Re-engineering Distribution Using Web-based B2B Technology

Gyeung-min Kim*

The focus of Business Process Re-engineering (BPR) has been extended to inter-business process that cuts across independent companies. Combined with Supply Chain Management (SCM), inter-business process reengineering (IBPR) focuses on synchronization of business activities among trading partners to achieve performance improvements in inventory management and cycle time. This paper reviews the business process reengineering movement from the historical perspective and presents a case of inter-business process reengineering using the latest internet-based Business-to-Business (B2B) technology based on Collaborative Planning, Forecasting, and Replenishment (CPFR). The case demonstrates how CPFR technology reengineers the distribution process between Heineken USA and its distributors. As world's first implementer of web-based collaborative planning system, Heineken USA reduces cycle time from determining the customer need to delivery of the need by 50% and increases sales revenue by 10%. B2B commerce on the internet is predicted to grow from $90 billion in 1999 to $2.0 trillion in 2003. This paper provides the management with the bench-marking case on inter-business process reengineering using B2B e-commerce technology.

〈key words〉 re-engineering, B2B, e-commerce

I. Introduction

Business Process Re-engineering (BPR) has been around over 10 years. Being considered as one of the top agenda in the corporate community, BPR is vital to remain competitive in the business.

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More than 70 percent of all large U.S. companies claim to be doing reengineering (Turban et al., 1999). Rather than optimizing particular business functions, BPR focuses on streamlining business processes by coordinating cross-functional activities related to the process (Johansson et al., 1993; Davenport, 1993; Davenport and Short, 1990; Rockart and Short, 1989).

BPR involves fundamental rethinking and radical redesign of the entire business process to achieve dramatic improvement in performance (Hammer and Champy, 1993). Information and communication technologies are considered to be BPR enabler that enables the business to restructure their operations around the processes. Recently, electronic commerce technologies play a major role in BPR.

Since mid 90's, the focus of BPR has been extended to inter-business process that cuts across independent companies.

The focus extension is affected by SCM (Supply Chain Management) in which business activities of trading partners are synchronized to achieve performance improvements in inventory management and cycle time. BPR combined with Supply Chain Management (SCM) results in inter-business process reengineering (IBPR).

IBPR is a new form of BPR applied to interorganizational context (Clark and Stoddard, 1996; Venkatraman, 1994).

Introduced by Venkatraman (1994), IBPR was originally named as business network redesign. While BPR within a business employs corporate intranet and organizational information systems, IBPR uses extranet-or Internet-based Business-to-Business (B2B) applications that are also called inter-organizational information systems (IOS). The purpose of the IBPR is to create a virtual organization through the strategic use of electronic integration. Much more than the use of EDI (Electronic Data Interchange), this IT-enabled virtual organization results from a tightly coupled strategic alliance between trading partners (Riggins and Rhee, 1999).

The purposes of this paper are to review the business process reengineering movement from the historical perspective and to present a case of inter-business process reengineering using the latest internet-based B2B technology based on Collaborative Planning, Forecasting, and Replenishment (CPFR). Heineken USA case is presented. The case demonstrates how CPFR technology reengineers the distribution process between Heineken USA and its distributors. As world's first implementer of web-based collaborative planning system, Heineken USA enjoys 50% reduction in cycle time from

determining the customer need to delivery of the need and a 10% increase in sales revenue; and the benefits are simply strategic.

B2B commerce on the Internet is already several times larger than Business-to-Consumer (B2C) electronic commerce, and this trend is expected to continue into the next century. A study published by Boston Consulting Group in 2000 forecasts that internet-based e-commerce between business will grow from $90 billion in 1999 to $2.0 trillion in 2003 (Cross, 2000). At this time of the digital economy, this paper provides the management with the insights on the consequence of inter-business process reengineering using information technologies. In the subsequent sections, the concept of the process reengineering is discussed from the historical perspective and then the case on distribution process reengineering is presented. Finally, the benefits of the reengineering and conclusions are presented.

