# The House of Quality Within a Knowledge-Based View of the Firm

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**Abstract**

Most, if not all, descriptions of process reengineering rely on the notion of translating the voice or satisfaction criteria of the customer into a redesigned chain of value-adding business processes. While customer satisfaction is critical to business success, the tactical process of designing processes to satisfy current customers may still overlook long-term strategic considerations. If managers are unable to see beyond current customer requirements, they will miss opportunities that require new combinations of knowledge and skill.

We suggest that quality function deployment provides a framework for considering a variety of strategic criteria and translating these criteria into well integrated business processes. The "House of Quality" used in the QFD process maps customer quality criteria to design and functional activities and includes benchmarking of competitors' customer satisfaction and technical performance. We will demonstrate that the house of quality can be used to match competitor best practices with a firm's desired competencies and business process purposes. This model successfully integrates QFD and Business Process Reengineering with a knowledge-based view of the firm.

# The House of Quality Within a Knowledge-Based View of the Firm

## Introduction

The purpose of this research is to present a conceptual framework for Business Process Reengineering (BPR) that integrates strategic purpose with specific knowledge-based competencies required to achieve effective and efficient processes. The key argument underlying the framework development is that the value-added in most business processes comes from knowledge-based services. Strategic deployment of reengineering must involve a critical evaluation of the knowledge-based competencies required to support business strategy.

Business Process Reengineering provides a new philosophy for improving the effectiveness and efficiency of businesses. The growth of BPR consulting signifies the widespread appeal and application of the concept. This signal of appeal also represents a potential issue. Significant inconsistency exits in both interpretation and application of BPR. Focusing on the reengineering of core business processes without tightly integrating efforts with the strategic intent of the organization can lead to suboptimized business redesigns and an overall lack of stability in process designs over time. Development of a framework used to consider strategic purpose during the reengineering process represents an attempt to overcome these potential shortcomings of BPR.

The next two sections present overview of process reengineering and business reengineering, a recently proposed strategic reengineering process. These sections are followed by discussions of the knowledge-based nature of business processes and Quality Function Deployment, a tool upon which our framework is based. We then present a framework linking strategic purpose to knowledge-based competencies followed by some concluding remarks.

While we present this from the perspective of conceptual business management model development, we appreciate the opportunity to share the framework with those who have the expertise to evaluate and extend our ideas from a system dynamics perspective. Our hope is to stimulate interdisciplinary research interests.

## Business Process Reengineering

Michael Hammer (1990) changed the way many think about quality improvement by suggesting that it is time to stop paving the cow paths. Rather than automating outdated processes, he suggest obliterating processes and starting from scratch. Reengineering begins with the question, "Why do we perform this process?" rather than with the search for methods by which existing processes can be continuously and incrementally improved. This distinction differentiate reengineering from the continuous improvement practices employed as a key component of most quality improvement initiatives.

Hammer (1990) argues that inefficient processes were not designed to be inefficient. They were created (some may have even just happened) based on Industrial Age principles of specialization. Organizations typically adopt functional structures to take advantage of specialization. However, when work is handed off from person to person and passed from department to department, inefficiencies and quality problems result.

Responding to these inefficiencies associated with functional specialization, reengineering involves analyzing the business from a process perspective. If the process is designed considering only the objectives of one function performing a piece the process, the effects of the redesign on other functions may be overlooked. Reengineering involves multifunctional process redesign teams. The team challenges every facet of the process to determine the true objective of the process, identify what steps add value, and, if necessary, radically redesign the process.

Hammer (1990) developed seven principles that may be used to guide reengineering efforts. An emphasis on information technology as a process enabler underlies his principles. Table 1 summarizes his reengineering principles.

Hammer and Champy (1993) identify common themes occurring in reengineered businesses. To a great extent, these themes parallel the principles and emphasis on information and information technology presented in the preceding table. In addition to presenting themes representing common outcomes of reengineering, Hammer and Champy also present some guidelines for implementing reengineering.

The widespread application of Hammer and Champy's business process reengineering concepts does not reflect broad agreement on deployment practices. One of the authors of this article interviewed seven consultants engaged in BPR consultation. While some mention of

linking strategy to BPR occurred during the interviews, the focus of most efforts was on reengineering of core processes without extensive linkage to overall business strategy. Even with respect to this limited focus, the consultants varied considerably in their interpretation of reengineering and deployment practices. This lack of consistency and understanding highlights the need for refined frameworks to guide reengineering efforts and align these efforts with business strategy.

