In the provinces, other than Québec and Ontario, the RCMP serves as the provincial police force. Likewise in many cities and towns across the country, the RCMP contracts to perform municipal policing services. Hence, the management of the RCMP must offer a service for a price and face any competition from a rival group wishing to offer such services. The customer, whether citizens, business leaders, or politicians must collectively be satisfied or, like in any business, they will switch. As indicated by the project renewal director, "We are realizing more and more that provinces and municipalities have options. They do not have to take our services, nor do the federal departments. We would like to provide the most effective and cost efficient services that we can."

This mission becomes possible through the evolution of strategic activities (*STP*) including, RCMP "protecting-core" functions, empowerment, flexibility, client focus, decentralization, consultation, and changes in structures, management philosophy, culture, and values. As a result, the strategic vision (*STV*) of the RCMP has become: **"Safe homes and a safe community through community based policing**", (Project Renewal training document).

It is this vision of "Community Based Policing", which is the basis of the hundreds of reengineering projects across the country. Some projects originate in Ottawa; others originate in the different divisions. According to one inspector "I am not aware of all the experiments that are going on across the country, but BPR started mainly as a movement at headquarters in Ottawa." At the level of the "cop on the beat", a constable offers this:

"Before, I think most police forces were mostly reactive, where if they had

a complaint they went to it and they turned around and left, and they had the same complaint two hours later. So this community policing type of thing means: instead of going to the same complaint ten times in a month we will to try to figure out another way to keep everybody happy and not have to return. With this community policing we are trying to involve everybody, local service groups, the community neighborhood watches, just anybody really that can give us a hand because as I say we are just not enough police officers to cover everything that is happening."

Another participant indicates,

"In our vision of organization (STV), what we want in our change process, is to have more of people at the point of service delivery making a lot of decisions. ... When we talk about community policing which is the vision, we look at it in the broader sense rather than the narrower sense. We expand the vision of community policing to include what we called initially the principles of streamlining and restructuring: flatten the organization, de-layer, eliminate work that does not need to be done, empower people, reduce spans of control."

Strategy can include use of technology for strategic alliance. "In the strategic plan of the force, we have a goal of linking ourselves to the other police departments in the country (STA), so that we can exchange information electronically. That's by the end of the century. We're working in that direction," said one participant.

During the case 1 interviews, a **concept** relating to this variable (ST) was mentioned on 63 occasions, an average of 12.6 mentions per each of the 5 interviews. (See summary Table VIII-2.) In terms of the number of mentions in a **word** count, there were 130 mentions of an ST element, an average of 26 mentions per interview. (Refer to Table VIII-3.)

Table VIII-2 Concept Accounting - RCMP case

Model variables	IV	MV	MV	MV	MV	DV	
Participant	IT	ST	HR	CL	OR	BE	Inter-rater Reliability
A	27	8	11	10	15	6	0.76
B	5	13	5	22	20	3	0.71
C	8	16	9	24	7	4	0.76
D	6	10	12	6	7	7	0.65
E	8	16	19	28	10	6	0.82
Total	54	63	56	90	59	26	
Average	10.8	12.6	11.2	18	11.8	5.2	0.74

DATA ACCOUNTING SHEET
 # OF MENTIONS OF CONCEPTS

Legend   IV Independent Variable   MV Moderating Variable   DV Dependent Variable
(IT) Information Technology   (ST) Strategy
(HR) Human Resources   (CL) Commitment and Leadership
(OR) Organizational Support   (BE) Benefits of the BPR Initiative
Inter-rater reliability:(agreements / (agreements - disagreements))

Table VIII-3 Variable accounting - RCMP case

DATA ACCOUNTING SHEET
 # OF MENTIONS OF VARIABLE

Participant	IT	ST	HR	CL	OR	BE
A	143	19	13	1	10	8
B	16	14	4	30	21	13
C	42	57	22	31	15	8
D	26	22	15	3	0	9
E	66	18	52	20	22	7
Total	293	130	106	85	68	45
Average	58.6	26	21.2	17	13.6	9

b) Information Technology (IT)

Information technology refers to any system, hardware, software, or system tool, that facilitates the work of organization members. This variable according to the model is the **key enabler** of BPR. This was supported largely by the participants. Participant C indicated, "Informatics, they are the truck that gives us the product"; and participant A stated, "Informatics of course is the key to what has happened here." Another participant stated, "I think information technologies is critical to what we are doing, it's absolutely critical. It's fundamental. You cannot do this restructuring unless you have a proper information technology staff." Consider this from one participant,

> *"Yes, IT has been a major factor. When you consider district (community) policing, what we are doing is using information technology in centralizing administration at a regional level, (i) to reduce over-all administration, (ii) to reduce the paper burden, (iii) to put our operational people out on the road, (iv) to give them more time to deal with the public. This applies to supervisors as well. Instead of supervisors being pre-occupied a 100% with their administrative duties, now they have time to spend on the road dealing with operational matters in the communities, dealing with the public"*

The model also suggests that IT acts as a facilitator to the other enablers, better allowing them to be enablers of BPR. From one participant, concerning how technology is facilitating the workings of strategy allowing strategy to enable reengineering, "IT has allowed us to meet our budget cuts and that sounds like a bit of a paradox, because we're shelling out major dollars to install ROSS (RCMP Officer Support System) ". He also had this to say:

> *"So, this is probably a very good example of how technology is facilitating this change. Everyday, our senior executive, the commissioner and all of his associates have a morning meeting at 8h30, in Ottawa. All through the evening and early morning, reports come in from the various divisions to the National Operations Center (NOC). And the*

commissioner and the deputy commissioners can be briefed on what's going on in the whole country, in the morning. That is all facilitated there. NOC also contains a video-conferencing center, and with the video-conference center at headquarters, we now do video-conferences throughout the country. We are also connected to outside organizations, and each division has a video-conference center. That is something which stems from the process of reengineering in Ottawa. "

Technology is also facilitating other enablers, in essence permitting them to, in turn, bring about reengineering. The participant from informatics understandably was generally more sensitive to the significant role that IT serves. "Technology has been able to facilitate the training as well. Every important piece of software usually has a tutor, which comes with it, so we've been able to have people use these tutors, as a way to get them going. And after that, we evaluate whether or not we have to sit in the classroom, and do it formally." In essence, IT helps make IT-trained personnel better able to affect other change.

Technology enables changes that are the benefits of the reengineered process. Technology permits the constable to be visible to the public much more than previously. Prior to reengineering the constable role, the officer would be in the office about 50% of his/her work shift doing administrative work. Because of the reengineering initiative and due to the availability of technology, officers are now able to be present in the public eye at least 7 hours of the 8 hour shift. This represents a 75% increase and is a visible improvement in customer service.

"In the district here, we are now on automated system which is called the ROSS system and all our files are now done on computer. We have laptops in the vehicles. There is no more handwriting, as everything is done on computer now, our forms, everything is done right out of our police vehicles. The reason behind this is to get us out of the office and on the road where people can see us, the visibility aspect of it. So everything now is done on a little diskette and we will go out for our shift which is eight hours and maybe we will spend seven of it on the road now.

Maybe we are not doing traffic enforcement but we are at least there, being visible and people see the police are out. It might be typing but where as before we were spending maybe four hours a shift in the office writing."

During the case 1 interviews, a **concept** relating to this variable (IT) was mentioned on 54 occasions, an average of 10.8 mentions per each of the 5 interviews. (See summary Table VIII-2.) In terms of the number of mentions in a **word** count, there were 293 mentions of an IT element, an average of 58.6 mentions per interview. (Refer to Table VIII-3.)

c) *Human Resources (HR)*

Concerning the reaction to change caused by reengineering, leadership and human resource personnel had to face a small amount of negative reaction (*HRC*). One participant indicated, "In some cases they feel threatened, they do not like the rate of change and what not, but I think it has gone very well so far. There is a greater understanding now of the need to change and where we are going, so it is not as bad as it was before."

An officer in a small detachment in "J" Division mentioned, "Maybe 20% of the detachment are a bit negative or seem to be bucking the changes, but I know a couple of guys for sure who have come around." From another, "I think I can say that most people support that. I'm not saying that everybody's happy with this. I'm not saying that everybody's on side, but I think that we have managed to appease, or calm a lot of the worries, because nobody's been laid off yet, nobody."

Concerning training (*HRT*), the force is going to great lengths to involve all the

partners in learning the new philosophy. As one participant said, "We train all of our people on the detachment. We bring in citizens and we bring in people from other government organizations, involve them all in the training. What it is really, is community problem solving." Another indicated, "We are in the process of having more of what we call community policing training, what you might want to call management training, leadership training, because what we are going from, is away from management skills and more to leadership skills, more to team building, more to coaching, more to mentoring, more to facilitation in groups."

Regarding job design changes (HRJ), the force, because of technology, is able to significantly modify these. Said one interviewee,

> "It puts the technology into the hands of the knowledge workers. In other words, it puts technology into the hands of police officers. So, no longer now, do we want the police officer to generate all this with a piece of paper, then give it to his secretary. We want the police officer, with that technology in his hands, to generate information that he has to generate, and to do it once and that's it, it's done, so there's an economy there. And what's happened is, it's changed the roles of our secretaries and clerks, throughout the whole organization. It's made them assistants instead of secretaries and clerks. It's made them take on more of a decision making, logical, head-use role."