II. Historic Perspective of Process Reengineering

1. Business Process Reengineering

Processes are defined as a set of logically related activities that take an input and transform it to create an output (Johansson et al., 1993). Using this definition, for example, manufacturing processes can be described as a set of activities that take a piece of metal, cut it, bed it, and machine it to create a bracket for a shelf.

Business Process Re-engineering (BPR) is a new way to rebuild a business as a process-oriented business. Rather than optimizing particular individuals or business functions, it focuses on streamlining current business processes by coordinating cross-functional activities related to the process (Johansson et al., 1993; Davenport, 1993; Davenport and Short, 1990; Rockart and Short, 1989). It has the following specific objectives (Davenport and Short, 1990):

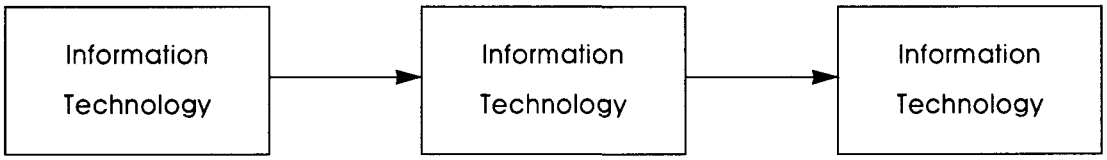
1) Output Quality.
2) Cost Reduction.
3) Time Reduction.

The first objective, output quality, is

defined by the customer of the process. It involves providing the customer (either internal or external) the right output at the right place, at the right time, and at the right price. It is related to process effectiveness, the extent to which the outputs of the process meet the need and expectations of customers. The second and third objectives are related to process efficiency, the extent to which resources are minimized and waste is eliminated in the pursuit of effectiveness.

Process re-engineering community takes the position that firms derive economic outcomes of Information Technology (IT) through its impact on business processes. The potential outcome of IT is further enhanced by redesigning business processes and by associated modifications to the organizational structure. Figure 1 summarizes relationships between IT and business value.

Figure 1. IT-Business Value Relationships



2. Inter-Business Process Reengineering

As businesses recognize the importance of the supply chain management, the focus on business process reengineering is extended to the inter-business process reengineering (IBPR). Also called as business network redesign (Venkatraman, 1994), IBPR represents the redesign of the nature of exchange among multiple participants in a business network through effective deployment of IT capabilities.

New paradigm-CPFR (Collaborative Planning, Forecasting and Replenishment) ? changes the way demand is forecasted and replenishment is planned. CPFR begins with an agreement between trading partners in demand-supply relationship to develop a collaborative business relationships. Demand forecast done by suppliers are shared with buyers (or vise

versa) and adjusted until mutual agreement is reached. Based on the agreed demand forecast, replenishment plan is prepared by the supplier. By synchronizing inter- business processes in the demand-supply relationships, CPFR brings mutual benefits -- cost reduction, efficiency increase -- to the trading partners.

EDI is the electronic interchange of the business document. EDI standards define the techniques for structuring data into the electronic message equivalents of paper-based documents. There has been a great deal of activities in establishing Electronic Data interchange (EDI) among trading partners. Wal-Mart uses EDI to implement CPFR (Darling and Semich, 1988). However, the costs to implement the system slow down the adoption of EDI communication.

Table 1. Distinguishing Intra-Business Process Reengineering from inter-Business Process Reengineering (Modified from Venkatraman, 1994)

	BPR	IBPR
Dominant Objective	Management of Interdependencies Across Functional Units	Management of Interdependencies Across Independent Companies
Primary Domain	Within a Company	Between Companies (trading partners)
Responsibility	Business managers	Alliance
IT infrastructure	Intranet based Information Systems.	Extranet, Internet-based Interorganizational System
Performance Assessment	Effectiveness of Task Arrangements.	Effectiveness of Business Arrangements; Enhance Relationship.

