604-023-1

ICMR Center for Management Research

Operations at Whirlpool

*This case was written by **Pillai P** and **Regani S**, under the direction of **Dutta S**, ICMR Center for Management Research (ICMR). It was compiled from published sources, and is intended to be used as a basis for class discussion rather than to illustrate either effective or ineffective handling of a management situation.*

ICMR, Plot # 49, Nagarjuna Hills, Hyderabad 500 082, India

Email: info@icmrindia.org.

www.icmrindia.org

case centre

Distributed by The Case Centre
www.thecasecentre.org

North America
t +1 781 239 5884
f +1 781 239 5885
e info.usa@thecasecentre.org

Rest of the world
t +44 (0)1234 750903
f +44 (0)1234 751125
e info@thecasecentre.org

Operations at Whirlpool

"Logistics is the most challenging of all business processes due to its extreme cross-functional nature and this challenge increases exponentially in a global environment."

-J. Paul Dittmannn, Vice-President, Whirlpool in 1997[1].

"We want to get the right product to the customer when they expect it. While that is a simple set of outcomes, it is an incredibly complex set of activities that have to be orchestrated all the way to our suppliers."

-Reuben Slone, Vice-President of Supply Chain, Whirlpool in 2003[2].

INTRODUCTION

Whirlpool Corporation (Whirlpool) was the world's leading manufacturer and marketer of home appliances in the 1990s and 2000s. (Refer to Exhibit-I on the major appliance manufacturers in the world). It led the appliance market in the United States and South America and was among the top three manufacturers in Europe. (Refer to Exhibit-II on the appliance industry in the US). It was also the largest western appliance manufacturer in Asia. The company was the leading manufacturer of refrigerators, microwave ovens, washers, dryers and air conditioners, and marketed its products under the names Kenmore, Sears, KitchenAid, Roper, Inglis and Speed Queen, in addition to the brand name 'Whirlpool'. (Refer to Exhibit-III for Whirlpool's brands and products).

As a manufacturing company, Whirlpool placed considerable emphasis on operational efficiency. The company began restructuring its operations in the early-1990s to orient itself to changing market conditions. As a part of its operational restructuring, the company set up several cross-functional teams for key product areas, entered into several agreements with its suppliers based on their reliability and their ability to assist in product design and began using Electronic Data Interchange (EDI)[3] to communicate with its suppliers. Almost all the Whirlpool stores around the world were linked with e-business software. The software linked each of its factories and sales operations with suppliers and key-retail partners.

Whirlpool's Vice-President, Paul J. Dittmann (Dittmann), remarked in the late-1990s that at Whirlpool, logistics did not start with the distribution of a finished product but was a true supply chain strategy, which encompassed materials flow into and through the manufacturing process. The company's supply chain executives charted the vision, "Winning companies will be those who come the closest to achieving an inter-enterprise pull system. They will be linked in a short cycle response mode to the customer."[4]

---

1 Jean V. Murphy, *Leveraging Big "L" Logistics across Whirlpool's Global Supply Chain*, www.supplychainbrain.com, February 1997.

2 www.appliance magazine.com, April 2003.

3 Electronic data interchange (EDI) is the electronic transfer of business transaction information in a standard format between business partners. EDI offers businesses the opportunity to retrieve information electronically from their internal systems and to forward that information to trade partners/suppliers/customers/government through a communications network.

4 www.ursuline.edu

As a result of these initiatives, by the early 2000s, Whirlpool had product availability in the range of 90 to 95 per cent, inventories were reduced by 15 to 20 per cent and lead times became as low as five days.

BACKGROUND

Whirlpool was founded in 1911 by three brothers - Frederick, Louis and Emory Upton. Their company, then called Upton Machine Corporation (Upton), was set up at St. Josephs, Michigan, USA. The company produced electric motor-driven wringer washers.[5] The company got its first major order for 100 washers from Federal Electric.[6] However, when the machines were put to work, there was a recurring problem — a cast-iron gear in them failed to work. The company's General Manager, Louis Upton, agreed to repair all the gears free of cost, although he could not afford it then. Impressed with the company's business ethics, Federal Electric not only agreed to repair the machines themselves, but also ordered an additional 100 washers.

In 1916, Upton entered into a business partnership with Sears, Roebuck and Co **(**Sears)[7] under which Sears marketed the washers manufactured by Upton under the brand name 'Allen'. Sears sold two models of washers — one for $54.75 and another deluxe model for $95. The partnership was a huge success and the washers were sold out faster than Upton could manufacture them.

