Developing a Model to Understand Reengineering Project Success

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Abstract

As more organizations are undertaking reengineering projects, project failure and associated riskiness is increased. This research shows that success was present, although failure was reported in some companies. The objective of this paper is to identify the factors that contribute to business process reengineering (BPR) success. This paper defines reengineering and develops a research model based upon over 1,250 relevant journal articles. The research plan is to conduct surveys, generate case studies, and build tool modules. The results of the Australian survey administered to 58 managers, government officials, and military leaders indicate that 76% of the respondents were participating in a new reengineering project. It was found that a very small percentage of executives defined a BPR vision or spent time planning for the strategic ramifications of the reengineering project. After the projects had been investigated, it was also found that the use of metrics was minimal. Future research directions include a cross-cultural analysis of survey data, validation of the research model using second-generation multivariate techniques, and an examination of case data for qualitative richness.

1. Introduction

Throughout the past five years, there have been a large percentage of reengineering projects undertaken by organizations and have resulted in failure. What is meant by failure and how is failure measured in terms of reengineering projects? Since organizations are conducting more and more reengineering projects, they need to understand how to avoid failure. To date, there has not been a comprehensive empirical study on reengineering project failures, although several studies have recently emerged dealing with certain aspects of failures (Clemons, Khoong). This type of research is helpful as reengineering projects are becoming more common in most medium and large organizations as we approach the end of the decade.

A 1994 investigation of three organizations in Colorado revealed that although failure was reported in all of these firms, success was also present. When failure was reported, whether from the CEO, CIO, or reengineering project leader, there were reasons for failure. During further research, it was found that a set of factors was important to the success of reengineering projects. These factors were not reported in the initial failure of the reengineering projects of the three Colorado firms by senior managers. Although reducing the opportunity for reengineering project failure was not an easy solution like many of the articles reviewed indicated, nine interweaving factors were found and may contribute to the success or failure of a reengineering project.

After this initial investigation, it was then determined that a rich data set needed to be collected to uncover those factors that would contribute to BPR project success and avoid reengineering project failures. The data collection program involves surveys, case studies, and tool development efforts. The objective of this research is to identify the factors that contribute to business process reengineering (BPR) project success. Those factors will be integrated together into a model and then tested to find which of the factors contributes most to BPR project success. The initial findings of these factors from the Australian organizations, and implications for future research are presented in this paper. This is the first empirical paper from a stream that will emerge from the important topic of uncovering the success of a reengineering project.

To enable such a broad-based research project, a widely-scoped research design was created in order to gather all of the relevant data for analysis. First, the definition for business process reengineering will be discussed. Second, the major research questions that this study aims will be addressed. Third, the data collection methods will be...
examined. Finally, the findings from the Australian survey, and implications for future research will be discussed.

2. Definition for Business Process Reengineering

Since the literature has many definitions for reengineering, it was necessary to comb over 125 articles, in order to find a working, common definition for the research. Basically, some authors and researchers have taken specific approaches to reengineering that are universal such as radical, downsizing, and other contexts that were written to promote certain ways of thinking. The definition that is used for this research is as follows:

| Business process reengineering (BPR) is a set of tools and techniques embodied in a methodology to allow old ways of thinking to be replaced with new, fresh approaches; thinking outside the box. |

While conducting the analysis for the appropriate research definition, certain terms were continually being found with similar (if not the same in some cases) definition as business process reengineering. For example, business process redesign and business reengineering were two terms that had frequently appeared and had similar definitions. System reengineering and organizational transformation were also two other terms that had similar definitions.

The discriminators of each of the synonyms of reengineering included the (1) level of change as being incremental or radical, (2) frequency as continuous or one-time, (3) time required as short or longer-term, (4) participation as primarily bottom-up or top-down driven, (5) typical scope as narrow within a function or cross-functional, (6) risk as moderate or high, and (7) primary enabler as metrics driven or quality driven.

3. Research Questions

While compiling a concise set of research questions for the overall objective of the research project effort of identifying and validating a set of factors that will contribute to the success of BPR projects, there were certain research trends that were forming a basic set of premises. While formulating a reasonable set of research questions, the relationship between methodologies, tools, and techniques was first addressed. These premises deal primarily with the relationship between BPR methodologies, tools, and techniques. They were also formed as a set of observations of the three, as discussed:

First, methodologies, tools, and techniques are interdependent and non-interdependent. With the worldwide acceptance of the information engineering methodology as the broad, front-to-back development methodology, the process tools and techniques emerged to support the methodology and deliverables required. Hence, there is interdependence between the three, however it became clear that each of the three could stand alone and could even be mixed due to the independent nature of methodologies, tools, and techniques.