Another participant said, "We are not going to replace anybody with a computer because there are going to be a different roles. The police officer is going to have a different role, because of the computer."

The force is faced with assuring an attrition program for those who leave as part of the downsizing (HRP). As indicated above, no one has been laid off due to reengineering. Job relocation or encouragement of attrition must be considered. One participant indicated, "The

bottom line is that the people affected by the workforce changes or changes in the organization, or cuts, are entitled to some kind of separation allowance, above and beyond what you would normally get with your pension."

During the case 1 interviews, a **concept** relating to this variable (HR) was mentioned on 56 occasions, an average of 11.2 mentions per each of the 5 interviews. (See summary Table VIII-2.) In terms of the number of mentions in a **word** count, there were 106 mentions of a HR element, an average of 21.2 mentions per interview. (Refer to Table VIII-3.)

d) Commitment and Leadership (CL)

Clearly, stemming from strategic decisions to reengineer, senior management is demonstrating a focus and a commitment towards renewing the force. Video-conferencing and the use of email (*CLC*) permit middle and senior managers from across the nation to be involved in the communication (input/output) of ideas. The officer in the trenches says, "I tell you one thing. Fredericton ("J" Division Headquarters) has been very supportive. I cannot think of any program or any member that has submitted a plan by which he would like to do something in the context of any community policing, where they have not said, 'Go for it.' They are very open and they want communication between the police and the communities."

Support from leadership (*CLS*) is of vital importance for revolutionizing a system as large as the RCMP. Said one director, "You have to have the key players on side in your division. If the commanding officer isn't on side, you're essentially wasting your time. And that, as far

as I'm concerned, is the absolute truth. The CO, the head person here, provides the leadership and provides the energy. He will say, 'Go ahead, you're on the right track. I support you.' "

Benchmarking (CLB) is one aspect of improvement initiatives that helps to set standards for change. The RCMP is aware of improvement plans in different forces and at different detachments within its organization. According to one interviewee,

> "We are trying to establish a database based on some types of investigations, i.e., it took so long, required so many people, and so on. We'll compare with other parts of the province, and we will start building up a base." Said the project director, "We go to different seminars, and we talk to consultants all the time to find out what they know. We read books and articles on all manner of things to try and we find out what others are doing that we can learn from them. We talk to other police departments, other federal departments, and private sector companies. We are also going to Madison Wisconsin to meet people in other organizations at the same time, to talk to them. Madison PD has done some very innovative things about policing. We are going to talk to them about what they are doing, so that we can incorporate it into our change process."

The notion of empowerment is tied in closely with accountability (CLA). The force expects that through empowerment, the members will feel accountable and act accordingly. One director indicates, "We are empowering them and making sure that they are accountable as well."

During the case 1 interviews, a concept relating to this variable (CL) was mentioned on 90 occasions, an average of 18 mentions per each of the 5 interviews. (See summary Table VIII-2.) In terms of the number of mentions in a word count, there were 85 mentions of a CL element, an average of 17 mentions per interview. (See Table VIII-3.)

e) Organizational Support (OR)

Renewing the force inevitably affects the culture of the organization (ORC). The RCMP

has taken on a different mantle. Said one director,

> "We have to change our management, our culture, and our values. Now when we talk about our management philosophy, our culture, and our values, there are things that we want to keep about the way we do business: like honesty, integrity, service to the public, respect, and to treat with dignity our clients as well as our employees. There are aspects dealing with our hierarchical semi-military, militaristic, structures that we have to change - the command and control mentality."

District policing, facilitated by IT use, allows a flattening of structures (ORS). The

constable indicated,

> "Things are going to have to change and this district policing concept is doing that. They are absorbing these small detachments and they are making the districts a little larger. They will open up a satellite detachment where a member will go and have a little office in any given community. They will spend eight hours, their whole shift there, and people will come in and talk to them, and they will have a phone and a computer."

As the force changes, there is a certain organizational evolution that occurs (ORL). Said

one participant,

> "Our idea of the changes we have to go through has evolved during a year in a half. We have, (i) learned more about ourselves, (ii) articulated dimensions of our organization that we would like to change, and, (iii) learned other things that we would like to keep. We understand the change process better since we read more and we talked to people from other government departments, from the private sector and other police departments as well."

Organizational change requires teams (ORT). As is suggested in the literature, cross-

functional teams facilitate renewal. Said one interviewee, "We have been bringing people

together for three years now. For example budget analysis: if you want to look at finance

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area, (i) bring the budgets analysts together, (ii) bring the accounts payable clerks together, and (iii) bring reviewers."

Process improvements (ORP) are identified with renewal. Indicated one participant,

> *"We're seeing communication at a pace that we hadn't seen before, and all of that has been facilitated by the computer. Here we use a radio system also, with radios in all of our cars. We've patched it to the telephone system. A police officer in a car who needs to make a phone call, can be patched through to the Bell phone system and call anywhere in the world through cellular telephone technology, "*

Later in the interview he said, "That's what technology is doing in that sense, pushing, not only the internal culture, but the external culture. It's pushing our government people."

During the case 1 interviews, a **concept** relating to this variable (OR) was mentioned on 59 occasions, an average of 11.8 mentions per each of the 5 interviews. (See summary Table VIII-2.) In terms of the number of mentions in a **word** count, there were 68 mentions of an OR element, an average of 13.6 mentions per interview. (Refer to Table VIII-3.)

f) Reengineering Outcomes: Benefits (BE)

The renewal project is bringing revolutionary change and benefit to the force, allowing it to fulfill its new mission. There appears to be significant improvement in: (i) internal and external customer satisfaction, (ii) time to get routine police matters done, (iii) efficiency (communication, leadership decision making, policing), (iv) reduced costs ($75 million dollars budget cuts being met).

Concerning customer satisfaction (*BES*), one director said,

> "*We are developing surveys right now. We have had surveys done in different areas, aboriginal communities, some of our rural communities, and urban communities. In different areas, like the J division, looking at client satisfaction, really they have been tremendous, 86 to 95 - 96% public satisfaction which is very high. We often are our worst enemies, we don't realize just how good a job we are doing because everybody wants to be better, but things have been going relatively well.*"

Successful cost cutting in the light of budget cutbacks is a benefit of renewal (*BEC*). Said another director,

> "*ROSS (RCMP Officer Support System) has played a major role, I think, in what's gone on here in the division. It has also allowed us to meet our budget cuts, and that sounds like a bit of a paradox, because we're shelling out major dollars to put ROSS in. On the other hand, we are saving many communications costs, we are saving paper costs. We are communicating now over a system that lets things happen immediately. Before we'd have to write memos which would go through channels and some work would be done, and the thing would come back. Now we have this done in a fraction of the time. I don't know what the fraction is, but it's a fraction.*"

Reduction in the size of the structure and reducing the amount of personnel is the sought after benefit of reengineering (*BED*). Said one leader,

> "*Information technology is critical to downsizing, and it's going to allow us as well, to go from 34 detachments, to many fewer detachments. We're going to form the district concept, with the administrative work being done more at the district level, letting the satellite detachments, satellite officers, basically do more of the actual police work, and be less involved with doing all the checking of peoples' expense claims. And the ROSS system is going to allow us to do that, because of that information can be transmitted electronically.*"

> Technology permits faster communication (*BET*). The constable in J Division indicated, "*We're seeing communication at a pace that we hadn't seen before, and all of that has been facilitated by the computer. We have radios in all of our cars that we've patched it to the telephone system. A police officer in a car, who needs to make a phone call, can be patched through to the Bell phone system and call anywhere in the world. Cellular telephone technology, of course is being used.*"

Planned improvements will totally reengineer the way the process of arrests is accomplished. A director proposed,

> "But, really every terminal should have a scanner beside it. When I receive a letter, I slip it in there, then I have gotten it electronically, and I do not have to worry about anything happening to it. That's where we are going. We are working on a system now of transmitting electronic fingerprints from all police agencies into Ottawa. The direction IT is going will allow the constable to transmit a fingerprint from the side of the road, or a photo image using scanners. The video cameras that are in the cars are only recording now, but in future may be transmitting."

During the case 1 interviews, a **concept** relating to this variable (BE) was mentioned on 26 occasions, an average of 5.2 mentions per each of the 5 interviews. (See summary Table VIII-2.) In terms of the number of mentions in a **word** count, there were 45 mentions of a BE element, an average of 9 mentions per interview. (Refer to Table VIII-3.)

2.   Data accounting and inter-rater reliability

Two analysts working independently determined the frequency with which concepts, relating to the variables of the model, were expressed during the interviews. These elements relating to the variables were extracted from the literature. For this case, the range of inter-rater reliability scores was 0.65 to 0.82, with a mean rating of 0.74. Table VIII-2, (based on Miles & Huberman, 1994), displays a summary of the count and indicates the inter-rater reliability score. The two analysts' identifications of concepts were compared, and the inter-rater reliability score was determined by dividing the number of correctly matched identifications by the sum of the correct and incorrect identifications.

