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ORGANIZATIONAL CHANGE AND CULTURE: INSIGHTS ON BPR PROJECTS

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Abstract

When it comes to process transformations, one wonders if organizational changes due to Business Process Reengineering, often implemented within the context of Enterprise Resources Planning projects, would be more successful when an organization initiates them for external reasons rather than internal, and with a flexible approach rather than control-oriented. This study is one of the first to look closely at the relationship between process transformations and archetypes of organizational culture, operationalized with the competing values model proposed by Quinn and Rohrbaugh (1983). Successful process transformations are examined through performance improvements realized from performing BPR projects. Results analyzed with PLS show that organizations with a culture profile emphasizing group and hierarchical archetypes improve their performance. The implications of this are that organizations successfully engage process transformations with a controlled internal focus rather than a flexible external one.

Keywords: Business process reengineering, organizational change, organizational culture, business performance, partial least squares

Introduction

This study looks at the relationships between an organization's culture and process transformations obtained through Business Process Reengineering (BPR), often within the context of Enterprise Resources Planning (ERP) implementation. BPR is often required for organizations to satisfy their business needs. The implementation of a BPR project often implies demanding organizational changes. BPR can be described as a redesign of organizations' processes while taking advantage of the level of technology available for the purpose of performance increases (Raymond, Bergeron and Rivard, 1998; Teng, Jeong, and Grover, 1998). For all of its promises, BPR has been lacking in its delivery of promised quality, cost, customer satisfaction and productivity improvements. The competitive advantage promised by the changes has been difficult to achieve.

This paper theorizes that in order to achieve performance improvements from BPR, an organization must look to its culture for a better understanding of how process transformations could be successfully implemented. As Parker (1996) states, in order for a BPR to be successful, "the enterprise must create a new culture or face the business consequences" (p. 166).

Organizational culture can be defined as an "abstract composite of assumptions, values, and artifacts shared by its members... [that]... can be reliably represented by the values... which drive its members' attitudes and activities" (Howard, 1998, p. 234). The model proposed in this paper suggests that there is a fundamental link between an organization's culture and the achievement of performance improvements due to BPR. A competing values approach to measuring organizational culture is used to provide an empirical measure for an organization's culture (Quinn and Rohrbaugh, 1983; Quinn and Spreitzer, 1991). The competing values approach describes four cultural archetypes that can be occupied by a particular organization. These archetypes are group, hierarchical, developmental and rational cultures. The combination of the archetypes describes the organization's culture profile.

Literature Review

This section will review the relevant literature touching organizational culture and performance improvements obtained from BPR.

Organizational Culture

An organization's culture can be defined by a number of constructs, such as the symbols, language, ideology, beliefs, rituals, and myths that affect an individual's behavior. Culture constructs exist to provide some form of commitment to the established order (Pettigrew, 1979). Hofstede, Neuijen, Ohayv and Sanders (1990) propose a model of culture that is made up of values and practices. The practices reflect member beliefs about symbols, heroes and myths.

Quinn and Rohrbaugh (1983) developed a quantitative measure of organizational effectiveness, which was later successfully used to study organizational culture (Kalliath, Bluedorn and Gillespie, 1999; Howard, 1998; Quinn and Spreitzer, 1991; Zammuto and Krakower, 1991; Yeung, Brockbank and Ulrich, 1991). Quinn and Rohrbaugh (1983) exploratory study revealed that organizational effectiveness can be represented by two distinct dimensions, a focus dimension (internal vs. external point of view) and a structure dimension (flexibility vs. control orientation). The authors call the resulting approach the Competing Values Approach to measuring organizational culture. The model in figure 1 represents the competing values approach.

The Flexibility – Control dimension looks at how top heavy an organization is, and how the organization views change. Flexible cultures are more employee-oriented and place a high value on innovation and change to meet current and future needs. Control cultures on the other hand are very task oriented, centralized and value stability and direction. The internal – external dimension on the other hand are more concerned with outcomes and motivations. Internal cultures focus more on how to manage the human resources of the organization in order to achieve targeted performance outcomes. They also value control and stability within the organization and its processes. External cultures focus on the external environment in order to achieve its goals and objectives. They look at what others are doing and are not afraid of innovation and change in order to obtain their goals.