Table 1. Principle of Business Process Reengineering

| Principle | Description/Purpose |
|---|---|
| Organize around outcomes, not tasks. | Avoid process handoffs. Pinpointing responsibility to a single person who has the knowledge of the process from inception to outcome. |
| Have those who use the output of the process, perform the process. | Shift the process to the customer. Customers possess the knowledge of process needs. Coordination mechanisms can be eliminated. |
| Subsume information-processing work into the real work that produces the information. | Have those who produce information process it. Eliminate specialized report generating organizations. Those who create the information possess the greatest understanding of the information. |
| Treat geographically dispersed resources as though they were centralized. | Use information technology to create benefits of economies of scale while maintaining flexibility and autonomy of decentralization. Sharing of information such as vendor performance increases organizational knowledge. |
| Link parallel activities instead of integrating their results. | Forge links between parallel process. Knowledge sharing mitigates integration problems. |
| Put the decision making point where the work is performed, and build control into the process. | Information technology such as expert systems can channel knowledge to front-line employees. |
| Capture information once and at the source. | Use integrated information systems to share information captured at its point of origin. |

Adapted from Hammer, M. (1990) "Reengineering Work: Don't Automate, Obliterate," *Harvard Business Review*, 68, July-August, 104-112.

### Strategic Reengineering

Talwar (1993) presents a strategy-driven approach to business reengineering. His business reengineering approach involves a rethinking and streamlining of business processes and supporting architecture. The addition of supporting architecture distinguishes business reengineering, a top-down approach to total business redesign, from process reengineering, or radical rethinking and redesigning of core business processes. Talwar asserts that process reengineering works best in the presence of clear process objectives. While identifying process purpose may constitute one of process reengineering's radical departures from continuous improvement practices, the purpose might be derived from short-term rather than strategic objectives.

Talwar (1993) presents the following six-step approach to business reengineering that links business strategy to process purpose. The main steps include 1) building a vision of the reengineered organization; 2) planning how the vision will be realized; 3) analyzing the current structure and processes; 4) redesigning the business architecture; 5) implementing the redesigned organization and processes; and 6) measuring the benefits and sharing the learning.

While this approach represents a needed framework linking strategic components of organizational effectiveness to business process reengineering, further development or extension of the framework with respect to transforming strategy into competencies should be of practical use. Business reengineering may be viewed as the skeleton holding the vital organs of organizational effectiveness in place. Understanding the nervous system linking these vital organs might be viewed as a next step in refining our understanding of reengineering processes based on desired knowledge-based competencies.

### A Knowledge-Based Service View of Business Processes

Quinn (1992) suggests that most of the value added in business processes is created by knowledge based services. This proposition holds for manufacturing as well as service businesses. The majority of manufacturing employees, 65-75 percent, perform service activities, or service business processes, such as marketing, accounts receivable, and inventory management (U. S. Trade Study 1983). These service, or business, processes either support internal customers (employees), external customers (end users), or intermediary customers such as retailers and distributors. The value-added is the knowledge embodied in these services.

The key rationale for Quinn's (1992) proposition lies in the fact that the competence in the manufacturing process of converting raw material into finished goods has become a competitive prerequisite rather than a differentiator. Value-added now comes from knowledge-based service activities that provide styling features, perceived quality, subjective taste and other sources of differentiation throughout the value chain of business processes.

Davidow and Malone (1992) echo the argument for the interdependence of manufacturing and service in order to achieve value-added manufacturing goals. They describe virtual products as those defined not only by form and function but also by services bundled with the product. These services include customer involvement in the design of both services and products. Given the increasing commoditization of product technology, value-added services provide a key means of binding customers to a particular company's bundle of products and services.

The authors also support the proposition that the majority of a manufacturing employees' work is of an information processing, or service, nature. The success of a corporation depends on the ability to gather and integrate massive flows of information and intelligently act upon that information. Davidow and Malone (1992) support Hammer's (1990) emphasis on getting the right information to the right person to provide the knowledge required for empowered decision making.