B. Case 2

This second case is a multinational aerospace manufacturer. The firm is in the throngs of a massive redesign following strategic merger. One in-depth interview and some secondary sources provide data for each of the variables.

1. Six variables for Case 2

Each of the variables of the model is supported by data taken from the interview. As with the previous case, in the exploration of each of the variables, this study will include *concept and word mention counts* (Miles & Huberman, 1994). Furthermore, inter-rater reliability was determined.

a) Strategy (ST)

Clearly, the strategic move to reengineer the corporation came from senior management who had examined the global situation and decided change was necessary (*ST1*). Said the interviewee,

> "When our new CEO arrived in 1991, he identified the company as very internally focused and lagging behind in improvement initiatives. He started a total quality initiative, telling us that (i) we were about 8 years behind the industry in general, but the automotive field in particular, (ii) that we had to be competitive globally in order to survive, and, (iii) that yes, if we were more efficient, and if we didn't grow, there would be fewer jobs, but there would at least be some jobs."

The change foreseen was for the corporation called for revolutionary improvement (*ST1*).

The liaison person stated,

> "You can challenge the team to be effective, challenging them to go for stretch goals, not for 3, 4, or 5% improvements but to go for half-life improvements, for 50% improvement, and challenging them to find out what it would take for that kind of breakthrough thinking."

Furthermore, indicating that strategy is influenced by organizational learning (*ORL*), he

stated,

> *"We have a common theme behind the total quality and reengineering effort. The organization itself has been changing so much in the process that our goals are constantly changing. Our business process objectives are constantly changing. When these two new people came in, they gave me a whole new set of business process reengineering objectives."*

During the case 2 interview, a **concept** relating to this variable (ST) was mentioned on 17

occasions, and the number of mentions in a **word** count, there were 37 mentions of a ST

element. (See Table VIII-4.)

Table VIII-4   **Data Accounting Case 2**

DATA ACCOUNTING SHEET						
# OF MENTIONS OF CONCEPTS						
Participant	IT	ST	HR	CL	OR	BE	Inter-rater Reliability
Case 2	13	17	24	27	23	9	0.65
# OF MENTIONS OF VARIABLES						
Case 2	111	37	59	15	49	22	**

** Inter-rater reliability was not performed on word counts of the number of variables.

b)   Information Technology (IT)

The progress so far in the reengineering initiative has not yet taken advantage of IT. The

size of the merger in the very recent past is causing some delays. Said the informant,

> *"We do have a site strategy for IS but we also have a business level strategy driven by one of the IS leaders from headquarters. We've missed some fundamental building blocks, connected with IS. We do not have a database hub, we are going to put in a common accounting package at all the sites, and a common MRP system. We are using a common desktop across all of the firm. There are probably 30,000 people that I can send email to within the company.*
>
> *IT enables you to automate the data handling activity, enables you to totally process things differently. You are able to get breakthrough results through technology, or using technology to redesign a product*

because the technologies become available, and you design processes to take advantage of the technology. In many cases technology is available, but we have not re-designed our processes yet. "

During the case 2 interview, a **concept** relating to this variable (IT) was mentioned on 13 occasions, and the number of mentions in a **word** count, there were 111 mentions of an IT element. (See Table VIII-4.)

c) Human Resources (HR)

Senior management indicated that because of the merger there were too many employees. The thrust to change in order to catch up to industry standards, was seen by the employees as an excuse to cut staff. The interviewee stated,

> *"The firm was a company that was formed in the mid 1980's by merging 2 large corporations and the guy that made the merger happen never restructured the company afterwards. So the company was carrying 15% more people than was needed. The new CEO just came in (1991) and challenged the organization of the company to justify the people that it had in place. A lot of people were taken out (HRC). There were a lot of people who claimed that the program was a smoke-screen to take peoples' attention off the fact that they were about to be laid off. There is always the self-pitying who just feel like they are victims and who express all the negatives. But while there was some push-back on these things, for the majority it wasn't a major problem. It didn't get to the point where the results were impeded by a kind of dissent. "*

The firm has undertaken to thoroughly train its employees in the quality initiatives (*HRT*). The participant indicated,

> *"In TQL we trained 100% of the population. In TQS we trained maybe 10% of the population because we knew that not everybody needed to be involved in the reengineering process. There was a plan to basically educate people in new tool sets and total quality training was part of that. What we call TQS, which was process reengineering training, was another step in that. There was other training as well. Our decision to go for ISO 9000 was part of it. "*

During the case 2 interview, a **concept** relating to this variable (HR) was mentioned on 24 occasions, and the number of mentions in a **word** count, there were 59 mentions of a HR element. (See Table VIII-4.)

d)   Commitment and Leadership (CL)

The Montreal site, because of de-layering and staff cuts, has several managers who have a sense of accountability (*CLA*). "Our people take a large degree of accountability in the staff group. The staff group is much smaller than it used it to be. Many of the managers are working managers or they are team leaders now." The distinction between them and the people who work with them is much less than what it used to be. There's a high degree of accountability among the people."

Leadership trainers demonstrate the firm's commitment to improvement and empowerment (*CLL*). The informant said,

> *"The message we are trying to get across, and although after training, people don't internalize this, (the message) is that leadership is not the manager or even the team leader. Leadership is tackling change, challenging yourself to improve, going somewhere. People, at a low level, are also encouraged to act and inform (CLE). They are encouraged to take a decision and inform somebody of the decision made, rather than delay a decision until they get a blessing and approval. Ninety to ninety-five percent (90-95%) of the time the proposed solution from the employee is a good idea. And, generally if it needs to be modified, there is time after the informing takes place, to modify it."*

During the case 2 interview, a **concept** relating to this variable (CL) was mentioned on 27 occasions, and the number of mentions in a **word** count, there were 15 mentions of a CL element. (See Table VIII-4.)

e) Organizational Support (OR)

The merger of large corporations to form a company with tens of thousands of employees provides for an interesting organizational structure (ORS). "At the same time the corporation was going through de-layering. We were being challenged to have about 4 layers - from a top-level person down to go from having supervisors to having team leaders to get down to that level if necessary. That was not done in a really formal manner. It was a management directed activity. But, there was a lot of restructuring around that."

The organization makes good use of teams to develop processes (ORT). "It was an example of how, teams were making improvement, how some teams got into the reengineering process. The firm is in the middle of its reengineering of processes. Considering its size, this is a tremendous operation.

> "Over the last 20 years, all of our factories had developed their own ways of doing things. These teams are just in the process of reengineering how we do things, e.g., (i) from order entry to collection, (ii) from placing orders in the factory and producing the product, to delivering to the customer, and collecting the payments. Our reengineering also includes: (i) integrated product development, (i)i new business development, (iii) identification of new markets, (iv) developing a new technology or prototypes to determine if there is a market potential there, and, (v) the after-market, based on customer support. Those are the major processes, the major businesses at all the sites. For the projects that we did in '92 and '93, when we had teams of roughly 6-8 people, with 700 people, here we launched over 100 teams."

During the case 2 interview, a **concept** relating to this variable (OR) was mentioned on 23 occasions, and the number of mentions in a **word** count, there were 49 mentions of an OR element. (See Table VIII-4.)

f)   Reengineering Outcomes: Benefits (BE)

The previous citation is an indication of the benefits in efficiency that are to come.

However, there have been benefits in time reduction. The interviewee said,

> *"A significant portion of the teams tackled process cycle-time-reduction activities of one kind or another. We had for example: (i) a team for getting material out of stores, and (ii) a team in assembly to tackle inventory waiting queue waiting for assembly. They cleaned up that whole assembly queuing activity so well that we cut about 3 weeks of inventory out of final assembly."*

The 700 people at the Montreal site of a few years ago are now down to 450 people. Yet

because of the reengineering of processes, "We are driving improvement and the benefits

are dramatic. We are running the business with the same sales, with 30% less employees.

That's a significant cost take out."

During the case 2 interview, a **concept** relating to this variable (BE) was mentioned on 9

occasions, and the number of mentions in a **word** count, there were 22 mentions of a ST

element. (See Table VIII-4.)

2.   Data accounting and inter-rater reliability

Again, two analysts working independently determined the frequency that concepts were

expressed during the interviews, concepts related to the variables that make up the model.

Table VIII-5, (based on Miles & Huberman, 1994), displays a summary of the counts and

the inter-rater reliability score. The analysts' identifications of a concept were compared.

The inter-rater reliability score of 0.65 was determined by dividing the number of correctly

matched identifications by the sum of the correct and incorrect identifications.

C. Case 3

This third case is a multinational intimate apparel manufacturer. The firm has recently undertaken several reengineering projects. One in-depth interview, seven follow-up complementary interviews, and some secondary sources provide data for each of the variables.