Second, tools are becoming uncoupled with respect to methodologies. This means that in the past five years, project leaders have been using a variety of methodologies with different tools and applying them to techniques in order to produce deliverables. Prior to 1990, tools contained a specific methodology which, in turn, dictated the types of deliverables that could be produced. While this is still the case to some extent, it has decreased.

Third, methodologies contain sub-methodologies which is “proven” by the use of metrics and benchmarking studies. The studies test the effectiveness of a methodology by examining the statistical data and reports that abound from organizations that have invested a tremendous amount of money and time. Reengineering methodologies can be considered sub-methodologies for the most part.

Therefore based upon the premises observed and stated above, the research project addresses the following research questions:

Research Question #1: What are the key success factors for a reengineering project? Or How can we avoid reengineering failures?

Research Question #2: What type of survey instrument can be used to assess the potential success or failure of upcoming reengineering projects?

Research Question #3: How can we use group support systems (GSS) tools to conduct reengineering joint application design (JAD) sessions and what tools are crucial for successful JAD sessions?

4. Data Collection

In 1995, the Global Reengineering Project was developed and launched with the cooperation of the Australian Defense Force Academy and the University of Colorado. The objective of this project is to collect data from 14 countries by the end of 1998: Australia, New Zealand, Hong Kong, Singapore, Korea, Finland, Norway, Denmark, Germany, England, Ireland, Canada, South Africa, and the United
States. The data collection effort has already begun in Australia, and these results will be presented later in the paper. There are four data collection methods that were used in order to collect a rich data set:

1. Comprehensive literature review and model building effort;
2. Reengineering diagnostic survey conducted in 14 countries;
3. Case studies with companies in various groups: military, government, private;
4. Tool development for components distinctive to BPR work.

First, a comprehensive literature review was conducted on all areas of reengineering in order to build a valid research model that had created and administered a survey. There were five overlapping discipline areas where the research was investigated, including: systems analysis, strategy, total quality management, innovation, and change management.

Over 6,000 article abstracts were examined and analyzed in order to gather a common definition for reengineering and to identify common areas for success or failure of BPR projects. Notice the tremendous growth in reengineering articles especially starting in 1994 and, as shown in Table 1. It was observed that less than ten percent of the article abstracts had indicated empirically-based research and was conducted. Most of the reengineering articles were trying to convince the reader that there are benefits to BPR. From the 1,250 articles analyzed in detail, these details were used to build a set of emphasized areas for the research model.

<table>
<thead>
<tr>
<th>Year</th>
<th>Articles</th>
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<tr>
<td>1971 - 1986</td>
<td>14 articles</td>
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<td>1987 - 1991</td>
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<td>1992</td>
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<td>1995</td>
<td>2483 articles</td>
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<td>1996</td>
<td>3486 articles</td>
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Table 1. Explosion of BPR Research

Second, a survey was created to compliment the research model and collect data from each of the model areas. The unit of analysis was a set of 20 to 30 managers, government officials, or military leaders in a firm or unit. In general, the plan is to survey about 50 organizations per country: 4 government agencies (20%), 2 military units (10%) and 14 large private firms (70%). The objective is to create a database of upwards to 1000 respondents for statistical validation purposes. It is hoped to use such a database to create a statistically valid path analysis model, which will indicate which path plays the most significant role in predicting the success of BPR projects a priori. By December 1995, we had completed the Australian data collection effort, and by December 1996, the United States collection data effort was completed. Currently, a second generation multivariate statistical technique, such as Lisrel or Partial Least Squares (PLS), is planned for examining the measurement and structural models simultaneously.

Third, a case study was conducted in a set of organizations that had conducted a reengineering project for over 3 months, and had facilitated a set of joint application design sessions with top managers. In each of the JAD sessions, a designated set of deliverables was developed using process tools to model processes and GSS tools to integrate managers’ ideas and provide input into the sessions.

