

Supply-Chain Integration through Information Sharing:
Channel Partnership between Wal-Mart and Procter & Gamble

Michael Grean

Director, Information Technology
Customer Business Development
The Procter and Gamble Distributing Company,
655 East Millsap Road,
Fayetteville, Arkansas 72703

Michael J. Shaw

Department of Business Administration
University of Illinois at Urbana-Champaign
Champaign, IL 61820

Abstract

This paper describes the development of channel partnership between a manufacturer (Procter and Gamble, or P&G) and a retailer (Wal-Mart). Both major players in their industries, P&G and Wal-Mart found a way to leverage on information technology by sharing data across their mutual supply chains. The resulting channel has become more efficient because channel activities are better coordinated. There are reduced needs for inventories with increased sales by focusing on selling what the customers want. All in all, the supply chain between P&G and Wal-Mart has adopted a much better customer focus through the channel partnership. And it is mutually beneficial. This integration of the supply-chain information systems will become increasingly important both for enhancing business-to-business electronic commerce and for supporting the increasing volume and customization in business-to-consumer electronic commerce.

Keywords: Integrated supply chains; information sharing; CRP; channel partnership

1. Introduction

One of the major transformations in the rapidly evolving digital economy occurs in the supply chains of both traditional and e-commerce companies. Information technology has enabled channel partners to trade goods, share information, and integrate their processes, thereby reshaping the inter-organizational dynamics and resulting in more efficient channels. Electronic integration of data and the automation of business practices has driven costs down and built sales by better satisfying consumer needs.

This paper describes the development of channel partnership between a manufacturer (Procter and Gamble, or P&G) and a retailer (Wal-Mart). Both major players in their industries, P&G and Wal-Mart found a way to leverage on information technology by sharing data across their mutual supply chains (Figure 1). Because of the information partnership described in this paper, the resulting channel has become more efficient because channel activities become better coordinated. There are reduced needs for inventories with increased sales by focusing on selling what the customers want. All in all, the supply chain between P&G and Wal-Mart has adopted a much better customer focus through the channel partnership. And it is *mutually* beneficial.

The power of inter-organizational information systems (IOIS) is well known in the literature of information systems research. It has proven to be an effective tool for reducing transaction costs. But the P&G and Wal-Mart partnership has gone further. To understand the impact fully, one has to think about three progressive degrees of IOIS: transactional, operational, and strategic (Seidmann and Sundararajan, 1998). The strategic partnership is the most involved, with the greatest commitments from the partners and requiring the strongest trust. In this paper we will describe how P&G and Wal-Mart developed this partnership, the main initiatives adopted in the process, and how the two companies, who are at the same time competitors and partners, created values from the partnership. Furthermore, it is a partnership that started with sharing information, but has since permeated throughout all levels of the two organizations.

Role of Technology

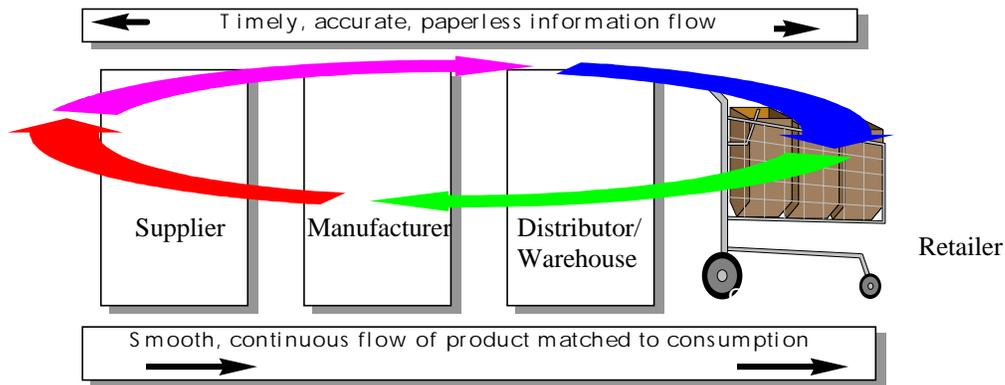


Figure 1. Role of Information Technology in Supply-Chain Integration

In retrospect, there is a strong logic associated with how P&G and Wal-Mart created values for both through the channel partnership. Yet, as described in this paper, the two companies in the beginning were both tentative. They essentially stumbled into the idea and then, as the value started to be discovered, progressively built stronger collaboration as more benefits were unleashed. The partnership started with the simple desire to improve business relationships, and was gradually enhanced by sharing information and knowledge about their respective markets. This sharing in turn enabled more effective execution of such concepts as category management, continuous replenishment, and process coordination, which collectively helped make the supply chain more efficient. Clark and McKenny (1995) detail the development of the supply-chain collaboration and describe the process in which the channel partnership between the two companies was built on an incremental basis.