Each quadrant in figure 1 represents an archetype of culture. A particular organization needs not be classified exclusively as having one archetype of culture, but can have a culture profile containing elements from the four culture archetypes. Yet one archetype may be dominant (Quinn and Spreitzer, 1991, Cameron and Freeman, 1991, Yeung *et al.*, 1991).

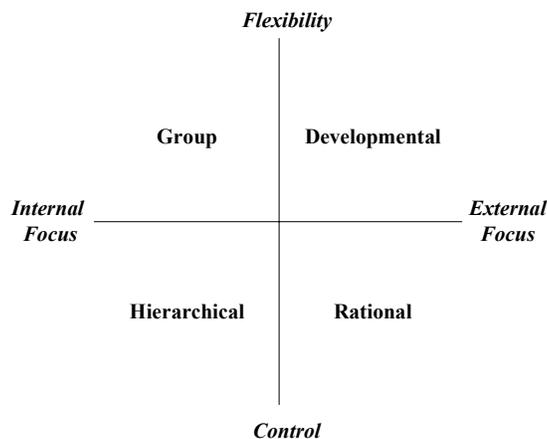


Figure 1. Organizational Culture (adapted from Quinn and Rohrbaugh, 1983)

The core values of the *group* culture archetype are belonging, trust and participation, which are motivated by factors of attachment, cohesiveness, and membership (Denison and Spreitzer, 1991). Like the group culture, the *developmental* cultural archetype also emphasizes flexibility but focuses its attention on the external environment. Its important factors besides flexibility are growth, innovation and creativity. Productivity, performance, goal fulfillment, and achievement are the important factors for the *rational* cultural archetype. Finally, for the *hierarchical* cultural archetype, the "focus is on the logic of the internal

organization and the emphasis is on stability" (Denison and Spreitzer, 1991, p. 6). The motivating factors for this quadrant include security, order, rules, and regulations.

A number of studies have been done, looking at and validating this framework. Quinn and Spreitzer (1991) performed a multitrait-multimethod analysis as well as multidimensional scaling on two competing values' instruments. The authors found evidence for both convergent and discriminant validity. Zammuto and Krakower (1991) looked for relationships between culture and other organizational variables including, centralization, moral, administrator credibility, conflict, strategic orientation and culture strength. Authors state that evidence for construct validity exists due to the correlation of the competing values measure of culture and the other variables stated. Yeung *et al.* (1991) studied the competing values measure of culture in relation to organizational performance, culture strength and human resource practices. In a cluster analysis, the authors found that organizations from their study could be classified into 5 distinct culture types (or profiles). More recently, the competing values framework was again validated in two more studies (Howard, 1998, Kalliath *et al.*, 1999). No research so far uses this framework in investigating organizational culture profiles that are more suitable for successful BPR projects.

Performance Improvements Due to BPR Projects

BPR involves the organizational transformation that can lead to increases in productivity, customer satisfaction, organizational quality, market coverage, cost reductions and defects reductions, through the potential use of information technology (Teng *et al.*, 1998; Raymond *et al.*, 1998; Grover, Jeong, Kettinger, Teng and Guha, 1997; Davenport and Short, 1990; Hammer, 1990). Since its foundations in the late 1980's and early 1990's, BPR has earned a somewhat controversial rating as the miracle solution to achieving organizational performance increases in a number of areas. The controversy stems from the high failure rate of implementation of BPR.

Although much of the literature on the topic of BPR is theoretical, there have been some empirical studies done in order to determine what aspects of the organization will lead to BPR success. Organizational fit between the ambition of the BPR project, and four independent factors such as breadth, depth, planning, and coordination must be balanced in order for the project to be a success (Huizing, Koster and Bouman, 1997). Yet, results indicate that fit is not easily achieved by organizations. The authors indicate that mismatches in the fit require the organization to rebalance the level of ambition with the independent factors. Interestingly enough, the authors use the reengineering effort as level of analysis while most of the other authors use an organizational level of analysis.