In each session, 8 to 12 managers, government officials, or military leaders were present to review key deliverables from previous sessions, to deal with key issues, to make decisions, to produce deliverables, and to decide upon future schedules. Each JAD session dealt with the goal of moving from the “as is” to the “to be” model. Each top management official understood the idea that they were going to use reengineering techniques to get them to the redesigned system. They knew that they had to understand the “as is” model and then apply reengineering techniques in order to make changes to create the “to be” model.

Fourth, the development of a BPR tool for conducting interactive reengineering sessions with top managers was undertaken as part of the research. This was done to administer a standard set of techniques in a pseudo-experimental design set of cases with a tool that was uniform across cases. The Grouputer group support tool was used to develop a set of business process reengineering modules. The objective of the development effort was to provide a distinctive set of features for the BPR effort.

When the specifications for the software tool modules were developed, it was determined that the features of the tool should embody include:

- Modeling and documentation of processes
- Process filtering by similarity of task
- Process shape identification based upon inputs and outputs
- Value added weighting of specific components
- Process expansion
- Cognitive mapping of “as is” processes onto “to be” processes
- Process deletion and dealing with links
- Model merging with process tools
5. Research Model: Theoretical Underpinnings

The first step in building the research model for this research effort was to collect data from the vast collection of journal articles published on reengineering and similar concepts. About 1,250 articles were used to create the model from findings where BPR projects were found to be successful in organizations, either from empirical studies or from anecdotal evidence.

The research model, depicted in Figure 1, outlines the results of the extensive literature review using reengineering and associated keywords. The areas chosen for the model were selected from keywords in the literature and content analysis research that led to trends or context subject areas. Each of the research model areas will be discussed. We will address each of the factors independently in terms of the literature that drew out the key factor.

5.1. Success in Previous BPR Projects
Organizations that have managed and implemented successful BPR projects will be able to be more successful in current projects. Alavi and Yoo make comparisons between the past decade of total quality management (TQM) project success and reengineering projects by pointing out that productivity gains should be assessed from past projects in order to learn in current ones (Alavi, Yoo). Outlining the degree of total change versus the productivity gains can enable organizations to assess their riskiness with current BPR projects (Hale, Craig). Most of the failures in reengineering projects occur due to functionality risk and political risk (Clemons, et.al.). To do this, it would be appropriate to examine the resource use and how politics played a role in the BPR implementation.

5.2. Management Commitment / Leadership
Management or organizational leadership must be committed to the BPR project for its success. Bartlett examined the behavioral context of reengineering projects and found that leaders have to show commitment by supporting their employees, exhibiting discipline, enabling trust to form, and encouraging people to feel stretched (Bartlett). The level of management should be as high in the organization as possible. Martinez cites that successful reengineering will be more probable when IS and business managers team together forming a partnership (Martinez).

Executive support for reengineering must include the executive’s time and personal energy; it must also include an adequate level of project resources (Holland, Kumar). Some of those resources include external facilitators and/or moderators (Davenport). Senior managers must of necessity provide the leadership for the organization to implement the recommendations made by BPR project teams (Hout, Carter). Cross-functional teams have been found to be vital to the success of BPR projects in several studies (Brooks, McCartney).

5.3. BPR Scope in Alignment with Expectations
BPR projects were found to be a failure when the scope of the project was out of line with expectations, either on the high side or low side. If the BPR project results fall short of managers’ expectations, meaning that either the depth or breadth of processes analyzed was not deep or wide enough, the entire project was deemed a failure (Gardner, Szafranski). That could occur even if the part of the reengineering project that was completed was done with a high level of quality (Patching). Klein states that the key requirements for successful BPR requirements with respect to scope include: clear definitions of objectives and methods, realistic expectations about results and requirements, appropriate sponsorship, project scope commensurate with the sponsorship, and adequate resources (Klein). Clearly one also needs good project management skills to effectively manage the resources and stay on track (Garvin).

5.4. Reengineering Vision and Strategic Issues
The BPR project should be thought of as a tool to turn information management into an effective business enabler (English). This can only be done if the strategic elements of the organization are identified and included within the BPR project: stakeholders, stretch goals, strategic positioning, and critical success factors (Mische and Bennis). It is suggested that the BPR vision be in line with a vision for enterprisewide transformation. Some of the studies indicate the need to align the BPR project with increasing customer satisfaction (Motley, Parker).