The remainder of the paper is organized as the following. Section 2 presents the business background behind how the two companies started building the partnership. Section 3 discusses how P&G and Wal-Mart built channel partnership and information sharing. In Sections 4, the details of how the two companies implemented information sharing and continuous replenishment is discussed. Section 5 further describes the additional benefits of the information partnership. Section 6 discusses the logic category management. Finally, Section 7 concludes the paper.

2. Business Background

To fully comprehend the role that technology has played in the Procter & Gamble and Wal-Mart business relationship, an understanding of the business relationship prior to 1988 is needed. The business situation in 1988 between P&G and Wal-Mart was broken. The business itself was \$375 million and growing. In spite of this, the business relationship between the two companies was poor. P & G had organized itself into 12 different internal product divisions. Each division had different sales managers that would separately and independently call on Wal-Mart. These individuals were accountable for the sales results of each division and never came together to represent P&G as a whole.

At that time, the relationship between P&G and Wal-Mart was characterized as anything but collaborative. As a matter of fact, their relationship was adversarial, obsessed by day-to-day transactions. Furthermore, their business relationship was conducted through fragmented processes. The details of these problems are summarized by the following characteristics:

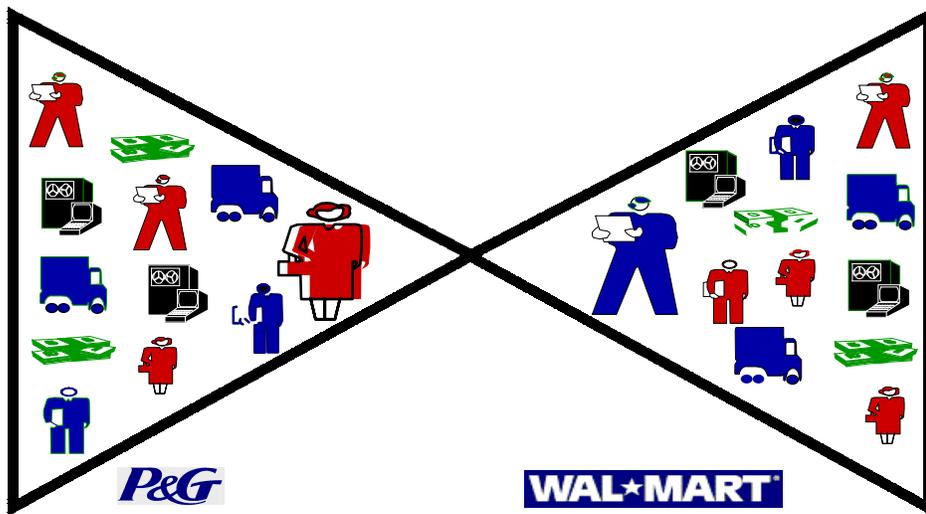
(1) Adversarial relationship. Wal-Mart did not like doing business with P&G. P&G organizations were too complicated and inflexible.

(2) Transactional focus. P&G were obsessed by day by day selling, in which success was that you got the order today - failure was that you did not. Efforts were made to push for sales irrespective of what the customer needed, or was rewarded for. There were no testing or long term planning.

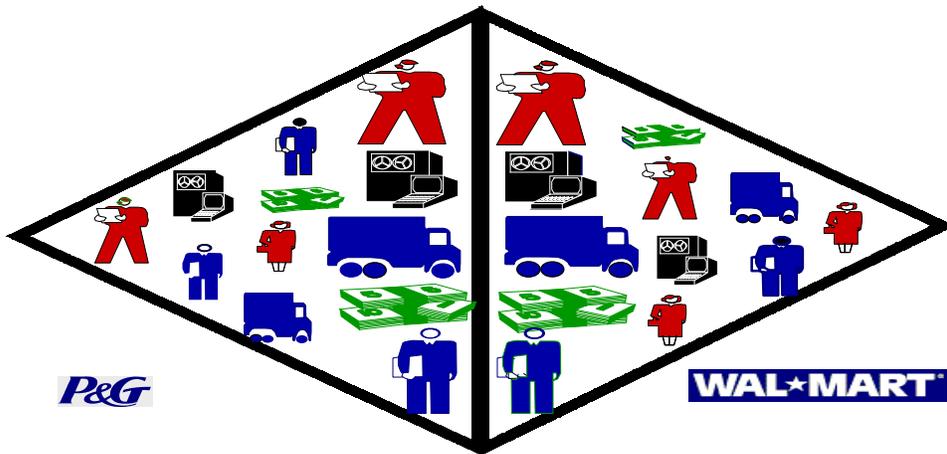
(3) Fragmented processes. Relationship and activities were managed by the buying and selling function only. The selling function within P&G was responsible for all customer activity. They were responsible for selling at the customer. The role that information systems played in the relationship was non-existent. The IT group typically got involved only after phone calls down the chain informed us that a technology project such as Electronic Data Interchange (EDI) was requested by the customer.

In 1985, Sam Walton called Procter and Gamble's CEO to inform him that Wal-Mart had awarded P&G their prestigious "Vendor of the Year" Award. The sales organization dealt with customers sent Mr. Sam's call to the corporate office resulted in him being transferred 5-6 times. Having never reached P&G's CEO, Mr. Walton decided to give the award to another vendor.