Another study looked at four independent factors while investigating the BPR process; compliance with BPR principles, diversity of the human resources allocated to the project, methodological rigor of the project, and organizational support (Raymond *et al.*, 1998). It also considered whether benefits are affected by the size of the firm. The authors found that the advantages that can occur from implementing BPR could occur in both large and small to medium size firms. Their hypotheses were all confirmed for large-scale enterprises.

Teng, Jeong and Grover (1998) looked for changes in roles and responsibilities, measurements and incentives, organizational structure, information technology, shared values, skills and process work flow to correlate with perceived level of success and goal fulfillment of a BPR project. They also studied the importance of the radicalness of the reengineering project. Highlighting the debate between Davenport and Short (1990) and Hammer (1990), Teng *et al.* (1998) found that the clean slate approach of Hammer (1990) is rarely found in organizations. Most businesses currently emphasize analyzing the current processes before and while implementing a BPR although Teng *et al.* (1998) found that doing such was not statistically important to the goal fulfillment.

Research Model and Propositions

The research model presented in figure 2 illustrates the following research question: What organizational culture profiles are suitable for performance improvements due to BPR projects?

The research model proposes organizational culture profile, composed of four different culture archetypes. They are illustrated by two dependent variables representing the two major axes described in the competing values approach. The independent variable is the achievement of performance improvements due to BPR efforts. The major proposition for this model is as follows:

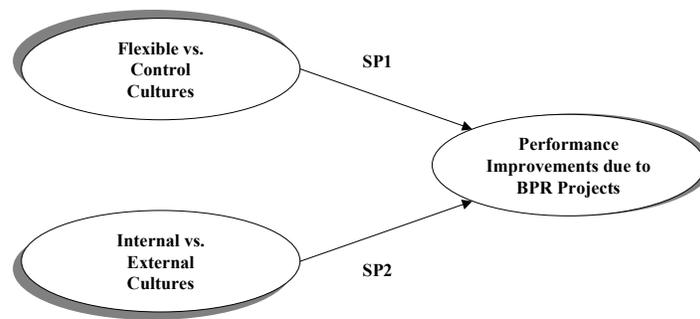


Figure 2. Research Model

Proposition: Organizational culture profile will be significantly linked to the achievement of BPR performance improvements.

This proposition attempts to test whether a relationship exists between the organization's culture profile and the achievement of performance improvements from reengineering an organization's processes. This proposition has two sub-propositions.

SP1: Flexible cultures will allow a greater achievement of BPR performance improvements over control cultures.

BPR is represented as an innovation in the underlying organizational processes through the use of technology. Organizations that espouse flexibility over control will have a better chance of successfully incorporating the organizational changes required by a BPR effort. Remember that flexible cultures will value organizational change and innovation. Furthermore, successful organizational change has often been shown to require a certain amount of teamwork and participation from the employees. Therefore, SP1 states that BPR attempts will be more successful for flexible cultures than for control cultures.

SP2: External-oriented culture will allow a greater achievement of BPR performance improvements over internal-oriented culture.

External-oriented cultures are represented by a combination of developmental and rational culture archetypes. Major concerns for these cultures are, innovation, change, growth and development along with goal clarity, objective setting, productivity, profitability, outcome excellence and quality. The main goals of a BPR project are to achieve efficiency and productivity through the use of innovation and technological change. As such, external-oriented cultures, that espouse these ideals should better benefit from the results of a BPR project.

Methodology

Variables

The organizational culture instrument was adapted from Quinn and Spreitzer (1991). An organization's culture profile is represented as a combination of the four culture archetypes, i.e. group, developmental, hierarchical, and rational. Four items were indicated per culture archetype. Respondents were asked to indicate their perception of their organization's culture on a five-point Likert scale varying from 1 to 5, with anchors that go from "not important" to "very important".