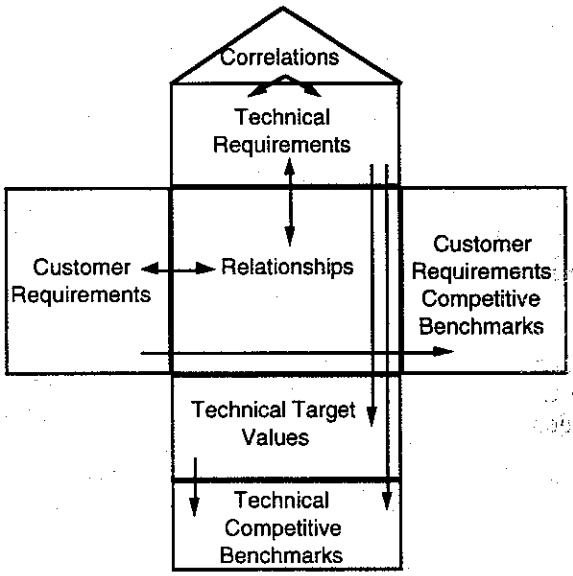
Knowledge-based service activities now occupy the critical positions in a company's value chain. Indeed, many production elements and all non-production elements in an organization's value chain at levels of administration can be redefined as knowledge-based activities or services . This alternative view of the firm requires a re-examination of some of the tools we presently use in industry and competitive analysis. In the past, competitive advantage has been seen as a concept of product positioning. The crucial question has been how and were can we position our products or services in order to create maximum value for our customers. Instead the question should be what knowledge-base and set of skills will be critical to success given the capabilities we are hoping to create.

Gven the view that value-added comes from knowledge-based activies and services, some framework for strategic reengineering of such services might benefit the overall business reengineering process. Specifically, the framework must identify key knowledge-based competencies required of the reengineered service, or business, processes. A modified version of Quality Function Deployment (QFD) might serve as a reasonable starting point.

### Service Quality Function Deployment

Quality Function Deployment (QFD) has been described as a system for translating customer requirements into appropriate company requirements at every stage, from research through production design and development, to manufacture, distribution, installation and marketing, sales and service (ASI, 1987). The structure of QFD is based on a set of matrices used to translate customers' requirements into technical requirements. The matrices also account for relationships between customer requirements and technical requirements, tradeoffs among technical requirements (and related functional areas), and competitive evaluation with respect to both customer and technical requirements (Kogure and Yoji, 1983). Collectively, the matrices form a house of quality as depicted in Figure 1.

Figure 1. The QFD House of Quality




QFD benefits both process and product development. Process improvements include increased functional integration, improved decision making ability, and increased customer orientation. Product improvements include lower costs, improved quality, increased reliability, and decreased warranty claims (Burns, 1990).

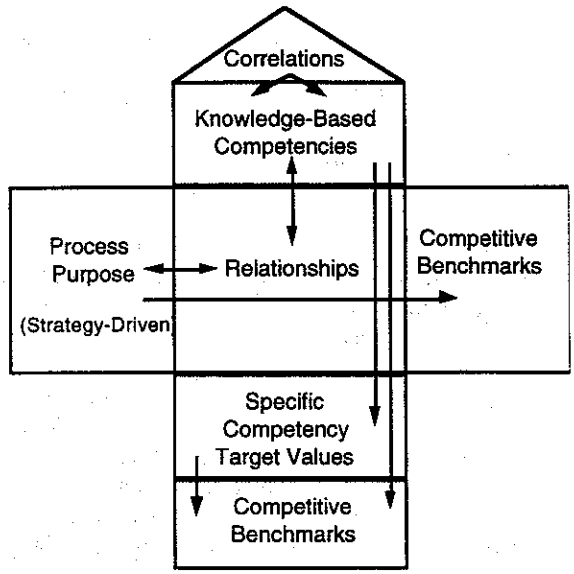
Behara and Chase (1991) illustrate the appropriateness of QFD for service design by developing a house of quality using service quality criteria and service design factors. They propose that such a framework for service design enables direct customer-driven design of services. We believe that the QFD house of quality can be further adapted as a knowledge-based framework for strategic reengineering.

### A Knowledge-Based Framework for Strategic Process Reengineering

A key component of reengineering that differentiates the process from continuous improvement is the critical evaluation of process purposes. This evaluation helps organizations avoid the trap of continuously and incrementally improving processes for which there are no clear purposes. A strategic framework such as business reengineering, as proposed by Talwar (1983) provides strategic direction with respect to process purpose. Translating such strategic purpose into effective and efficient processes requires a thorough understanding of the specific

knowledge-based competencies required to drive the newly designed, value-added business processes. We present a framework, depicted in Figure 2, to assist in such translation of process purpose into specific competencies.