P&G began to re-think the way it approached its customers about the same time. The newly appointed Vice - President of Sales of P&G met with Sam Walton and discussed the P&G / Wal-Mart relationship. Mr. Walton indicated that it was a shame that two quality companies could not work together effectively. He shared that P&G had an extremely overcomplicated and inflexible sales organization. He stated if P&G thought of Wal-Mart stores as an extension of the P&G company, P&G would treat Wal-Mart differently. This challenge became the rallying cry for the two companies. Figure 2 (a) describes the relationship between the two companies before and after the partnership. Today, as depicted in Figure 2 (b), the two organizations collaborate on all levels in all business functions.



(a)



(b)

Figure 2. Working Relationship between P&G and Wal-Mart (a) before the Channel Partnership and (b) the Relationship Today.

Great strides have been made since the 1988 start-up of the P&G dedicated Wal-Mart team. The two companies have grown the joint businesses from \$375 Million in 1988 to over \$4 Billion dollars today. Moreover, P&G and Wal-Mart have improved the profitability of both companies by using multifunctional resources to drive out costs and improve sales. The two organizations use joint scorecards to review the joint business and make annual plans to drive

category growth for both companies. Together they use technology as a method to drive out costs, and openly share data to better understand our joint customer - the consumers. To emphasize the strong commitment to develop a mutually beneficial partnership, the P&G and Wal-Mart team developed a mission statement, which reads:

“The mission of the Wal-Mart/P&G Business team is to achieve the long-term business objectives of both companies by building a total system partnership that leads our respective companies and industries to better serve our mutual customer - the consumer.”

Technology has played a key role with Wal-Mart in three areas:

1. Joint scorecards and measurements
2. Driving out costs through automation
3. Sharing data to better understand the consumer and drive sales

3. Channel Collaboration and Information Partnership

P&G’s Corporate Reporting System was developed based on the market and geographic structure used by the 12 product divisions. All sales reports were designed so P&G could track the amount of product (e.g., laundry detergent) sold in the Western part of the country, however, they did not have a system capable of reporting total product sales by customer. A system needed to be developed to track sales by customers. Once this system was developed tracking sales by customers was possible.

P&G’s shipment data proved helpful in understanding how much business was sold to Wal-Mart. Some of the questions Wal-Mart had were:

- (1) How much of the product was sold at stores last year?
- (2) How many customers bought P&G products?
- (3) What was the profitability of these products for both P&G and Wal-Mart?

These were real questions that needed to be answered. The infrastructure that was needed to link P&G's data with Wal-Mart's data proved to be a critical step in understanding the consumer's needs. Wal-Mart was just coming online with a new data warehouse that allowed them to track sales of all products in each of their stores. P&G and Wal-Mart jointly developed a data highway that linked P&G data to Wal-Mart data driving down costs and sharing information to meet the consumer's needs.

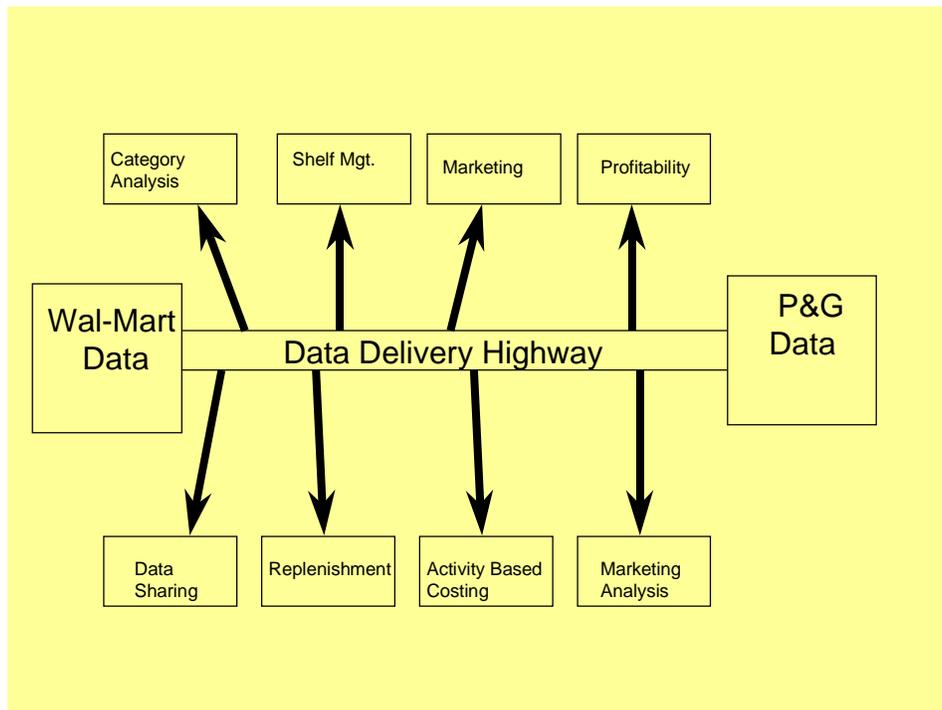


Figure 3 The Data Highway for the Manufacturing/Retailing Integration

The data highway concept (Figure 3) was straightforward, Wal-Mart had scanners in all of their stores to track, measure and analyze their business. Wal-Mart collected its own data then analyzed the results. P&G also had data about the consumer which was used to make product decisions. Why did she/he prefer a certain product or go to a certain store to buy diapers for her/his children? These insights from P&G about the consumer were combined with information regarding what was happening inside the store from Wal-Mart thus creating an information data highway.