III. Reengineering Distribution at Heineken USA

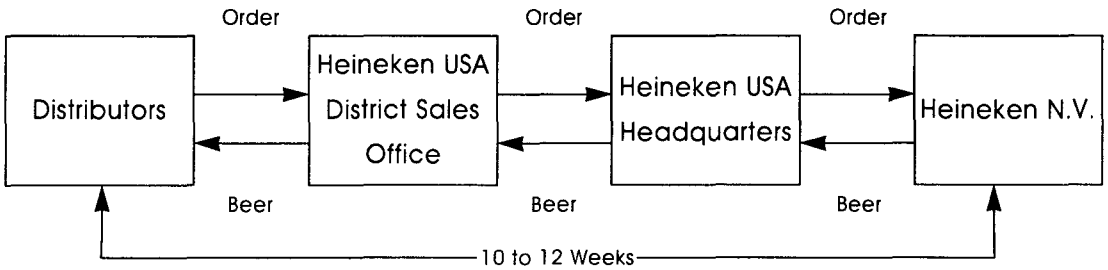
1. Old Distribution Process

Heineken USA is a subsidiary of the parent company Heineken N.V. of the Netherlands that is currently the world's second largest brewer. They began operations in January 1995. Previously, Heineken was imported to the United States through a private distributor under license. Heineken N. V. bought back the distribution rights and established a wholly owned subsidiary in White Plains N.Y. The parent company was planning a new market push in the United States (Roberts, 1999).

As recently as 1996, distributors would sit down with sales representatives from Heineken USA and plan out orders three months in advance of delivery. Trying to predict the factors that would affect the amount of product that was needed such as weather, special promotions, and local demand fluctuations that may or may not occur so far in advance was a daunting task. This time consuming effort took up to three days per month to accomplish. Once an order was agreed upon, the district sales managers would fax the orders to Heineken USA's headquarters, which in turn would forward them to the brewery in Amsterdam, the Netherlands. Lead times from order to delivery averaged 10 to 12 weeks (Weston, 1997). Figure 2 shows the old distribution process.

To facilitate the parent company's move to increase market share in the United States, Management at Heineken USA knew they had to develop a new way of doing business. They needed to find a way to reduce the lead-time between orders to delivery to their U. S. distributors. The current process was very labor intensive

Figure 2. Old Distribution Process



and involved almost no central planning.

Orders would arrive at all different times, which made it difficult to coordinate brewery production, raw materials purchase, shipment and delivery, especially when the production facility was located 3,500 miles away. Besides, there is always a chance of typing errors when order data delivered by fax or phone is entered into the system manually.

Because of the long lead-time between order and delivery, they found that responding to marketplace changes in a timely fashion was becoming increasingly difficult. As time lengthens, sales forecasts that guide the distribution planning, no longer reflect the current market condition. As Stalk emphasized in his time-based competitive strategy, longer cycle-time of the planning process could have the following unforeseen impact: "with more forecasting errors, inventory balloons and the need for the safety stocks at all levels increases" (Stalk, 1988).

Reducing inventory levels, eliminating shortages and putting a fresher product on the store shelves and in the bars were the priorities for newly formed Heineken USA. Major competitors such as Anheuser Busch were responding to consumer demands for fresher products by providing freshness label dates.

With the new marketing push, better data on product consumption and more sophisticated data analysis would be required. As it stood, a heat wave could deplete a distributors stock before a replacement order could arrive. Alternately, new local competition such as microbreweries, which in certain parts of the country were increasing at a very rapid pace, could slow demand, leaving distributors with excess product on their hands. In short, Heineken USA needed a system that would allow them to forecast, process and deliver orders much quicker than they currently were capable of.

Because of Heineken's relatively small market share in the U.S., expensive EDI (Electronic Data Interchange) system that requires direct line from the distributor to Heineken was not an option for the distributors. Management at Heineken USA soon realized that the Internet would be the key to the solution. In late 1996, Heineken USA launched its new extranet based ordering, planning, and forecasting system dubbed HOPS (Heineken Operational Planning System). The company viewed its decision as a means of strategically changing the nature of the processes between themselves and their trading partners.

2. New Distribution Process

Developed by American Software Inc., HOPS was the first example of a new kind of software to support CPFR (Collaborative Planning, Forecasting and Replenishment) (Juan, 1997). This type of software allows business partners share sales data and forecast information. The software also employs an optional Internet component called Resource Chain Voyager, which enables Heineken to deliver customized forecasting data to distributors through individual Web pages. A key feature of this program is that distributors need only Internet browser to access the program.