1. Six variables for Case 3

Each of the variables of the model is supported in varying degrees by data gathered from the interviews. Once again, this study will include *concept and word mention counts* (Miles & Huberman, 1994) and an inter-rater reliability score.

a) Strategy (ST)

From the informant interview and the complementary interviews, it is clear that the catalyst for reengineering processes (*STC*) at this plant included a need to develop: (i) lower operating costs, (ii) greater customer intimacy, and, (iii) quicker turn-around-time. The key informant stated,

> "There were three main objectives: (i) to improve operational efficiency, i.e., 'Can we operate the way we are operating now but at a lower cost?' (ii) Building to a certain extent a customer intimacy, meaning, 'Are we able to get closer to our customer? Are we able to differentiate ourselves to our customers so that they will do more business with us?' and, (iii) 'Are we able to churn out new products much, much faster?' That's in terms of new product development."

The firm in Case 3 is successful and yet it felt it needed to reengineer in order to stay ahead (If it ain't broke, break it', (Stewart, 1993) mentality). The informant offered,

"We're an extremely successful company. We have a growth rate of approximately 30%

per year. In our market which is intimate apparel, in Canada, we own 55% of the market. So, that in fact makes it somewhat difficult to implement reengineering project. Being aware of that, we wanted to say that yes, we were really good, but we want to be even better."

This firm is implementing strategic alliance (*STA*). From the informant,

> *"We were involved with Sears and Wal Mart to the extent that we integrated ours systems together. There was nobody working full time at each other's site, but there was a lot of communication, like a virtual committee as we were all linked via email. During the design and implementation phases they were involved as customer. As regards the front end, with the receiving we are now getting into relationships with our suppliers. We are requesting that they ship in a specific manner and through EDI they are shipping us advanced shipping notices. So in this way we are working together."*

During the case 3 interview, a **concept** relating to this variable (ST) was mentioned on 11 occasions, and the number of mentions in a **word** count, there were 39 mentions of a ST element. (See Table VIII-5.)

Table VIII-5 Data Accounting Cases 3

DATA ACCOUNTING SHEET						
# OF MENTIONS OF CONCEPTS						
Participant	IT	ST	HR	CL	OR	BE	Inter-rater Reliability
Case 3	10	11	5	13	14	6	0.52
# OF MENTIONS OF VARIABLES						
Case 3	9	39	11	3	3	13	**

** Inter-rater reliability was not performed for word counts of the mentions of variables

b) Information Technology (IT)

The interviewee indicated that IT was significant, "The 3 objectives are being made possible because of technology. In terms of the executive, they see IS as a supporting

role. The IS people are not the leader but they do represent a strong impact. We view MIS as more of a supporting role. At this point, for reengineering, they are not the CZAR (See Table VI-3), but they help, they are enablers."

Process improvement is demonstrated by the *receiving* process. Suppliers are linked through EDI to allow concurrent operations for product arrival. Delivery time is reduced substantially. From the informant,

> *"We track everything now. Before BPR I could track things at a very aggregate level. Generally what do I have in sewing? What do I have in distribution? What do I have in shipping?. Our wall-grid was a series of very big squares. Now we map over the big square, processes that make little squares. Now, there are several very small squares, with small details. Now, with an order I can track every little corner: like how much is in Costa Rica, Mexico, Philippines, China, the plants here, the distribution centers. In terms of tracking and control it is absolutely unbelievable. But we don't really use it to exploit potential at this point. EDI sends advance shipping notices through WAN, synchronous communication systems. We have constant snapshots. I could tell you, for example in Megantic, what style in a particular line for a particular operation is in the works. This is possible because everything is bar-coded. Thus. BPR is made possible because of the technology. We could not do it without the technology. It is the enabler."*

During the case 3 interview, a **concept** relating to this variable (IT) was mentioned on 10 occasions, and the number of mentions in a **word** count, there were 9 mentions of an IT element. (See Table VIII-5.)

c)   Human Resources (HR)

The reaction that occurs to change (*HRC*) was tempered by success at this firm. "At the beginning there might have been some apprehension, but when the employees saw that there was success then as members of the union, they did not get excited. They saw that

we were not getting rid of anyone, that things were going smoothly, that things were kind of fun."

Rewards (*HRR*) were one result for employee compensation changes. The liaison person stated,

"In the plants we changed the style of sewing by implementing Toyota style groups, where these people decide on their own objectives during the day, decide on the hours they will work during the day. There is no control. The team of 7-8 are responsible for churning out a specific amount of items per week, and they need to be together to churn it out. If they can churn it out in less hours then they may start working on their bonuses. They are driven to go faster. It is their call whether they want to take the time off or to work the hours on extra output. As long as they meet our objectives, we are happy."

During the case 3 interview, a **concept** relating to this variable (HR) was mentioned on 5 occasions, and the number of mentions in a **word** count, there were 11 mentions of a HR element. (See Table VIII-5.)

d)   Commitment and Leadership (CL)

The firm demonstrated some leadership in the reengineering initiative by (i) assigning an individual (*ORS*) to a specific post (Manager of Systems Reengineering) , (ii) consulting employees at different levels (*CLC*), and, (iii) mapping the entire process to better understand where they were (*ORL*). From the interviewee,

"When we talked about a BPR program, what we wanted to do was to involve everyone (CLC). So, we really went with sort of a big bang approach. The first thing we did was to hire a person to be responsible for the project. Then, we did process mapping, so as to see how it worked now. Our first thing was a grand situational analysis, so that everyone was at the same level knowing how it worked at that time.

"We talked to the VP manufacturing. Then we talked to the VP sales, because we wanted to get different perspectives. And then we went down the levels to the director of operations, the supervisor of the

specific department, and then the actual employees.

Then actually to the shop floor, trying to understand it in more detail. Doing it in actual details, moving all the way down. In fact, it was actually surprising that only when we went to the shop floor to see the workers that we really, finally, understood how it was working and the complexity of it, some of the complications with which they work."

The Montreal VP of Manufacturing was the organizations major supporter (*CLL*) of the reengineering initiative. From the interviewee, "The president does not own the BPR. I would say we have a champion who is the VP manufacturing, who, through his tentacles touches other departments and takes up a lot of space. He is really the champion of it."

On the other hand, the some of the complementary interview group were not totally enamored with the leadership of senior management (*CLL*). About management role in the BPR initiative, one said, "They are not very positive. They keep interfering and it has not been a successful implementation." Said another, "They have created confusion." A VP indicated, "It is difficult for them to change their ways."

During the case 3 interview, a **concept** relating to this variable (CL) was mentioned on 13 occasions, and the number of mentions in a **word** count, there were 3 mentions of a CL element. (See Table VIII-5.)

e)   Organizational Support (OR)

The organization used cross-functional teams (*ORT*) both to design and to implement changes. "The way we worked is that, besides myself, we involved an MIS person, someone from the receiving function, and someone from the plant. This was for the design phase. The implementation phase team was different."

The organization, using EDI, is fairly well connected such that it could be considered a virtual organization (ORS). From the interviewee, "Access is possible from anywhere in our organization, and plants across the world. It is ONE system. Our world is very small. Our down the street is anywhere in the world. From my home in the morning I am in contact with the lines of Costa Rica. I know what's on the line there. This is our telecommuting office, our virtual office as it were".

During the case 3 interview, a **concept** relating to this variable (OR) was mentioned on 14 occasions, and the number of mentions in a **word** count, there were 3 mentions of an OR element. (See Table VIII-5.)

f) Reengineering Outcomes: Benefits (BE)

Customer focus (BES) is a major reason for reengineering. This is supported by the interviewee,

> "We are focusing specifically on the external customer. I can give you an example. In the industry right now you have WalMart who state that you need to ship 100% accuracy, and if you don't then Wal Mart will charge a penalty that could run into the millions for an organization such as ours.
>
> So we implemented a project that will ensure that Sears and Wal Mart, who require this, will get 100% efficiency. But we are also doing it for all of our other customers. We could have done it just for Sears and Wal Mart and invested $25,000, but we decided to reengineer that entire area and invest $750,000 in order to offer that guarantee to all of our customers. So, when we go to our customers, we can tell them 'when we say this is what we are shipping, then this is so, and you will get it 100% accuracy all the time'."

Other benefits included reduced turn-around time (*BET*), and improved efficiency of people-hours (*BED*), and inventory space requirements. These are significant BPR benefits. The participant offered this: "For the receiving function, we had a 3 week schedule and were able to reduce it to 2 days; we had labor of 7 people and we were able to reduce it to 3.5 people; we had space requirements of x amount and we reduced it by half."

During the case 3 interview, a **concept** relating to this variable (BE) was mentioned on 6 occasions, and the number of mentions in a **word** count, there were 13 mentions of a BE element. (See Table VIII-5.)

2. Data accounting and inter-rater reliability

Again, two analysts working independently determined the frequency that concepts were expressed during the interviews. Table VIII-5, displays the counts and indicates the inter-rater reliability score. An inter-rater reliability score of 0.52 was determined.

D. Cross Case Analysis and Interpretation

Miles and Huberman (1994) use conceptually ordered displays (pp. 127-142) to demonstrate a research evaluation of findings. Figure VIII-1 is inspired from such conceptually-ordered displays. The three firms used the five variables to enable reengineering but with a relatively different focus.