These linkages allowed P&G to build “exit ramps” to support applications such as joint business scorecards, replenishment, EDI, customer table checking and category management. Each of these will be explained later.

A joint common scorecard was developed that reported, as described in Table 1: the sale of P&G products at Wal-Mart, margin and profit results, inventory turns, and other financial and logistics measurements. The integration of P&G and Wal-Mart data played a key role in delivering these scorecards. This common “language” allowed the partnership to focus on the end consumer and used combined data to measure joint progress.

**Wal-Mart - Procter & Gamble U.S. Business
1998-99 Scorecard**
Wal-Mart Fiscal Years - \$ Millions

	Wal-Mart FYs		
	96/97	97/98	Index
Retail Sales (W-M POS Data) Wal-Mart Stores			
Gross Margin % (W-M POS Data) Wal-Mart, Inc.			
Inventory Management (Wal-Mart Stores) Store Inventory DOH Total DOH Service Levels (% Fill) In Stock Level On-Time Delivery to Whse			
<u>Financial</u> PO/Invoice Match Rate Deduction Rolling Balance Past Due Invoice Payment Rolling Balance Customer Pick-Up Revenue			

Table 1 Wal-Mart Procter and Gamble 1998-99 Scorecard

Leveraging technology to drive costs out of the supply system is another important aspect of the information systems function. The delivery of products to the end consumer involves a series of steps including raw material delivery, conversion to a finished product, transportation to a distributor or customer distribution center, transportation to the store and placement on the store shelf. The degree to which all parties involved can drive costs out of these systems result in corresponding savings that can be passed on to the consumer in the form of lower product costs.

In order to drive down costs product information is needed to move from the retailer back through the supply system. As better consumer data flowed back from the retailer to the raw material supplier, better forecasts could be anticipated and the right material put in place for finished product manufacturing.

4. Information Sharing and Continuous Replenishment

An important strategy for managing integrated supply chains is to share information among supply-chain partners. One of the main benefits of sharing information is the reduced need for inventory. As a result, the supply chain achieves better performance in terms of financial returns, service level, and turn-around times.

With information shared among the manufacturer and the retailer, the manufacturer can use the information about the inventory level of the retailer to manage the frequency, quantity, and timing of the shipments-- instead of waiting for the retailer to place orders. This practice, referred to as continuous replenishment process (CRP), enables the manufacturer to reduce the inventory necessary and to plan the shipments more efficiently (Clark and Lee, 2000), as has been implemented by P&G and Wal-Mart.

P&G replenished Wal-Mart's inventory based on inventory data received from Wal-Mart's distribution center (DC). This data allowed P&G to manage the inventory levels to insure that P&G products were in stock at all times. P&G used their information data highway to fundamentally change the replenishment process by linking Wal-Mart's inventory data at their distribution centers and P&G's replenished inventory based on movement of product through their DC's. P&G reduced the order cycle time (amount of time from the order generation to

delivery) by 3-4 days. This process also dramatically increased inventory turns which resulted in a reduction in the inventory of the entire system.