Bottom-line outcomes should be discussed as a strategic issue including achieving a cost or differentiation strategy, strategic positioning issues, and organizational flattening (Bartolomeo). Khoong states that successful envisioning of the BPR project occurs when an emphasis is placed on cultural sensitivity and applying reengineering at the level of business strategy (Khoong). Clemons suggests the use of scenario analysis to manage the strategic risks of reengineering projects (Clemons).
5.5. Workflow Analysis

Workflow automation is the context of process tools which enables companies to reengineer its business processes. Denning and Medina-Mora categorize workflow activities as moving material, information, or human coordination. They argue that although technologies for modeling material and information processes are quite mature, technologies for drawing maps of human coordination processes and tracking events that constitute them have not been widely available. The basic element of a coordination process is a closed loop, called a workflow, that connects any two parties. Measures of workflow efficiency must be put in place in order for the organization to be successful at workflow analysis. The work of an organization is carried out in a network of business processes, where cross-functional flows will probably be the norm and will need to be analyzed. The focus of workflow analysis needs to be to refocus corporate managers and military leaders to look at the organization as a set of value-add work systems rather than departments and divisions (Wood).

Workflow reengineering efforts are being addressed at a growing rate of 35% a year (Hoke). Imaging processes can be a great asset to business process reengineering projects by allowing the eventual speeding up of business processes (Gehling, Gibson). Transactions can be significantly streamlined when workflow is examined in depth with an eye to cut corporate costs but not the
value-added output from the process (Lewis). Financial applications specifically benefit from automating workflow so that data are made more available for workflow applications (Frye). Well designed workflow applications can speed the synapses and reflexes of an organization, causing it to function more quickly and accurately (Dickover).

5.6. Modeling of Business Processes
The focus in modeling business processes is to create models of the enterprise that key players can understand and talk to. Martin recommends using the broad range methodology called enterprise engineering to model processes and workflows in a BPR project (Martin). Enterprise engineering is a recognizable methodology dealing with the architecture of future enterprises and the methods needed to change the enterprises. To be successful modeling processes Martin warns, an equal amount of time must be devoted to process and data modeling efforts. Warren, et.al. and Parker talk about the strength of using simulation tools for capturing information about the behavior of specific processes (Warren, et.al., Parker).

Perhaps the best way to educate managers about how to use process models is to incorporate business objects (Sutherland). BPR projects often run into technology roadblocks, such as either a lack of modeling or not understanding modeling approaches. Business objects have been found to speed up reengineering projects and new development of subsequent systems (Wilson).

5.7. Use of Metrics
Putting in a metrics program to measure process and workflow efficiency is the first step in the reengineering project. It is imperative to know how to measure your processes in an before and after look in order to be able to quantify competitive results (Gale). Davenport and Beers talk about the two types of process information: measures and ideas. They site that you need to have measures in place and the tools to crunch the metrics data in order to assess the eight dimensions of process quality (Davenport, Beers). In fact, most reengineering studies recommend that a comprehensive metrics program be in place so that data gatherers are able to collect multiple measures (Faidley). Some studies show that BPR projects cannot succeed without benchmarking and creative techniques (Hall). Once the metrics have been collected though, it is important that they be used. Effective utilization will require processing the data into meaningful statistics and building appropriate decision support system reports (Maglitta).

5.8. Use of Good BPR Tools
Often organizations take on enormous reengineering projects without considering any tools at all for documenting, managing, and transforming processes. Process tools have proven very effective in modeling both data and processes. It appears that reengineering projects have revitalized the process tool marketplace (Richman). Iivari talks about why process tools aren’t use for BPR projects where he cites the lack of tool training and lack of tool workstations as two possible factors (Iivari).

Process tools have been found to be catalysts for reengineering projects, their use upping the chances for success (Borchardt, et al.). They have a number of key capabilities including reverse engineering, reengineering, and forward engineering. Other tools such as network modeling software, group support systems, and integrated systems software such as SAP are also useful tools for BPR projects (Jaynes, Leventhal, Ahrens, et al.). Groupware is invaluable in running JAD sessions so as to make teams more effective, making process changes, and building consensus for change (Leventhal). Simulation modeling tools such as iThink and PowerSim allow managers to view costs and product flows (Tyo).

5.9. Political and Change Management Issues
The first step to overcoming resistance to change is to understand the corporate problems and opportunities that can be capitalized upon. Legare states that in order to minimize resistance to change in projects such as reengineering, one must take a power and politics approach (Legare). You have to involve senior management and other leaders in the front end of the project as well as the back end (Guaspari). Allen states it best by saying that the best change agent is success in the BPR project (Allen).