By 1925, Upton had become an exclusive supplier for Sears electric and gasoline powered washing machines. In 1929, Upton merged with Nineteen Hundred Corp. (Nineteen Hundred) of New York, USA. By 1936, Nineteen Hundred began entering global markets, and sold its washers in Europe and Asia.

In 1948, Nineteen Hundred marketed an automatic washer under the Whirlpool brand. With this, the company had a dual distribution — one line of products marketed by Sears and the other by Nineteen Hundred. In 1950, Nineteen Hundred officially changed its name to Whirlpool. Whirlpool expanded its product range to include automatic dryers, refrigerators and air-conditioners. To keep pace with the immense competition it faced, Whirlpool decided to spread its manufacturing facilities around the globe. It acquired a spare parts facility in LaPorte (Indiana), a refrigeration plant in Evansville (Indiana) and a dryer production plant in Marion (Ohio). In 1951, it merged with Clyde Porcelain Steel Company (Ohio) to create the world's largest washer manufacturing unit.

The Appliance Buyers Credit Corporation (which was later known as Whirlpool Financial Corporation) was set up by Whirlpool in 1957 to provide credit to customers who wanted to buy the appliances (these services were eventually discontinued by 1997). In 1958, it invested in Brasmotor S.A.[8], for an equity stake in the Brazilian appliance market.

---

5 "Wringer washers" were the forerunners of washing machines. They had a tub for washing the clothes and a double roller arrangement above the tub to wring out the wet clothes as there was no "spin drying" in those days.

6 One of the member companies of the Federal Group, which comprised six companies. Federal Electric, the biggest company of the group, is a leading company in manufacturing Low Voltage Switch Gear.

7 Established in Minneapolis in 1886, Sears operated 863 mall-based retail stores and an additional 1,200 retail locations including hardware, outlet, tire and battery stores as well as independently owned stores, primarily in smaller and rural markets by 2000. The company's services operations include product installation and repair services; service contracts; selected installed home improvements; and direct response.

8 Founded in 1945, Brasmotor made washers, dryers, microwaves, dishwashers, refrigerators and air-purifiers under different brand names. It sells worldwide and has facilities in Brazil, China, Italy and Slovakia.

By the mid-1960s, Whirlpool had become one of the well-established brands in North America. In the 1970s, the company established Cool Line (later known as Customer Interaction Center), the first toll-free consumer service support line, through which the customers had direct 24-hour access to the company. During the same period, Whirlpool acquired the Ft. Smith[9] refrigeration plants in Arkansas, as well as an equity interest in the Canadian appliance manufacturer, Inglis Ltd. In 1968, the company's annual revenues touched $1 billion for the first time.

In the 1980s, Whirlpool expanded into markets in Europe, Mexico, India, Canada, China, South Africa, Argentina, and Brazil. In 1987, Whirlpool and Sundaram-Clayton of India formed TVS Whirlpool Limited to make compact washers for the Indian market (Whirlpool Corporation acquired majority ownership in 1994). Later, the company built a manufacturing plant in Pondicherry, India. In 1989, Whirlpool and N.V. Philips[10] of the Netherlands formed a joint venture called Whirlpool Europe B.V., to manufacture and market appliances in Europe. Whirlpool became the sole owner of the venture two years later.

The acquisitions helped Whirlpool gain access to markets around the world. The company hoped that the acquisitions would give it the resources and scale to compete in global markets. It realized that it could obtain a major competitive advantage by leveraging on its global reach. Whirlpool aimed at integrating all its regional subsidiaries through its common systems, thus speeding up its product development, making purchases cost-effective and improving the manufacturing process as a whole.

In 1993, Whirlpool won the $30 million Super Efficient Refrigerator Program (SERP) challenge.[11] The Whirlpool SERP refrigerator had better energy efficiency levels than any other refrigerator in the market.

By the 2000s, Whirlpool had become a well-established brand in the world-wide appliance market. The company remained the principal supplier of major home appliances to Sears under the Kenmore brand name. Due to the large number of joint ventures it entered into, Whirlpool also sold appliances under other brand names like KitchenAid, Roper, Inglis, Acros and Crolls in North America; Supermatic, Brastemp, Consul, Embraco, Eslabon de Lujo, and Semer in Latin America; Bauknecht, Ignis, and Laden in Europe and Asia; and KIC in South Africa**.**

In September 2002, Whirlpool decided to make use of e-commerce to improve its services and launched a program called e-Partner that allowed customers to purchase products online. The program provided customers with information on pricing, product specifications, product availability, delivery and installation, on its website (Refer to Exhibit-IV to know about Whirlpool's performance in 2002).