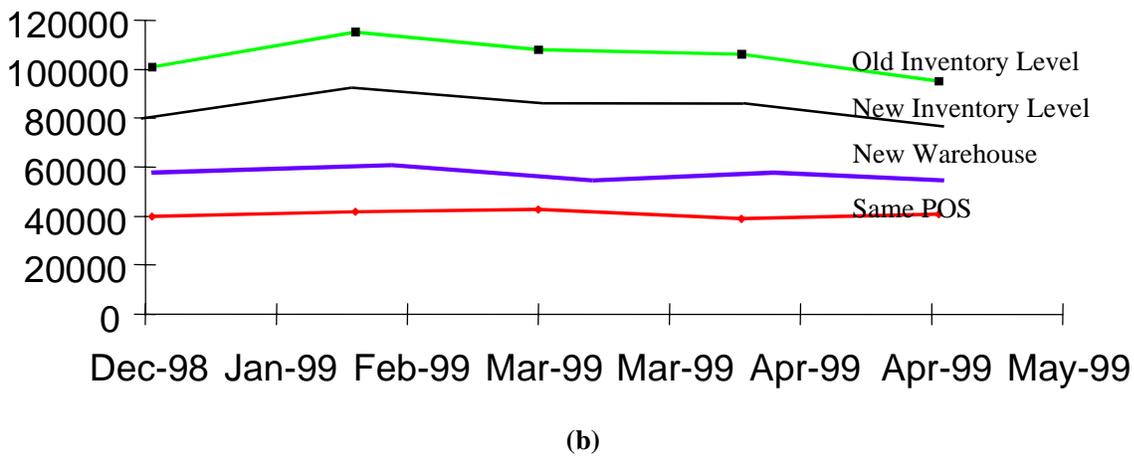
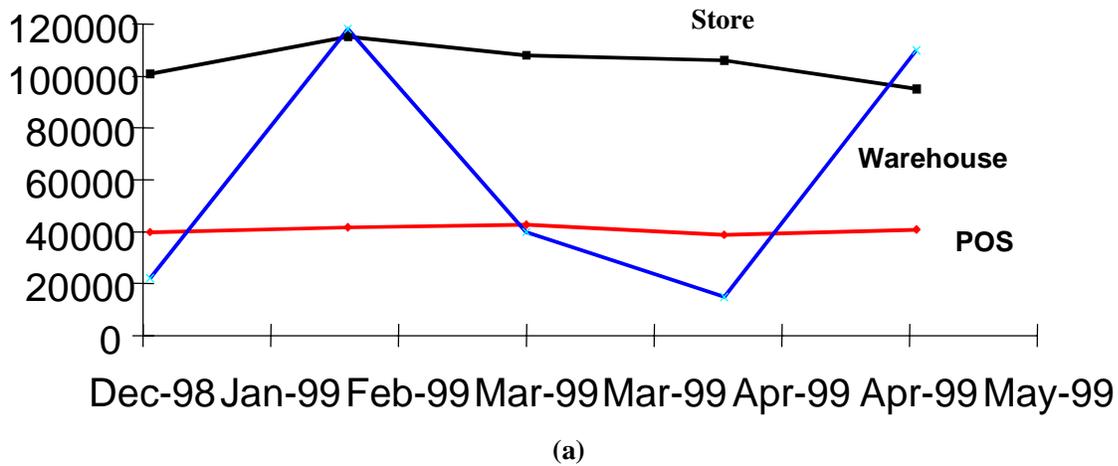


Figure 4. Inventory Levels without (a) and with Information Sharing (b).

One way to explain the benefits of information sharing and CRP is from the perspective of the so-called “bull whip effect,” that is, the small fluctuation of demands tend to be progressively amplified when moved up the supply chains. There are many reasons behind this phenomenon in a multi-stage supply chain, such as the use of safety stock at each stage, the

varying batch sizes, ordering frequency, and lead-times, and irregular behaviors like forward buying (Lee, et al., 1997). In Figure 4 (a), for example, the real demand as reflected by the POS data is relatively flat, but the inventory level at the warehouse becomes very fluctuating because of such factors as batching and order lead-times.

For the same POS data, when CRP was implemented by sharing the demand data with the manufacturer, i.e., P&G, the performance is greatly improved (as shown in Figure 4 (b)). Instead of the highly fluctuating inventory level used by the warehouse in Figure 4 (a), the warehouse inventory is much reduced. Moreover, the inventory level for the retailer is also reduced. This is due to the reduced uncertainties and shorter lead-times when CRP is used. P&G executes continuous replenishment by three pieces of information:

- (1) actual warehouse on-hand quantity,
- (2) actual warehouse on-order quantity, and
- (3) projected sales demand from the stores.

CRP has become a common practice in the retailing industry (Cachron and Fisher, 1997). Wal-Mart, for example, has demanded its suppliers to implement CRP. However, underlying the implementation of CRP as well as sharing information is the mutual trust among the partners. Also involved in the equation of information partnership is the bargaining power. Because of the possession of demand data and the customer information, the retailers increasingly have the bargaining power. As a result, they can demand their suppliers to implement CRP, thereby freeing them from having to place orders. Other than sharing the demand information, supply-chain partners have started to share other types of information as well.

The leveraging of information technology and the successful improvement of channel process efficiency have enabled Wal-Mart to reach higher financial goals. Now Wal-Mart is aiming to sell its goods so quickly that they are out of the store before Wal-Mart must pay its suppliers. That is primarily made possible by sharing information and executing CRP. The typical item from P&G currently spends less than 8 hours in a Wal-Mart warehouse. These products shipped to Wal-Mart are on the retailer's shelf within 4 hours, and are usually sold within

24 hours¹. This ability to receive payments from customers for its products before having to pay the suppliers, that is, achieving negative “cash-to-cash cycle-times” makes Wal-Mart in the same league with companies such as Amazon.com and Dell Computers as companies having the most efficient supply chains.

5. Additional Benefits of Information Sharing

The role of technology was to link the supply chain by using industry standards Electronic Data Interchange (EDI) to communicate key business documents. Purchase orders, invoices, advanced shipment notification, and financial payment are just a few examples the electronic transmission of EDI. It was critical that EDI not be used to automate poor business practices. It was imperative that we streamline the business “handoffs” then use automation to drive the process. To understand the value of simplifying the business process then applying technology, the business situation below provides a concrete example.