Porter's (1985) value chain processes were used as the areas in which an organization may affect BPR. An organization's value chain represents all of the different processes that involve organizational resources and that are needed to support the organization's operations. Porter (1985) developed a model of an organization's value chain that contains 9 processes; 5 primary processes, and 4 support processes. The organization's primary processes involve the production and delivery of the organization's products to the consumer (Bergeron, Buteau and Raymond, 1991). The processes involved in the primary activity are inbound logistics, operations, outbound logistics, marketing and sales, and customer service. The organizations secondary business processes represent the support processes for the primary activities and are, administrative coordination and support, human resource management, technology development, and procurement of resources.

Respondents were asked to identify which value chain processes have been affected by BPR, and evaluate for each affected process, the achievement of the performance improvements such as productivity, customer satisfaction, market coverage, organizational quality, cost reductions, and defects reduction. The level of improvement was measured using a five-point Likert scale varying from 1 to 5, with anchors that go from "negligible" to "excellent". Therefore the dependent variable is composed of six performance improvement items (mentioned just above) measuring the mean improvement across the nine value chain processes that were affected by the reengineering initiatives. For example, an organization that reengineers its processes will be asked to rate the productivity improvements due to the reengineering initiative across nine dimensions (being the primary and support processes). The mean of these nine values represents the productivity rating. This is repeated for the 6 improvement areas.

Data Collection

A four page pre-tested questionnaire was sent randomly to 998 organizations that had at least 200 employees from different industries. The cover letter was asking respondents to indicate the role of BPR in achieving performance improvements. Many of the projects were implemented within the context of an ERP. As culture is often imposed from the top down (Parker, 1996, Howard, 1998), top-level management was targeted for responses. Reminders were sent a month later to each company. Of the initial sample, 32 packages were returned as undelivered. Forty-eight questionnaires were returned completed. For analysis 31 questionnaires were usable. All of the questionnaires were answered by higher-level executives, which included presidents, vice presidents and a number of managers and directors. The mean revenue for the sample of usable organizations was \$450 million and ranged from \$5 million to \$6 billion.

Data Analysis

Validity and Reliability of the Dependent Variables

Before testing the overall model, confirmatory factor analysis was performed for the dependent variable. Factor analysis was carried out for each of the six BPR performance area constructs (productivity, customer satisfaction, market coverage, organizational quality, cost reductions and defects reduction). The initial number of items per performance area constructs was nine, representing the nine activities or processes of Porter’s (1985) model. This was followed by a reliability analysis to determine the most reliable combination of the items. A mean was taken of the reliable processes in order to create the second order constructs that were used as the items in the PLS path analysis. The descriptive statistics along with the results of the reliability analysis for these constructs are shown in table 1.

Table 1. Descriptive Statistics (n = 31)

	Initial # of items	Final # of items	α	Mean	Min	Max	Std. Dev.
BPR Performance Areas							
Productivity	9	6	0.79	3.5697	2.33	4.33	0.4433
Customer Satisfaction	9	6	0.84	3.5722	2.17	4.33	0.3627
Market Coverage	9	7	0.83	3.6257	3.00	4.57	0.3057
Organizational Quality	9	7	0.91	3.7604	3.00	5.00	0.3876
Cost Reductions	9	9	0.87	3.1901	1.00	4.11	0.5774
Defects Reduction	9	9	0.93	3.1900	1.00	4.00	0.5319

Structural Equation Modeling and Partial Least Squares

The method of analysis in this study was limited in its choices due to the resulting sample size. Furthermore, histograms and normal probability plots showed skewed distributions and raised doubts as to the normality of the samples' distribution. PLS (partial least squares), a structural equation modeling technique was used due to its distribution free methodology. Non-normality may perhaps be explained by the low sample size of 31 respondents. Hair et al. (1992) state that a sample size of 30 or less will

not give good indications of normality within the sample. Possible reasons for non-response of the survey, among other potential limitations to the study, are discussed in the conclusion of this paper. When using PLS, data do not have to be normally distributed, scales may be ordinal and the sample can be small as long as it is 10 times larger than the number of items contained in the most substantial construct (Chin, Marcolin and Newsted, 1996). Yet this restriction can often be relaxed to 5 times the number of items in the largest construct (Chin, 1997). The minimum sample size should be of 30 respondents since the largest construct is the dependent variable with its 6 items. Therefore, this criterion is met.