Figure 2. A Knowledge-Based Framework for Strategic Process Reengineering




The process purpose is driven by the strategy developed during the early stages of business reengineering. The process purpose is, in other words, the organizational level skills that the firm needs to activate to remain competitive. Process purpose is often defined in terms of speed-to-market, flexibility, response time, quality specifications, etc. For example, a hotel might desire to develop a customer recognition process by which return customers are recognized and rewarded. The process purpose, driven by the business strategy, may be complete customer satisfaction and retention. Additional purposes might include identifying revenue streams from return customers, and identifying causes of customer defection, or failure to return. Knowledge-based competencies might include information processing systems that help a hotel 1) to know when a guest is a return visitor; 2) to know the frequency of visits; 3) to know how much each customer spends per visit; 4) to understand what types of rewards are valued by return customers; 5) to understand when to reward return customers; and 6) to know when a customer has defected.

A fundamental strategic problem has to do with obsolescence of knowledge-based competencies. Knowledge-based competencies evolve in life cycles or stages of maturity. The evolution of knowledge-based competencies can be described as following an "s-shaped curve," beginning with the a new skill, eventual achievement of full performance potential, and ending with the displacement of the skill by another emerging knowledge-based competence. The five phases of competence evolution are: emerging, advanced, core, base, and declining. There is difference in maturity among these five stages. Emerging competencies are new forms of organizational knowledge that are in the early stages of development. They tend to be tacit and are not yet commercialized, but will become so within five years. Advanced competencies are "state of art" forms of organizational knowledge which may be in use, but will evolve significantly. A large amount of uncertainty surrounds advanced competencies. Advanced competencies are newer or less mature than core competencies. Core competencies are primary sources of advantage of the firm (Prahalad and Hamel, 1990). Core competencies have been fully developed and drive the most critical processes of the firm. Base competencies have fully diffused throughout the industry, are no longer a source of advantage, but are required for survival nonetheless. Declining competencies are those that are losing their competitive relevance.

This process can last a few months, several years, or decades. All competencies do not necessarily complete the entire cycle. Some competencies never reach their full performance potential and are quickly replaced by new emerging ones.

Several measures can be used to determine the maturity of a knowledge-based competence:

- The knowledge prerequisites for understanding and having access to the knowledge.
- Its transferability and imitability (degree of tacitness and intangibility)
- Amount of uncertainty around the knowledge, which tends to be highest for emerging competencies.
- The level of interest around the competencies, internal and external to the firm, which tend to be highest at the advanced stage.
- The amount and focus of patent activity surrounding the patent.
- The number of possible new applications
- The amount of effort required to fully develop the competence.
- The potential return on investment

Most processes have competencies in different stages of maturity. The overall maturity of a firm'sbusiness processes is a function of the maturity its competencies.

The center of the grid identifies the relationships between purposes and desired competencies. A particular purpose may be related to multiple competencies. Conversely, many purposes, or goals, could positively relate to a single competence. This latter case may be viewed as a high-leverage competence. For example, understanding when to reward return customers might positively relate to both customer retention and identification of customer revenue streams.

The roof of the house represents correlations among the knowledge-based competencies. Strong positive correlations might indicate the need to embed sets of knowledge-based competencies at a particular point in the process. Strong negative correlations could indicate some trade-offs. For example, possessing knowledge that a customer is a return visitor and possessing knowledge that the same customer has defected cannot occur at the same instant. It is the absence of a return customer after some predetermined time that signals defection.

Specific target values indicate measurable performance dimensions such as information recovery and retention rates. Once developed, attempts should be made to assess competitors' performance along the same dimensions (competitive benchmarking). This might be accomplished through the use of mystery customers, employees posing as customers at competitors' facilities. Likewise, some analysis of competitors' awareness of their process purposes will indicate the extent to which the competition has strategically driven its sets of business processes.

## Conclusion

The rationale for developing the framework presented in this paper is that business processes undergoing reengineering represent more than chains of activities. Business processes constitute goal-directed sets of knowledge-based service activities. The overall process design involving employees and their facilitating technology depends on a clear understanding of the knowledge needed to drive the process. We believe that identifying knowledge-based competencies is a necessary step in the strategic deployment of business process reengineering.

Future efforts will include refinement and testing of this framework. We humbly presented this work in hope that it will stimulate interdisciplinary research interests. Our approach has been one of conceptual model development from the business management research perspective. We appreciate the opportunity to share this work with those who have the expertise to evaluate and extend the framework from a system dynamics perspective.

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