By 1990, P&G’s business relationship with Wal-Mart was headed in a positive direction. Joint sales were up, standard scorecards to track the business, and both companies were proud of the progress of the partnership. However, there continued to be issues in the area of accounts payable/receivable.

For example, P&G had developed a billing accuracy system that was used to measure how accurate P&G’s invoices were against Wal-Mart’s purchase orders. P&G felt that Wal-Mart’s accuracy was very good, exceeding 95%. During a meeting to discuss vendor performance, the accounts payable manager of Wal-Mart stated that P&G was one of their worst vendors with the lowest purchase order to invoice match rate. Of the purchase orders sent to Wal-Mart, 15% matched invoices. Something was wrong. All purchase orders were via EDI as were all invoices. If the invoices matched, they would be paid automatically. If they did not match, both companies manually handled them. P&G believed that 95% of the invoices were accurate, Wal-Mart believed it was 15% and deductions were at an all time high.

To address this problem P&G placed a person from their customer service organization into Wal-Mart’s accounts payable group. The person’s responsibility was to track each purchase

¹ From *The Wall Street Journal*, November 10, 1999

order/invoice combination and attempt to identify the problem. After a 3-week assessment, P&G found that they had different definitions of billing accuracy. P&G defined billing accuracy as being billed for a certain number of cases that were shipped to Wal-Mart. However, Wal-Mart defined billing accuracy as both the number of cases *and* the dollar amount of each case. For example, if P&G had a box of detergent for \$25 in their item file while Wal-Mart had the same product for \$25.05, the invoice sent did not match the purchase order! P&G also discovered that most purchase orders and invoices that did not match were due to different prices in the Wal-Mart and P&G systems. The automation through EDI only moved bad data faster and resulted in re-working both systems. The cost of the mismatch was calculated at \$50 per occurrence.

Technology played a role in identifying and correcting pricing errors. A tool was built called the Customer Table Checking Tool (Figure 5). Every Monday morning before any purchase orders were created, P&G linked into Wal-Mart's item file of P&G products and compared them to the pricing and product specifications in P&G's item file. If any of the items did not match, they were flagged as an exception and electronically corrected.

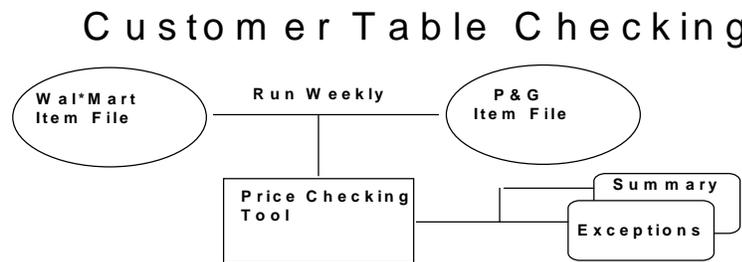


Figure 5 Customer Table Checking

As a result, P&G's purchase order-invoice match rate went from 15% to 95%. This new system has resulted in P&G moving from one of Wal-Mart's worst vendors to one of the best. The customer service organization insured the data in both systems would be correct and EDI was used to drive down costs and improve the order cycle time. This tool has been used with P&G customers worldwide.

6. Category Management

Using the design technology of data sharing allowed P&G and Wal-Mart's partnership to make better consumer based decisions. The key decisions made by the retailers include:

- What are you going to buy?
- Where are you going to put it (shelf location)?
- How are you going to price it?
- When should it be promoted?

Key questions for retailers can be answered by integrating data from three sources:

- (1) Manufacturers' market data
- (2) Retailers' internal point-of-sale systems and
- (3) Third party market data providers such as Nielsen or IRI.