PLS analysis involves two stages: (1) assessment of the measurement model, including the item reliability, convergent validity, and discriminant validity, and (2) assessment of the structural model. Together, the measurement and structural models form a network of constructs and measures. The item weights and loadings indicate the strength of measures, while the estimated path coefficients indicate the strength and the sign of the theoretical relationships (Hulland, 1999; Igbaria and Greenhaus, 1992; Thompson, Higgins and Howell, 1991).

In order to have item reliability in the measurement model, only indicators with factor loadings of 0.5 were kept (Hair, Anderson, Tatham and Black, 1992). Evidence for convergent validity was obtained for the measurement models by using the construct Rho's. The criterion established by Nunnally (1978) concerning the reliability of construct, which also applies to PLS (Hulland, 1999), is that any constructs having a rho value equal or greater to 0.70 should be kept. Evidence of construct validity can be seen from the high Rho values that range from 0.75 to 0.85 for the culture independent constructs, and .92 for the BPR dependent construct (see table 2).

Table 2. Convergent Validity (n = 31)

	Initial # of Items	Final # of Items	Mean	Std. Dev.	Rho ^a
Organizational Culture Archetypes					
Group	4	3	4.15	0.67	0.85
Developmental	4	2	4.10	0.69	0.75
Hierarchical	4	4	3.46	0.70	0.85
Rational	4	3	4.308	0.59	0.83
BPR Performance Improvements					
	6	6	3.48	0.36	0.92

$${}^a\text{Rho} = \frac{\left(\sum_{i=1}^n \lambda_i\right)^2}{\left(\sum_{i=1}^n \lambda_i\right)^2 + \sum_{i=1}^n \text{Var}(\xi_i)}, \text{ where } \text{Var}(\xi_i) = 1 - \lambda_i^2$$

Discriminant validity can be represented by the ability of a construct to discriminate itself from another construct. Examining the variance extracted from a particular construct, and comparing it to the shared variance of the other constructs in the model can obtain evidence of discriminant validity. The average variance extracted (AVE) for a particular construct need to be higher than 0.5, which was the case for the sample (Fornell and Lacker, 1981). All conditions are respected for both samples (see Table 3).

Table 3. Discriminate Validity (n = 31)

	Group	Developmental	Hierarchal	Rational
Group	0.655			
Developmental	0.196	0.618		
Hierarchical	0.043	0.086	0.543	
Rational	0.193	0.238	0.132	0.548

Diagonals represent the average variance extracted, while the other matrix entries represent the shared variance.

Results

Figure 3 shows the PLS analysis results between the organization's culture and the achievement of BPR performance improvements. Group and hierarchical archetypes are significantly and positively linked to the dependent variable.

Therefore the main proposition for the paper can be accepted, as some archetypes are significantly associated to BPR performance improvements. Sub-proposition 1 is rejected, as there was no evidence to support the theory that flexible cultures (group and developmental) are significantly linked to performance improvements from BPR projects. The second sub-proposition is also rejected though, as it is the internal culture archetypes (i.e. group and hierarchical) and not the external ones that contribute to the dependent variable.