Heineken need not provide its distributors with proprietary software, equipment, or support, and it does not incur the high communications cost of a direct line from the distributor to Heineken.

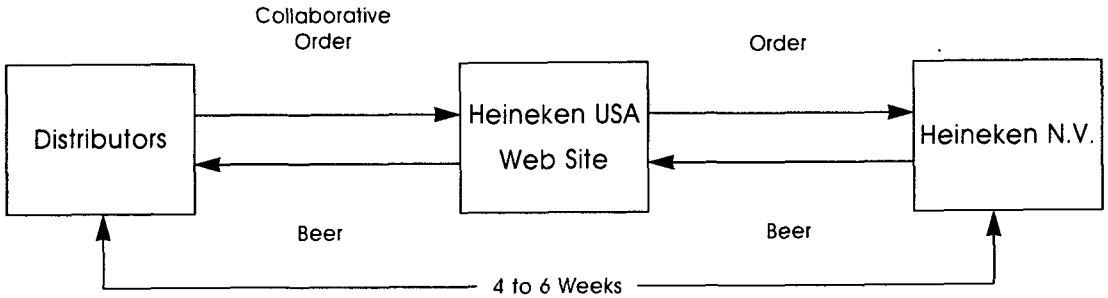
Heineken USA turned to new technology as the core component of its new business model. By the end of 1998, all 450 Heineken distributors were on line. HOPS generates order and replenishment recommendations for individual Heineken distributors based on criteria such as past sales performance, seasonal trends and geography. With this system, Heineken distributors access on a monthly basis the HOPS Web site using a standard browser and Internet connection. Once they enter their ID and password, they can review their sales forecast, modify their order if desired, and submit their order by pressing a button.

The approved forecast is processed by the Replenishment Planning module and calculates the distributors' inventory needs. A demand forecast can be created for the individual distributor on that distributor's personalized Web site. When a distributor has finalized an order, the system creates an electronic purchase order. The software captures the order and makes the information immediately available to Heineken officials for analysis.

And Heineken officials can use the software package to plan brewing and delivery schedules. Order submissions are available in real time at the Heineken brewery in Europe, which can, in turn, adjust its brewing and shipment schedules.

The distributors can use the browsers to track their beer orders from a Web site at Heineken headquarters. In addition, the HOPS system can notify distributors of promotional events, new products or production bottlenecks. The reengineered distribution process is shown in Figure 3.

Figure 3. Reengineered Distribution Process

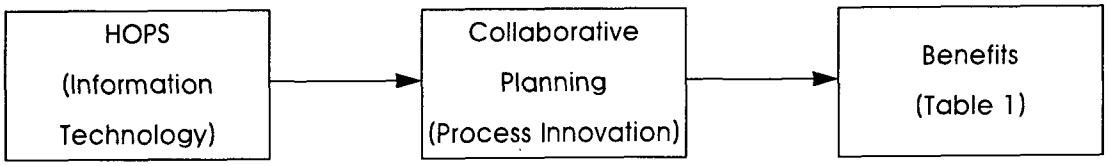


IV. Value of Reengineering Distribution

Figure 4 shows the relationship between HOPS, process reengineering and benefits of the reengineering.

According to Lacovou et al. (1995), the factors that affect the EDI adoption and its technological impact are organizational readiness, external pressures to adopt and perceived benefits. Since the HOPS are web-based, the system was easily integrated into the distributors' existing business operation as well as Heineken USA. Non-experienced personnel can operate the system very easily. The only equipment required is a PC and access to a Web browser. The external pressure also plays a major role in the adoption of HOPS. Heineken lost market leader's status to Grupo Modelo's Corona. Besides major competitors such as Anheuser Busch were responding to consumer demands for fresher products by providing freshness label dates. Improving the distribution process were priorities for newly formed

Figure 4. IT-Business Value Relationships in Heineken USA Case



Heineken USA. Since both Heineken USA and distributors parties were aware of the problems associated with the long lead-time, the perceived benefits from the system for both parties are considered to be high.