Putting in place a change management program at the beginning of a reengineering project of size is recommended to enhance its success (Hammer, Stanton). Senior managers must take a leadership role since reengineering might have as its outcome a total reinvention of the work in an organization. Managers must be personally involved in the project and cannot skimp on resources or quit before achieving payoffs. A lot of attention should be given to the political environment where information wards are set up by individuals vying for power, control, and ownership (Hart). As processes are changed more radically in a BPR project, it is recommended that more revolutionary change tactics be used (Stoddard, Jarvenpaa).
6. Initial Findings

The survey results that are reported in this article, include the results that were administered in 1995 to 58 managers, government officials, and military leaders in a five units in Australia. All of the organizations surveyed were currently undergoing a reengineering project. The units represented government, military, and private organizations where the mean budget for the organizations was $43A million with an average of 292 employees in the unit. In these firms, 76% of the respondents said they had not previously undertaken a reengineering project.

Of those respondents who spent time on the BPR vision, 37% felt that adequate time was spent producing a good working vision, whereas 29% did not spend any time on the vision. Only 14% identified stretch goals; identified their stakeholders including them in the BPR project, and identified their critical success factors with high level managers.

When it came time to undertake the current BPR project, 80% of the respondents understood that process breakdowns were the crucial element, whereas 20% felt that reengineering dealt with firing key personnel, even after a two-week training session. Only 52% of the respondents spent time studying and analyzing detailed workflow. And a smaller percentage of 33% modeled business processes as part of the reengineering project. That finding can be justified, since only 8% of respondents reported using either a reengineering tool or process tool during their project.

Looking at the use of metrics, only a very small percentage of respondents (4%) reported using metrics in their BPR projects to measure changes in process output. However, 23% of respondents had in place a quality assurance program. When asked if the respondents thought their companies would invest in metrics, 82% said they didn’t know, while only 17.6% of respondents said yes, but only to some degree.

When asked if respondents thought that the management team understands problems, 48% said yes, but only 24% or half of the 48% said yes to a high degree; the other 52% said no altogether. The responses were different when asked if corporate employees understood the problems, 71% of employees were found to understand them, but all of those responses were in the lower range of the scale. Finally, in this category, respondents themselves were asked if they understood the organizational problems, and 61% said they did not. The other 39% who did understand the problems rated their understanding in the upper part of the scale.

Respondents were asked about what percentage of top managers that were involved in change management were not committed to change and 43% replied they felt that their senior managers or military leaders were not committed to change during the BPR project. Every respondent claimed to have some sort of a change management program in place; however, the responses varied across the spectrum as to how effective the change management efforts had been in their organizations. When asked if managers put their own personal time into the BPR project, 76% of them said yes, while 48% of the respondents claimed to invest a large amount of time into it, indicating commitment to the BPR effort.

Finally, when asked if the respondents thought that the BPR effort would be successful, only 55% felt that it would be successful and those responses ranged across the scale; however, 20% thought the project would be very successful. This finding and the other data collected from Australian organizations indicated that corporate managers do not appear to understand the problems to reengineer it. A big problem that was found was that the reengineering projects were not always perceived as redesigning process, which is the primary activity of a BPR project, but often as realigning people or downsizing, which are considered secondary activities.

7. Implications for Future Research

This research represents a comprehensive examination of reengineering success factors using a multiple methods approach. In this paper, the initial reengineering success model was presented, and the Australia survey findings were examined. The survey that was conducted in Australia is also being conducted in thirteen other countries, including the United States. It is hoped that cross-cultural analysis will be conducted, and yield important evidence for the managers of organizations in their respective environments.

A three year data collection effort may produce some longitudinal data from which to analyze changes within specific countries. It would be particularly useful to make cultural comparisons among BPR projects that are being conducted and implemented in different environments. The case studies will yield a richer data set for analysis by providing a qualitative assessment to the political environment of a specific organization. This will also enable the research community to differentiate good and bad techniques for enabling process changes.

With enough observations, the research model will eventually be validated. This, in turn, will enable organizations in the future to administer the instrument.
before a reengineering project is funded and initiated. The priori results will enable managers to determine the risks of BPR projects that they are managing, and also manage the areas within their organization where problems may occur downstream.

8. References


Godkin, Lynn and Pamela Parish. “Making Reengineering Work: Practical Help from the