Figure VIII-1 Enabler Effect

Enabler Focus & Effect
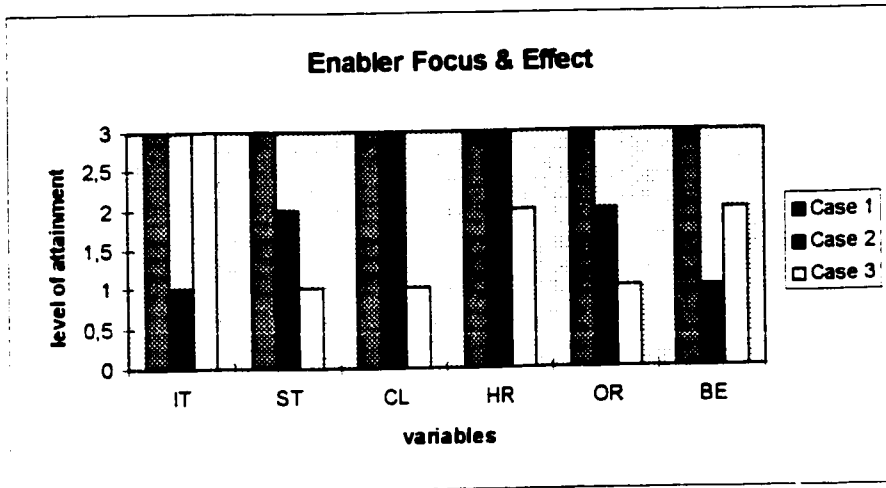
The Y axis values in Figure VIII-1 represent 3 ranges. The range 0-1 represents a Low level, the range 1-2 represents a Medium level, and 2-3 range represents a High level of attainment of the variable.

A cross-case examination reveals not only differences among the cases in the data-accounting, as previously indicated, but also differences in the degree of implementation of the variables. Using concept counts, word-mention counts, secondary data, and particularly the actual interview data, this study proposes that the variables for each case attained different levels that could be categorized as *High*, *Medium*, or *Low*. (See Figure VIII-1.) The degree of implementation of the enabler variables, in turn, effects a range of reengineering benefits.

1. Information Technology

Both cases 1 and 3 effectively focused on the use of technology to advance desired change. In case 1 the use of EDI, including video-conferencing and the ROSS platform, is allowing leaders to thoroughly redesign the force. In case 3, the use of mobile scanners

and UPC labels has allowed them to totally redesign receiving, shipping and inventory systems. Both of these cases may be classified as *High* degree of *IT* implementation. On the other hand, case 2, probably due to its size and relatively-recent mergers, is not yet using technology as a reengineering enabler. This firm continues to use various technologies that have existed in the past.

2. Strategy

There is a specific strategy and a corporate vision in case 1 to redesign the force. Cases 2 and 3, however, are not driven with the same level of strategic focus. The initiative in case 2 is based mostly on return on investment. The reengineering initiative in case 3 is limited to production.

Technology permits rapid communication for decision making. Group decision software facilitates decision making. One significant feature of case 3 modus operandi is the strategic association, via EDI and the use of UPC, with suppliers and customers. Accordingly, based on the data, case 1 might be evaluated as a *High* degree of *ST* implementation and cases 2 and 3 as a *Medium* degree of implementation.

3. Commitment and leadership

Senior management commitment for case 1 is driving the change. Communication (through EDI and email) both upwards and downwards is constant and input or feedback into the strategy is sought. For case 2, improvement initiatives have begun at different levels of the organization with various levels of intensity. Case 3 initiatives are driven by the VP of Manufacturing and other executives are not involved; and neither is the parent

company.

Leaders in all three cases have empowered lower ranked employees to participate in decision making process. The existence of on-line databases in cases 1 & 3 facilitates such empowerment. Considering the data, case 1 and 2 might be evaluated as a *High* degree of *CL* implementation and case 3 as a *Low* degree of implementation.

4.   Human Resource

The three cases demonstrate a concern for the needs of the individual employee in redesigned change. All 3 provided training for employees, with case 2 providing a significant amount. State-of-the-art office and presentation software facilitate training.

Furthermore, cases 1 and 2 have redesigned jobs and have downsized. However, using normal attrition and reassignment, although downsizing has occurred, no lay-offs have resulted. Based on the data, cases 1 and 2 might be evaluated as a *High* degree of *HR* implementation and case 3 as a *Medium* degree of implementation.

5.   Organizational Support

While case 2 is developing a new organizational (matrix with molecular cell) structure, case 1 has not as yet modified its structure, and case 3 did not at all modify its structure. Regarding organizational culture, case 1 is developing an entirely new culture for the force, based on a mission of service to community needs. Telecommunications (video-conferencing, cellular telephones, lap-tops and cameras in cars) and soon-to-be imaging resources are making the forces very susceptible to a new culture. Case 2 is changing its

culture through extensive training while case 3 is only slightly adopting a new culture of change. In all cases, however, the objective of customer satisfaction has become ingrained in the culture. Based on the data, cases 1 and 2 might be evaluated as a *High* degree of *OR* implementation and case 3 might be classed as a *Low* degree of implementation.

6.   Benefits of Reengineering.

Case 1 clearly focuses on all five enablers to achieve BPR. Furthermore, the force admittedly took advantage of information technology to facilitate the use of each of the enablers. Thus, for the RCMP, these reengineering enablers have caused the desired benefits. Considering the data both primary and secondary, case 1 can be classed as a *High* degree of BPR implementation benefit.

The firm in case 2, possibly because of its size and the fact that the decision to reengineer is recent, has not yet achieved full integration of the enablers. Furthermore, contrary to the other 2 cases, this firm does not indicate that IT is as vital an enabler (Parra 1994). They appear to lend greater emphasis to HR and OR as vital enablers, with IT taking on more of a supportive role. Based on the data, both primary and secondary, case 2 can be classed as a *Low* degree of BPR implementation benefit. In time, with continued focus on the moderating variables and eventual implementation of IT, this firm may indeed benefit greatly from reengineering.

Case 3, on the other hand, appears to have undergone reengineering almost strictly with an emphasis on the enabling ability of the IT variable. There was only moderate use of HR enabling elements, and very little deployment of the other 3 variables. Of the 3 cases,

this firm demonstrated the least integrative approach. However, based on the interview data that the benefits of reengineering have been significant, this case might be classed as a *Medium* degree of BPR implementation benefit.

IX. DISCUSSION

The three firms studied all indicated that they were in the process of reengineering several processes. Although measurement of metrics is an indicator of the improvement (Deming 1986; Hammer and Champy 1993) the three firms provided only a few measurements. Instead for cases 1 and 3 the participants spoke of "significant" or "substantial" improvement without putting specific "before & after" figures to the area in question. Case 2 with only some significant improvement todate may potentially produce other significant benefits because of reengineering. Hence, this study accepts that there have been indeed "revolutionary" (Hammer & Champy 1993) changes, thus qualifying the cases as reengineering, rather than the gradual and continuous improvement of other approaches.

A. Classification of the Reengineering Efforts

The Venkatraman (1994) model, (Table VI-2), suggests 5 levels of transformation based on IT use. The findings from these three cases permit an allocation of a Venkatraman level.

Case 1 strategically uses IT to redesign its operations. All levels of the force (senior management, middle management, staff and constables) effectively use IT for communication, learning, decision-making, and to benefit the customer with increased efficiency. This case suggests that the RCMP has used IT as a lever to redesign its core business and as such would be a level 3 according to Venkatraman (1994). (See Figure IX-1.)

Case 2 continues to use technology the way it has for sometime. New IT applications are added to previous packages to permit a gradual implementation and change. This use of IT would be similar to TQM usage (Davenport 1993) and accordingly would be level 1 in Venkatraman's model.

In case 3, the firm has integrated IT into various functions. Previously sequential steps are now concurrent operations. Suppliers and customers are involved in the distribution chain. Accordingly, this firm might be classified as a level 2 transformation.

Figure IX-1   Classification of Cases
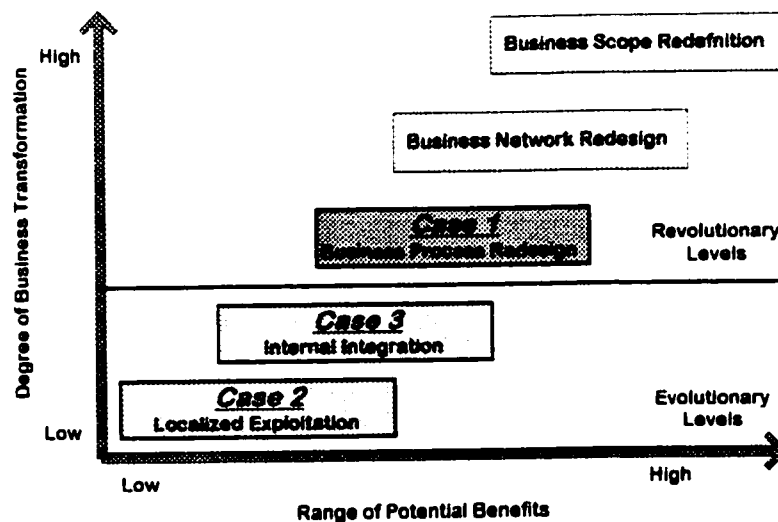
B. Limitations

One limitation to this study is the fact that the 3 cases are still in the process of reengineering. Hence, they still have not measured many of the benefits in a quantitative manner. Furthermore, contrary to suggestions from the literature, they do not have extensive pre-reengineering measures to use to definitively identify cause and effect. At most, they will be able to only intuitively declare revolutionary gains.