Since HOPS was introduced, lead-time on order delivery has been cut from 10 to 12 weeks to an average of 4 to 6 weeks.

Because order submissions are now available in real time, and all orders arrive at the same time, the brewery in the Netherlands can adjust purchase planning, brewing and shipment schedules accordingly. All this has been achieved despite the fact that the brewery is located 3,500 miles from Heineken USA headquarters in White Plains, N.Y. The benefits from reengineering are summarized in Table 2.

Table 2. Benefits from Process Reengineering through CPFR

	Benefits
Benefits to Supplier (Heineken U.S.A.)	Lead Time Reduction Inventory Reduction Sales Increase Error Reduction in Order Taking Relationship Improvement Organizational Learning
Benefits to Customer (Distributors)	Procurement Cost Reduction Inventory Reduction Order Planning Time Reduction Better Track on Orders

Another benefit from the system is better inventory management. Inventory has been reduced from 45 to 30 days. The collaborative process is self-regulating ? giving Heineken USA management better information about sensitive changes in the market. This enables Heineken to achieve more accurate planning throughout the entire material flow process. HOPS is a unique supply chain planning system because it allows faster and easier collaboration by leveraging the Internet as a communications medium.

Heineken's total revenues for fiscal year 1998 were over US$7.3 billion, a 10.4% increase from 1997. Net income figures were even more impressive at US$ 522 million, a 39% increase from 1997. For its part, Heineken USA has seen sales increase by 10% since the introduction of

HOPS. The CPFR suite on which HOPS is based was priced at approximately $400,000 from American Software Inc. in 1996. Resource Chain Voyager, the Internet component of the Supply Chain Planning suite was priced at $50,000 for an unlimited number of Internet users.

While the total cost of the HOPS is unknown, it paid for itself three or four time over in the first two years of operation according to Thomas Bongiovanni, Heineken USA's Director of Operations Planning.

An improved relation with distributors has also been a major benefit realized by Heineken. The new order process also allows Heineken to eliminate the district management duties of its sales staff. Staff will spend less time on ordering issues and more time working with distributors to sell beer. The sales force is actually increased without hiring an additional person.

Human error in order taking has also been eliminated as orders are now received electronically instead of via telephone or fax. As a result, three data entry positions have been eliminated.

Aside from the elimination of three data entry positions mentioned previously, Heineken USA's new business model appears to have had very little impact on the number of employees. The new model will allow employees to learn about new technology and encourage them to think creatively about new ways to do business.

Distributors as well as Heineken benefit from the reduction in procurement costs, smaller inventory, and shorter cycle times.

Distributors now are less anxious about running low on inventory during a heat wave or having excess inventory due to the opening of a new local microbrewery.

Order planning time has been cut from 3 days per month to 45 minutes. Distributors are also able to track their orders via their web page and get a much more accurate forecast of their order's arrival date.

V. Conclusion

This paper shows how business efficiency can be improved through Internet-based B2B e-commerce technology. As world's first implementer of web-based collaborative planning system, Heineken USA enjoys 50% reduction in cycle time from determining the customer need to delivery of the need. The Internet based technology also enhances relationships among business partners.

The technology enables the sales force in

Heineken USA to focus more on meeting customer needs than processing the paper work for order delivery. The benefits of the using the technology to reengineer the distribution process are strategic.

This Web-based system provides an easy and cost-saving way to link suppliers and customers. Even non-experienced personnel can operate the system very easily. One of the most important advantages is that HOPS easily integrates into the distributors existing business operation. The only equipment required is a PC and access to a Web browser. From the perspective of the distributor, this system creates a synchronous conversation where the customers and their suppliers are looking at the same data at the same time.

Heineken's new business model is not only a technological challenge but also a challenge of finding an innovative way to do business. New technologies require new organizational approaches, and have a large and durable impact on the strategies of the organization. This paper presents the management with industry's best practices on supply chain management.

Future research can be done on studying the factors that affect successful CPFR technology adoption in multiple cases. The future research can investigate the organizational, existing IT (Information Technology) infrastructure and external factors to consider for the successful adoption. That way the study can be more meaningful to provide managements with the guidelines for CPFR implementation.

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