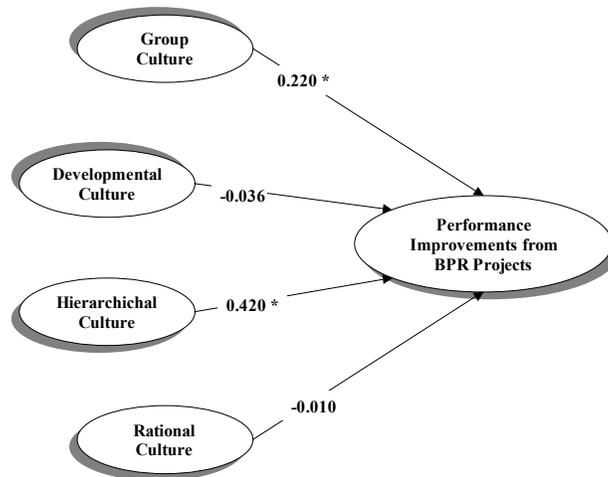


Figure 3. Organizational Culture and BPR Performance Improvements. * $p \leq 0.05$

Looking at the path coefficients for both group and hierarchical archetypes there are indications to support the theory that control-oriented cultures benefit more from BPR projects than the ones with a flexible approach. This is evidenced by the fact that the hierarchical culture's path coefficient is nearly double that of the group culture.

Discussion

As was mentioned just above, the main proposition was accepted, as there was a significant relationship between some of the organizations culture archetypes that are components of culture profiles and BPR performance improvements. Yet the two sub-propositions were rejected. The assumed hypothetical dynamics of the relationships between organizational culture archetypes and process transformations were not present (i.e. the importance of flexibility and an external view). What was seen instead was that internal culture archetypes play a positive and significant role in achieving BPR performance improvements, and the beginning of evidence showing that control culture archetypes also play a positive and significant role.

BPR often involves the radical reengineering of processes that are internal to the organization. Results indicate that organizations need to focus internally in order for changes to generate the expected benefits. The competing values framework suggests that internal cultures attach importance to items such as assessing employee concerns and ideas, human relations, teamwork and cohesion, as well as stability, continuity, order, and predictable performance outcomes. Focusing on these items may help organizations implement BPR projects more successfully.

The strength of the path coefficient found between hierarchical culture archetype and BPR performance improvements in comparison to the weaker one with the group culture archetype support the interpretation that control cultures may achieve greater success with process transformations. This also goes against the original assumptions that were made. It was assumed that flexibility would be more of an asset than would be control in the implementation of organizational change. The implications here are that perhaps some degree of control is required in order to realize greater performance improvements. For control cultures,

items such as routinization, formalization, structure and quality are valued. The ability to apply these values may facilitate a successful implementation.

It should be remembered that most organizations do not value the attributes of only one single archetype. According to the literature, many organizations value some combination of the attributes, where valuing one may not necessarily mean not valuing another. It is the relative strength of the archetypes that is important. Hence, the fact that group and hierarchical cultures are simultaneously significant is not necessarily paradoxical. Either archetypes, or even all, can be valued within a single organization (Cameron and Freeman, 1991). As such, business process engineering may require the open and willing participation of the employees within the organization for performance improvements at the same time as requiring the change process to occur in a controlled environment.

Conclusion and Research Avenues

This paper concludes by saying that organizations with cultures that espouse a more internal perspective and more control-oriented values are more successful in process transformations than the ones embracing external and flexible approaches.

The major limitation of this study is the limited sample size that may be explained by a non-response bias and late reminder. Since many organizations in this study implemented BPR within the context of ERP implementation, perhaps organizations were not willing to report on their successes and/or failures. Some organizations that returned their non-completed questionnaire indicated they were unable to respond as they have either just completed process transformations or are planning on it for the near future. Another possible reason for such a small sample size was that the questionnaire was sent to the CEOs, which are difficult target respondents due to their busy schedules and heavy considerations.

A replication study should be performed to confirm the validity of these results before they can be generalized to a greater population of organizations. Future research should also perhaps choose a more selective data set. Not all industries and/or organizations perform BPR. Selecting a few promising industries would perhaps improve the response rate. Finally, the organizational culture instrument is fairly remarkable and versatile. Therefore it could be applied to different research domains in the information systems field.

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