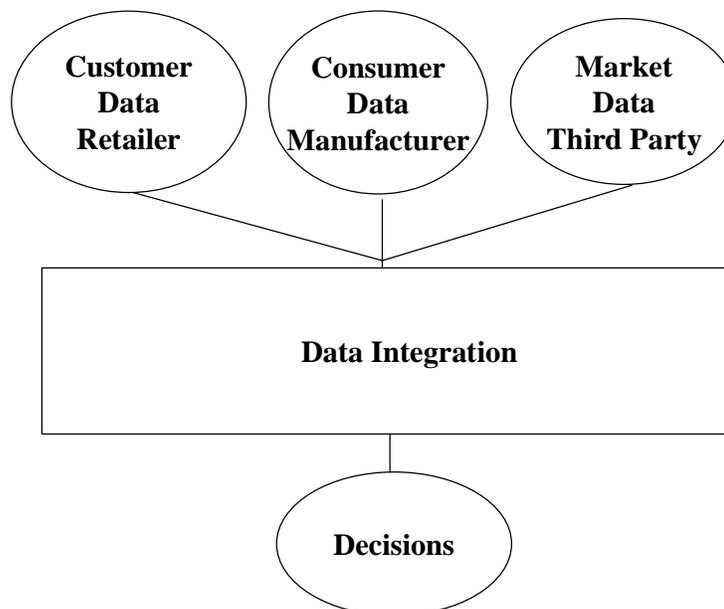


Figure 6. Category Management

Retailers point of sale (POS) data show the results of consumer's choices, thus providing the actual demand. It provides the platform resulting in information on what is selling and the selling price. It does not explain why nor does it provide insights into the market dynamics. In contrast, manufacturer's consumer data is helpful to understand why a product is being purchased. *P&G is a research and development company first.* Consumer needs are studied, products are then developed and manufactured to meet those needs. P&G studies consumer trends and understanding these trends provide insights that the retailer itself does not have. Finally, third party data providers help explain the market dynamics of a product. It provides insight into consumer trends and provides a perspective on growing consumer needs. Should a retailer be pleased with a 10% increase in sales vs. last year on a particular category? If his competition is indexing at 5% the answer is yes, if the competition is indexing an increase at 18% then the buyer is losing share in a growing category. This information is valuable in determining the markets key items not carried in their stores.

The key is the *integration* of these three data sources for making decisions, as shown in Figure 6. An integrated manufacturer/retailer database should be used to share common data scorecards and allow for quick analysis by all parties.

Each business application between a manufacturer and a retailer should be agreed upon early if it is proprietary between the two companies or if it can be shared with other customers/suppliers. Wal-Mart, for example, now has a strategy to share data with their vendor partners. A tool has been developed called "Retail Link" that links Wal-Mart's data with their key vendor partners and carriers. P&G has re-applied their customer replenishment systems and the Customer Table Checking Tool to other customers. It is critical for both companies to come to a common point of view on the expansion of these systems. Ideally, most of the electronic linkages between manufacturers and retailers will be similar to the EDI standards that are in place today.

Wal-Mart has in its possession customer data that is greater in volume than the database of Internal Revenue Service (the U.S. Federal Government's tax agency). When this vast set of data is shared, what is in great need is to use data mining techniques to develop actionable decision rules. For instance, P&G and Wal-Mart have shown that simply by eliminating losers

from the shelf and add more winners, the two companies can both be better off. For example, after a study of the sales data, P&G recommended to Wal-Mart to eliminate 56 items that were not sold well based on Wal-Mart's POS data. What is more, using its market data, P&G also recommended 25 products that were market winners. This simple decision based on data shared among the two companies increased the sales by 32.5%.

Technology continues to play a role between manufacturers and suppliers. On the supply side, they have moved from EDI purchase orders and invoices to looking at *Collaborative Planning Forecasting and Replenishment* (CPFR). This industry model provides a platform for the collaboration of a joint forecast between manufacturers and suppliers that will ultimately drive the replenishment process through the entire supply chain. This may eventually lead to the elimination of purchase orders and invoices as we know them today.

Second, watch for industry standard approaches to share the demand side data similar to the standards they have in place today for EDI. Developing an industry based approach for sharing point of sale data, market data, and consumer data for joint decision making will be a key to success. In addition, driving key third party data providers such as Nielson and IRI to provide quality data in agreed to Industry standard hierarchies will lead to better integration between joint buyer/seller workstations. The Internet will provide the technical platform to exchange information between manufacturers, retailers and third party data providers.