Another limitation to this research was time. Case 3 cooperation was rushed. The liaison person was often unavailable and was rushed to cooperate on the few available occasions during a six-month attempt at data collection. When the follow-up complementary interviews were done, they were completed in a cursory manner. The interviewees were pressed for time and the liaison person was leaving the firm within days.

The case 2 liaison person, while being very cooperative and forthcoming with information, was nevertheless traveling all over the country. His availability for ongoing contribution to the research, and in gaining cooperation from other participants from the firm, suffered. Much more time would have been necessary to study this firm.

Generally, attempting to obtain firms for research data was a major problem. Firms undergoing reengineering are normally in a state of chaos. Several firms, that this researcher approached at the outset, declined to be involved precisely because they were in a chaotic situation and did not have the time to cooperate with such a study. Ironically the fact that the situation was chaotic would appear to be good reason to study the firm.

C.   *Future Research in Reengineering*

Several questions can be considered for future research in the area of reengineering. Concerning this present study, future research could begin with the model and attempt to discover how many firms actually used a holistic approach comparable to the model to reengineer. It would also be interesting to establish the degree to which each enabler was developed, applying metrics both before and after the initiative to allow quantitative analysis and pattern-matching.

Middle Management:

Reengineering will generally cause downsizing, although this should not be the goal, but one of the effects. There would also be a flattening of the organization as empowerment pushes decision-making lower. What is to become of the middle manager? Should middle managers be reassigned, kept at all costs, as these individuals have already proven themselves? How will firms accommodate these individuals and the junior executives that BPR may effect?

TQM & BPR:

Research might be carried out to examine combination TQM-BPR initiatives. Do companies, following successful BPR projects, continue with a TQM approach in their business strategy? The literature suggests that these initiatives should work in tandem. Where firms have applied both, will their TQM efforts be different from firms that have

not reengineered?

Non-holistic BPR:

Notwithstanding the suggestion that successful BPR initiatives require a firm to undertake BPR by adopting a holistic approach, there will be firms which have attempted to reengineer without, for example, (i) sufficient management support, or, (ii) a fully thought-out strategy, or, (iii) fully training their personnel, or, (iv) modifying organizational structures. Research might attempt to identify these firms. How do measured results compare under these circumstances?

IS T-led BPR:

The literature strongly suggests that BPR initiatives not be led by the IS/T leader. For some firms, appointing such an individual may have been the only practical choice for leader. Research may be carried out to compare BPR projects led by IS/T personnel with projects led by non-IS/T personnel. Concerning strategic use of IT, it may prove interesting to determine how BPR affects IT planning.

Metrics:

The cases researched in this study did not generally apply before-and-after measures to determine the directly-related BPR benefits. In such circumstances, there exists only the impressions of the leaders that improvement has been significant or revolutionary. There is need for more empirical studies (i) of the performance results in various industries, (ii) of variances in service, quality, and satisfaction. There might also be investigations into (i)

the types of processes being reengineered, (ii) process optimization through BPR, and (iii) research into reengineering-process tools.

D. Conclusion

An initial review of the literature on the subject of reengineering suggested that a new cause and effect model might emerge. This model posits that four moderating variables are integrated with an independent variable to cause the dependent benefits of a BPR process. The first objective that IT is the vital driver of reengineering has been demonstrated. Also, this research has demonstrated that the holistic integration of other variable-enablers is required. The use of a case study approach permitted this.

Although the firms studied appear to be on the right path, it might be premature to declare the 3 cases initiatives as fully successful. Yet it is possible to state that the model proposed in this research is applicable for other firms wishing to undergo a transformation by reengineering their processes. It is suggested that the RCMP model is closest to the proposed model and that their holistic treatment of the various elements of each of the variables might serve as an exemplary model for other organizations.

On a different issue, qualitative research of business requires a robust design prior to any attempts to gather data.. Researchers must clearly identify all the elements that compose the variables during the design phase. This would help eventual analysis, particularly if the design includes inter-rater reliability testing. In the current research, an appreciation for

the complexity of qualitative research grew as the research proceeded. Future qualitative researchers would be advised to acquire much of the basis of this approach prior to beginning the research design.

Finally, convincing firms to cooperate in contributing to such research is difficult. Organizations are inundated with requests to do research. Furthermore, research when times are particularly chaotic for an industry magnifies the problem. Accordingly, with a serious research intention, the student researcher may find it advantageous to approach a firm as part of a committee of researchers, i.e., the request for research should be made on behalf of the student and the supervising team. In the present study, cooperation was more easily obtained when this tactic was used.

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XI. APPENDICES

APPENDIX A   SAMPLE OF FIRMS WITH SUCCESSFUL REENGINEERING PROJECTS

FIRM	Reference	Sample IT used (when indicated)
Apple Computers	Johansson et al., (1993)	GUI
AT & T	Johansson et al., (1993)	
Bell Atlantic	Hammer and Champy (1993)	shared database
Benneton	Bergeron & Falardeau (1994)	networked sales-inventory-purchasing control
Bose Corporation	Venkatraman (1994)	JIT EDI
Capital Holding	Hammer and Champy (1993)	customer information channel
Carpet Industry	Johansson et al., (1993)	Accounting system
CIGNA Corporation (case-study article)	Caron et al., (1994)	Common information database with online access, GUI, Scaleable architecture.
Coca-Cola	Johansson et al., (1993)	new tech. machinery -bottling/manufacturing
Dun & Bradstreet	Johansson et al., (1993)	EDI
Dupont	Bergeron & Falardeau (1994)	EDI, EIS,
Federal Mogul	Davenport (1993)	
Ford	Bergeron & Falardeau (1994)	database control for suppliers and automated accounts payable
Frito Lay	Davenport (1993)	inventory control from POS
Hallmark	Hammer and Champy (1993)	POS terminals, DSS, Tracking
Harley-Davidson	Johansson et al., (1993)	JIT
Honda	Stalk et al., (1992)	automation of product design
IBM	Davenport (1993)	p2 how? IT's
Industrial Alliance	Bergeron & Falardeau (1994)	risk & tariff expert system automated contract & payment
Ingersol Mining Machine	Venkatraman (1994)	CIM, CAD/CAM, Integrated database,
IRS	Davenport (1993)	
Jones Truck Lines	Venkatraman (1994)	integrated database
Levi-Strauss	Currid (1994) Swatman et al., (1994) Vallerand (1995)	EDI
Medequip	Stalk et al., (1992)	database for sales-service
Mutual Benefit	Davenport (1993) Currid (1994)	Case manager using database application
OSRAM Sylvania	Bamberger (1993)	
Otis Elevator	Venkatraman (1994)	online-dispatching
Quebec Ministry of Income Security	Bergeron & Falardeau (1994)	database of service data
Quebec Ministry of Revenue	Bergeron & Falardeau (1994)	telecommunication controlled robots for microfilm library
Richmond Savings	Currid (1994)	Information network
Taco Bell	Hammer and Champy (1993)	total automation
Timberland	Bergeron & Falardeau (1994)	UPC inventory control networked order system
Wal-Mart	Bergeron & Falardeau (1994)	
Wal-Mart	Stalk et al., (1992)	satellite-communication, tracking, bar-code
Whirlpool	Venkatraman (1994)	telecommunication, expert system diagnosis

APPENDIX B   PATTERN CODING

First coding Variables	code	code	Cluster Coding Variables
cost reduction	BEC	BE	Benefits (BPR- results)
customer satisfaction	BES		
downsizing	BED		
lead time	BET		
accountability	CLA	CL	Commitment & Leadership (senior or middle management)
benchmarking	CLB		
communication	CLC		
empowerment	CLE		
focus groups	CLF		
input seeking (int./ext.)	CLI		
leadership / involvement	CLL		
support / commitment	CLS		
change (reaction to)	HRC	HR	Human Resources
job (design / recruit / assign)	HRJ		
measure performance	HRM		
programs (attrition)	HRP		
rewards	HRR		
training	HRT		
information technology use	ITU	IT	Information Technology
info. tech. strategy	ITS		
culture	ORC	OR	Organization
learning	ORL		
process improvements	ORP		
review quality performance	ORR		
structure/flatten	ORS		
teams (quality/cross function)	ORT		
alliances /strategic	STA	ST	Strategic Policy
catalysts for change	STC		
critical success factors	STF		
mission	STM		
BPR ownership	STO		
strategy & policy	STP		
vision	STV		

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APPENDIX C   INFORMATION TECHNOLOGY THAT ENABLES PROCESS REDESIGN, OR THAT FACILITATES THE COMPLEMENTARY ENABLERS (DAVENPORT 1993)

IT enablers of Process Innovation Implementation

Computer-aided software engineering (CASE)
Code generation
Conferencing
Conventional programming Very high-level languages
Current applications
Data gathering and analysis tools
Decision analysis software
Desktop graphics tools
Executive information systems (EIS)
Fourth generation languages
General communication technologies
Group decision support systems (GDSS)
Idea generation tools
Information engineering
Object oriented programming
PC-based prototyping tools
Programmable databases and spreadsheets
Project management tools
Prototyping
Rapid systems development techniques
Simulation   Storyboarding
Strategic application databases (generic and case-based)
Systems reengineering products
Technology trend databases

Enablers of Innovation in Service Processes

Real-time on-site delivery through portable workstations
Customer database-supported individual service approaches
Service personnel location monitoring
Portable communication devices and network supported dispatching
Built-in service diagnostics and repair notification
Service diagnostics expert systems
Composite systems-based service help desk

Enablers of Innovation in Marketing Processes

Customer relationship databases & frequent buyer programs
POS systems tied to individual customer purchases
Expert systems for data and trend analysis
Statistical modeling of dynamic market environments
Close links to external marketing firms

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Enablers of innovation in sales and order management
Prospect tracking and management systems
portable sales force automation systems
Portable networking for field and site communications
Customer site workstations for order entry and status checking
"Choosing machines" that match products and services to customer needs
Electronic data interchange between firms
Expert Systems for configuration, shipping, and pricing
Predictive modeling for continuous product replenishment
Composite systems that bring cross-functional information to desktops
Customer, product, and production databases
Integration of voice and data (e.g. automated number identification)
Third-party communications and videotext
Case management roles or teams
Empowerment of front-line workers.

Enablers of Innovation in Management Process
Executive Information Systems that provide real time information
Electronic Linkages to external partners in strategic Processes
Computer-based simulations that support learning-oriented planning
Electronic conferencing and group decision support systems
Expert systems for planning and capital allocation
Standard technology infrastructure for communication and group work
Standard reporting structures & information
Acknowledgment & understanding of current management behavior as a process
Accountability for management process measurement & performance

Enablers of Innovation in Engineering & Design Processes
Computer-aided design & physical modeling
Integrated design databases
Standard component databases
Design-for-manufacturability expert systems
Component performance history databases
Conferencing systems across design functions and among design, manufacturing & sales
Cross-functional teams comprising individuals from design & manufacturing

Enablers of Innovation in Concurrent Engineering
CAD/CAE
Cross-functional teams

Enablers of Innovation in Manufacturing Processes
Linkages to sales for build to order
Real-time systems for custom configuration & delivery commitment
Materials & inventory management systems
Robotics and cell controllers
Diagnostic systems for maintenance
Quality & performance information
Work teams

Enablers of Innovation in Logistical Processes
Electronic data interchange & payment systems
Configuration Systems
Third-party shipments & location tracking systems
Close partnerships with customers & suppliers
Rich & accurate information exchange with suppliers and customers.

APPENDIX D   **Introductory Letter (English & French Versions)**

March, 1995.

Dear

As agreed in our telephone conversation, here is the research project in which I am involved. I am presently in the Master of Science (Administration) program at Concordia University. This M.Sc. degree requires advanced research and thesis. My thesis entitled "An Examination of the Role of Information Technology as an Enabler of Business Process Reengineering" will be primarily supervised by Professor M. Gopalakrishnan, Ph.D.

Dr. Gopalakrishnan, Dr. Waldman (presently at Arizona State West University) and myself are preparing to publish an article based on the early findings from this research. Likely, other publications will follow.

I have conducted an extensive literature review of this area of study and wish to validate specific hypotheses via **case study** research. I am seeking the cooperation of three firms that have undergone BPR. **Hence the purpose of this letter is to ascertain the possibility of involving your firm as a case study in my research.**

I have enclosed an executive summary of my thesis proposal and a sample of the interview questions to be used for data collection. The research, which would take place at your location at a mutually convenient time, would involve separate interviews with various individuals, each of which would require approximately one hour. These individuals would include senior administrators, department managers, project leaders and reengineer team members. My research would also require relative, supporting documentation used by the firm, for example, reports, directives, and charts.

Please be assured that there is no risk to the interviewees nor to the firm and all information will remain totally confidential. In any publication of the research, names both of the individuals involved as well as the firm would remain anonymous.

Since third party observations frequently help to clarify issues and offer a new global perspective of a situation, I am sure this reengineering study will benefit both your firm and the employees themselves. The research would also benefit the business community and, needless to say, myself. I will contact you in the near future for your reaction and discuss your participation in this study. I look forward to the possibility. Thank you for the consideration you are giving this request.

Kevin Laframboise, M.Sc. student

Department of Decision Sciences and MIS

mars, 1995

M.

Comme prévu dans notre conversation téléphonique, voici mon prôjet de recherche. Je suis inscrit au programme de Maîtrise en sciences en administration et ce programme nécessite des recherches avancées. Le professeur M. Gopalakrishnan, Ph.D. assurera la direction de ma thèse, intitulée: "Une étude du rôle des technologies d'information comme catalyseur dans la réingénierie des processus d'affaires".

Dr. Gopalakrishnan, Dr. Waldman (présentement au Arizona State West University), et moi-même travaillons à la publication d'un article sur les résultats préliminaires de cette recherche. Évidemment d'autres articles suivront.

J'ai complété une étude approfondie de la littérature sur ce sujet que je désire valider par des cas d'études. Je tente donc d'obtenir la coopération d'entreprises qui ont vécu une RPA. **Cette lettre a pour objet de susciter l'intérêt de votre entreprise à participer à cette recherche à titre de cas d'étude.**

Vous trouverez ci-joint un sommaire de thèse et une liste de questions qui serviront à la cueillette de données. Cette recherche se traduit par **une entrevue**, à vos bureaux, d'une durée approximative d'une heure avec la personne plus apte à repondre à ces questions. En deuxième lieu, cette recherche implique un questionnaire, lequel exigerait environs 10-15 minutes pour y répondre. Les répondants visés regrouperaient des cadres, des directeurs de service, des chargés de projets et d'autres membres de l'équipe impliqués à la réingénierie des processus d'affaires . Ma recherche nécessiterait également copie de documentation pertinente utilisée par votre institution, par exemple: rapports, directives, et graphiques.

Soyez assuré qu'il n'y a aucun risque pour les répondants, ni pour l'entreprise, puisque toute information recueillie demeurera strictement confidentielle. Dans la publication de ma recherche, j'emploierai des noms fictifs pour protéger les individus impliqués ainsi que le nom de l'entreprise.

L'intervention d'un tiers apporte souvent une nouvelle perspective et permet une vue d'ensemble d'un sujet. Je suis donc convaincu que vos employés et votre entreprise profiteront de cette étude en réingénierie. Cette recherche contribuera grandement au monde des affaires. Je vous remercie de l'attention apportée à cette demande et j'espère avoir bientôt l'occasion de travailler avec vous.

APPENDIX E   QUESTIONNAIRE A (ENGLISH & FRENCH)

IN-DEPTH INTERVIEW OF KEY-INFORMANT PARTICIPANTS 3 CASES.

Concerning the firm's decision to embark on a **Business Process Reengineering Redesign (BPR)** program:

1. What were your expectations at the introduction of BPR to the firm?

2. How was the reengineering program implemented?

3. What are your firm's critical success factors for BPR?

4. Who owns the BPR program in your firm?

5. Who was involved in the planning of the design changes?

6. Were external consultants involved in the redesign process?

7. Has your firm been involved with any other firm as part of any BPR project?

8. What is your firm's strategy regarding information system/technology **(IS/T)** use?

9. What impact has IS/T strategy had on the firm's business strategy?

10. Were any original BPR objectives modified during implementation of the program?

11. What role (if applicable) has the union(s) played in this BPR program?

12. What has been the budgetary commitment for IS/T applications? for BPR?

13. Was a cost-benefit analysis performed?

14. Explain changes to employee empowerment?

15. What has been the impact on the system of accountability?

16. What has been the impact on process sequence?

17. What has been the impact on monitoring process status and objects?

18. What has been the impact on coordinating processes over distances?

19. What has been the impact on analysis of information and decision making?

20. How many reengineering projects have there been in your firm?

21. What were the scheduled time limits? Were you able to meet deadlines?

22. Which enablers has your firm used from the following list? For computer technology, please identify the specific software product and hardware involved, if possible.

1. Quelles étaient vos attentes à l'époque?

2. Comment s'est effectué cette reconception?

3. Quels sont les facteurs essentiels au succès de votre entreprise face à la RPA?

4. Qui a la responsabilité du programme de la RPA dans votre entreprise?

5. Qui a été impliqué dans la planification des changements de conception?

6. Est-ce qu'il y a eu des consultants de l'extérieur impliqués dans le processus de reconception?

7. Est-ce que votre entreprise s'est joint à d'autres entreprises dans un projet de RPA?

8. Quelle est la stratégie de votre entreprise quant aux systèmes et technologies d'information? (S/TI)

9. Quel fût l'impact de la stratégie des S/TI dans la stratégie des affaires de votre entreprise?

10. Les objectifs originaux de la RPA ont-ils été modifiés au cours de l'implantation du programme?

11. Quel rôle (s'il y a lieu) a joué le syndicat dans le cadre du programme de la RPA?

12. Quel budget a été consacré à l'implantation des S/TI? de la RPA?

13. Y a-t-il eu une analyse des coûts et bénéfices?

14. Expliquez les changements à la délégation de pouvoir aux employés

15. Quel fût l'impact sur la responsabilisation?

16. Quel fût l'impact sur la séquence des phases du processus?

17. Quel fût l'impact sur le contrôle des différentes étapes du processus et des produits?

18. Quel fût l'impact dans la coordination des processus à distance?

19. Quel fût l'impact dans l'amélioration de l'analyse de l'information et des prises de décisions?

20. Combien de projets de la RPA ont été exécutés dans votre entreprise?

21. Quels étaient les délais prévus? Avez-vous réussi à respecter ces délais?

22. Quels catalyseurs depuis la liste jointe ont été utilizés par votre entreprise? Si possible, indiquez le logiciel ou l'équipement.