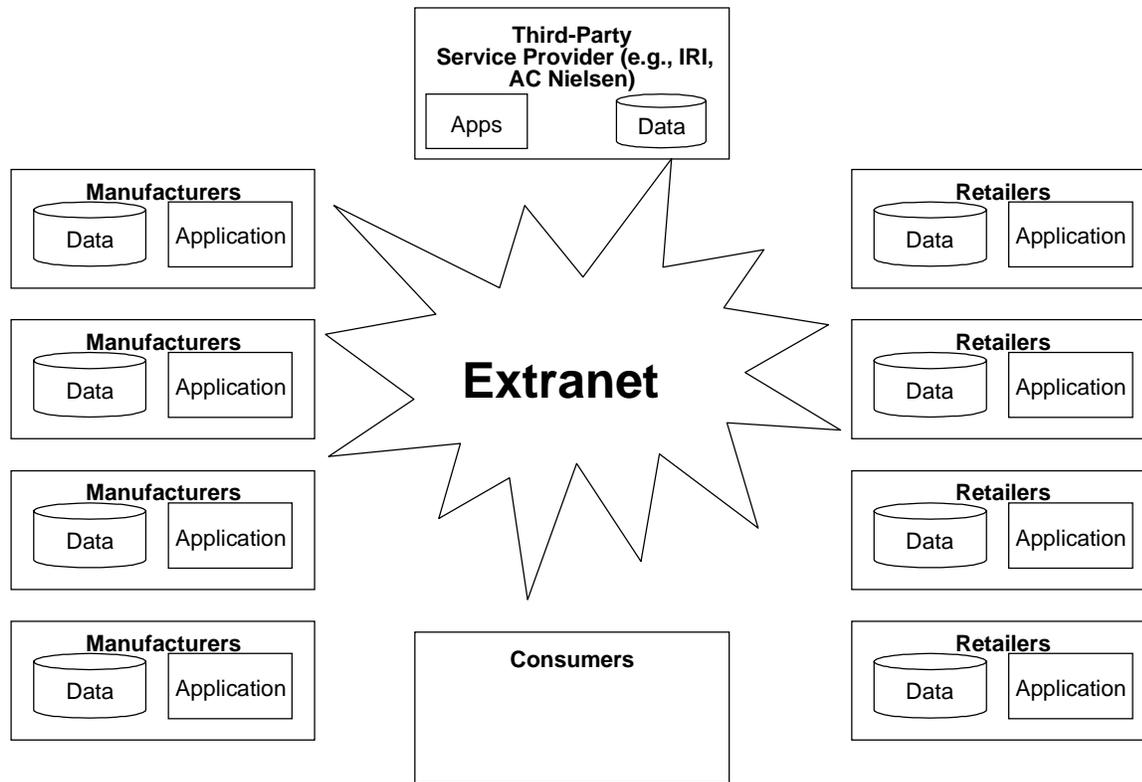


Figure 7 The Use of Extranet in the Supply Chain

7. Summary

Looking back over the ten-year period between Wal-Mart and P&G, information technology has created a common language, driven down costs, and provided an avenue for increased sales for the P&G and Wal-Mart partnership. Several key lessons learned are summarized in the following for understanding the role that Information Technology can play in the manufacturer / supplier relationship:

- 1) Use Information Technology Resources: Information Technology (IT) resources can play a big role in the business. IT can provide technology solutions to link suppliers and retailers. Ensure proper staffing of these resources to drive volume and reduce cost.
- 2) Teach them the business: Take time to train your IT about the business. The days of the business ignorant programmers are fading. IT professionals have to know the business perspectives.
- 3) Focus on the consumer: Use data and technology to understand better the consumer's needs. When a debate about approaches occur, ask yourself the question "What is right for the consumer, what are her/his needs?". This will help you approach the problem differently.
- 4) Data can be information: Retailer data is typically used for quick decision support, P&G data is used for analytic decision support. When merged, this data create tremendous gains for both companies. Information Technology can also be used to sift through large amounts of data and provide exceptions or out of range business parameters. Using IT to identify key outages such as low sales on a fast moving item, out of stock on a key sku etc, will provide powerful business solutions for both companies.
- 5) Employ Industry standards: Driving towards common methods of communicating business transactions and data sharing reduces cost for the entire supply chain. Just as we have standardized logistics such as pallet size, truck dimensions from a supply chain perspective, automating business transactions will also drive down costs of the manufacturer/supplier relationship.

- 6) Commitment to Information Sharing: Sharing point of sales data. Market data, and consumer data among channel partners for joint decision making is a key to the success of the integrated supply chains.

References

- (1) Cachon, G., and Fisher, M., “Cambell Soup’s Continuous Replenishment Program: Evaluation and Enhanced Inventory Decision Rules,” *Production and Operation Management*, 6, 3, Fall, 1997, 266-276.
- (2) Clark, T. H. and Lee, H. G., “Performance, Interdependence, and Coordination in Business-to-Business Electronic Commerce and Supply-Chain Management,” *Information Technology and Management*, 1, 2000, 85-105.
- (3) Clark, T. H. and McKenny, J. L., Procter&Gamble: Improving Consumer Value through Process Redesign, HBS Case #9-195-126, Harvard Business School, Boston, MA, 1995.
- (4) Lee, H., Padmanabhan, P., and Whang, S., “Information Distortion in a Supply Chain: The Bull Whip Effect,” *Management Science*, 43, 1997b, 546-58.
- (5) Seidmann, A. and Sundararajan, A., “Sharing Logistics Information Across Organizations: Technology, Competition, and Contracting,” in *Information Technology and Industrial Competitiveness*, C. Kemerer (Ed.), Kluwer Academic Publishers, 1998.

Michael Grean is Director of Information Technology in the Customer Business Development department at the Procter and Gamble Distributing Company located in Fayetteville, Arkansas. He heads the IT group working with Wal-Mart, and wherever there is a Wal-Mart store, on developing the information partnership described in this paper.

Michael J. Shaw is a Professor of Business Administration and Director of the Center for Information Systems and Technology Management at the University of Illinois at Urbana-Champaign. He is also a Senior Research Scientist for the National Center for Supercomputing Applications (NCSA), and is a Professor at the Beckman Institute for Advanced Science and Technology. Shaw is on the editorial boards of eight academic journals and he has published over sixty refereed scholarly papers in journals such as *Management Science*, *Information Systems Research*, *INFORMS Journal on Computing*, *Communications of the ACM*, *IEEE Internet Computing*, *IIE Transactions*, and *Decision Support Systems*. He is the lead editor of the recently published *Handbook on Electronic Commerce*.