QUESTIONS FOR INDIVIDUALS INVOLVED IN A BUSINESS PROCESS REENGINEERING INITIATIVE:

Firm:
What is your function/title?
How long have you been in this function?
How long have you been with the firm?
Gender: Male: ___   Female: ___

N.B.   As you respond to these questions, without restricting your answer, **please supplement the response**, where applicable, **with any reference to technology**.

Concerning the firm's decision to embark on a Business Process Reengineering or Redesign (BPR) initiative:

1- PROCESS:

a) *Which process(es) was reengineered and why was it selected for reengineering?.*
b) *How was the reengineering effort carried out?*

2- ROLES and LEADERSHIP:

a) *What role did you serve in the reengineering initiative?*
b) *Who were the leaders of the reengineering initiative?*
c) *Comment on the leadership role of management in the reengineering effort.*
d) *Describe leader behavior and actions, during implementation of the BPR effort.*

3- STRATEGY:

a) *What caused your department, or firm, to initiate a reengineering effort?*
b) *What, if any, technology (ies) made it possible to initiate reengineering?*
c) *Could the reengineering have occurred without the technology? Explain.*
d) *What policies (company level, department level) were changed because of the BPR effort?*

4- CUSTOMER:

a) *What customer (internal, external) issues were considered in this BPR effort?*
b) *What effect did reengineering have on internal or external customer satisfaction as a result of the reengineering effort? How is satisfaction measured?*
c) *How is satisfaction measured?*
d) *Did reengineering create greater flexibility in providing a service to your customer? If so, how?*

5- EFFECTS OF TECHNOLOGY:

a) What (if any) technology changes took place as a result of BPR?
b) Describe the effects of technology and reengineering efforts on communication and on the work environment.

6- CULTURE OF THE FIRM:

a) Describe the sense of ownership on the part of employees as a result of reengineering.
b) Did reengineering have an impact on the behavior of employees? If so, explain.

7- HUMAN RESOURCES:

a) Has your job function been redefined as a result of reengineering? If so, how?
b) How have performance appraisal and the reward system been affected by the BPR initiative?
c) What sort of changes in the Organizational structure of the firm resulted from the reengineering initiative?

8- RESULTS OF REENGINEERING:

a) Describe the results (positive and negative) of the reengineering effort. How were these measured?
b) Describe how you are, or how your team is, empowered to make decisions, as a result of reengineering.

9- IMPLEMENTATION:

a) What problems or obstacles did you encounter during implementation of the reengineering initiative? How did you (or the leaders) deal with them?
b) How did you (or the leaders) deal with them?
c) Were company procedures affected by the reengineering initiative? If so, how?
d) Looking back, what would you have done differently to implement reengineering?

LES QUESTIONS POUR LES INDIVIDUS IMPLIQUÉS DANS UNE INITIATIVE DE REINGÉNIERIE DES PROCESSUS D'AFFAIRES:

Entreprise: _____

Quel est votre fonction/titre? _____

Depuis combien de temps avez-vous cette fonction? _____

Depuis combien de temps travaillez-vous pour cette entreprise? _____

Sexe: Masculin: ___ Feminin: ___

N.B. Tout en répondant aux questions indiquez toute référence à la technologie appliquée, s'il y a lieu. Cependant, ne vous limitez pas dans vos réponses pour vous attarder aux resources de technologie.

Concernant la décision de votre entreprise d'entreprendre une initiative de reingénierie des processus d'affaires:

1- PROCESSUS:

a) Quel(s) processus a subi une réingénierie et pourquoi ce processus?

b) Comment cet effort de réingénierie s'est-il effectué?

2- Les RÔLES et le LEADERSHIP:

a) Quel rôle avez-vous joué dans cette initiative de réingénierie?

b) Qui a initié cette initiative de réingénierie?

c) Donnez vos commentaires sur le rôle que les câdres ainsi celui que les membres de la direction ont joué dans cette initiative?

d) Décrivez le comportement des leaders et les actions posées dans l'exécution de cet effort de réingénierie.

3- LA STRATÉGIE:

a) Qu'est-ce qui a incité votre département ou votre entreprise à entreprendre cet effort de réingénierie?

b) Quelles technologies, s'il y a lieu, ont rendu possible l'initiation d'un tel projet de réingénierie? Est-ce que la réingénierie aurait pu s'effectuer sans l'aide de la technologie? Expliquez.

c) Quelles politiques (au niveau de l'entreprise' au niveau du service) ont changé dû à cet effort de réingénierie?

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4- CLIENT:

a) Quelle considération a été accordée vis-à-vis le client (interne ou externe) dans cette RPA?

b) Quels furent les effets produits en ce qui concerne la satisfaction du client (à l'interne comme à l'externe) résultant de l'effort de la réingénierie? Comment mesurez-vous cette satisfaction?

c) La réingénierie a-t-elle créé une plus grande flexibilité dans le service à la clientèle? Si oui, de quelle manière?

5- LES EFFETS DE LA TECHNOLOGIE:

a) Quels changements technologiques (s'il y a lieu) se sont effectué à cause de la RPA?

b) Décrivez les effets que la technologie et la réingénierie ont eu dans le contexte de la communication et dans l'environnement de travail.

6- CULTURE DE L'ENTEPRISE:

a) Décrivez le sentiment d'appartenance de la part des employés suite à la réingénierie.

b) Est-ce que la réingénierie a eu un impact sur le comportement des employés? Si oui, expliquez?

7- LES RESOURCES HUMAINES:

a) Est-ce que vos tâches ont été redéfinies suite à la réingénierie? Si oui, de quelle manière?

b) Comment le système d'évaluation du rendement et le système de récompense ont-ils été affectés par l'implantation de la RPA?

c) Dans la structure organizationnelle de l'entreprise, quelles genres de changements ont résulté suite à l'implantation de la réingénierie?

8- LES RÉSULTATS DE LA RÉINGÉNIERIE:

a) Décrivez les résultats (positifs ou négatifs) de l'initiative de la réingénierie. Comment ces résultats ont été mesurés?

b) Décrivez quel pouvoir de décision vous, ou votre équipe, avez suite à la réingénierie.

9- IMPLANTATION:

a) Quels sont les problèmes et les obstacles que vous avez rencontrés dans l'implantation de la réingénierie? Comment les avez-vous surmontés?

b) Est-ce que la réingénierie a affecté la marche à suivre de la compagnie? Si oui, de quelle manière?

c) Avec un recul, qu'auriez-vous fait différemment dans l'implantation de la réingénierie?

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APPENDIX G CONTACT SUMMARY FORM (_SAMPLE PAGE_)

Within-Case Data Reduction - RCMP

Site: Ottawa Headquarters

Office of Dawson Hovey, Chief Superintendent,

      Executive Director, Project Renewal

Interviewer: K.L.

Transcription: N.H.

Coder: K.L. / Z.K.

Date: May 2, 1995

Present: C/S Hovey, Sergeant K. Mole,

Reference legend:

I : Transcript of (Key-Informant Focus) interview with Dawson Hovey & Kevin Mole, with page number reference

Var.	Citation [6]	ref.
CLE	• We have empowered the directors who are the program officers to take ownership of the reengineering.	I-4
HRC	• People were uncomfortable with all the <u>changes</u>, with the rate of change • In some cases they feel threatened.	I-2 I-8
CLC	• I think we have the best video conferencing of anybody right now. All our provincial capitals, our divisions headquarters hooked up as well as some other sights and locations.	I-10
	• We can have over seven hundred detachments right from the north to the south from the east to the west and they are going to be all hooked up on a ROSS platform.	I-10
	• Now we realize communication is really participation, it is involvement of our employees	I-13
STF	• Our implementation tool is community policing. In this we are developing performance measures regarding, e.g., client satisfaction -- how our clients feel and about the services that we provide.	I-3
ORC	• We have to change parts of our management philosophy, our <u>culture</u>, and our values.	I-2
BES	• We have done some surveys in different areas, like "J" Division, looking at client satisfaction. Really they have been tremendous: 86 to 95 - 96% public satisfaction which is very, very high	I-14
BED	• And so, we are migrating from 28 directors down to 19, and we would hope that in a year we will be down to 15 or 16 or maybe a little bit lower. But the objective is to have fewer in administration and operational support and more emphasis and more resources in front-line policing.	I-3
	• Last year we removed 710 (full-time-equivalence) positions, forever gone from our organization. So far this year 469.	I-8

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[6] A citation may apply to more than one variable