By 2003, Whirlpool had an annual sales of $10.3 billion, 65,000 employees, and nearly 50 manufacturing and technology research centers around the globe. It sold its products in 170 countries across the globe but most of its sales (almost 60 percent) came from North America.

OPERATIONS AT WHIRLPOOL

Whirlpool's operations were based on Six-Sigma,[12] and lean manufacturing skills and capabilities. The company used information technology tools to cut down on the cost of doing business. Its unique global platform helped it transfer its key innovations and processes across regions and brands.

---

9 A refrigeration and electrical supplier company.

10 Based in the Netherlands, it is a developer and manufacturer of electronic and electrical products.

11 The Super-Efficient Refrigerator Program is a challenge to appliance manufacturers to use advanced technology while maintaining quality, performance, features and conveniences that consumers expect, at an acceptable rate. In March/April 1993, The SERP project named Frigidaire Co. and Whirlpool Corp. as the two finalists to compete in the much publicized $30 million race to manufacture a fridge of the future, a chlorofluorocarbon-free "super-efficient" model.

12 A quality measure and improvement program developed at Motorola. It includes identifying factors critical to quality as determined by the customer, reducing process variation and improving capabilities, increasing stability and designing systems to support the six sigma goal of reducing defects to 3.4 defects per million items.

Globalization of Key Functions

During the mid-1990s, Whirlpool carried out a massive restructuring and reorganizing exercise to create a more responsive environment to work in. In this process, it globalized some of its key functions including procurement and product development.

Whirlpool's procurement was one of the first functions to go global. As the company was spread across the globe, suppliers found it a very attractive customer. Whirlpool's Global Procurement department entered into deals with suppliers around the world and ensured that it used only high-quality, low-cost materials and components while manufacturing its home appliances. By selecting and partnering with the best suppliers globally, it tried to deliver the best value to its customers. Further, a partnership with Whirlpool benefited the suppliers as it gave them an opportunity to sell globally.

Whirlpool also globalized its product development and this allowed it to transfer consumer solutions from one part of the world to another. Jeff Fettig, Whirlpool's president and COO, said Whirlpool's global product development structure helped it to rapidly transfer innovative consumer solutions from one part of the world to another. Whirlpool based all its manufacturing processes on a common global platform. The basic structure of the product (it did not vary much across different regions) was designed on these platforms. Later, this basic structure was sent to different regions and was customized as per individual and global requirements.

Global product development ensured that the needs of customers in diverse markets were met. By transferring technology and knowledge around the globe, market needs were met more easily. Earlier, there were multiple platforms for every product category, little feature leverage, multiple technologies with wide performance variations, considerable technical resources to keep all these platforms going, and long and costly product development. Global product development cut the engineering costs and provided better performance and more of the features that were desired by the customers.

'Push' and 'Pull' Manufacturing

Until the early-1990s, Whirlpool followed a 'push' manufacturing strategy. In this strategy, the company produced as much inventory as possible and then sent the inventory to the distribution channels. Using this system allowed all plants to operate at their full capacity. However, it also led to a periodic oversupply at the distribution channels. Further in the 'push' system, the production schedule was pre-designed on a weekly basis so if any non-standard orders were received, it took four weeks to fulfill them.

In 1992, Dittman was given the responsibility of restructuring Whirlpool's logistics in North America. This restructuring was initiated to eliminate the problems of unavailability of products, to improve efficiency and cut the inventory stocked to half. Dittmann's team consisted of members from manufacturing, sales, procurement, accounting and material management. The team recommended the adoption of the 'pull' system.

The 'pull' system was adopted by Whirlpool in 1997. In the 'pull' manufacturing system, factory production was based on actual customer demand. In this process, orders received were immediately sent to the plant and a highly optimized production scheduling process fulfilled them. Production time was reduced significantly and the response time for customer orders fell drastically from four weeks to five days. By compressing the cycle time, Whirlpool not only reduced the time between order and supply but also predicted demand more accurately (Refer to Exhibit-V for a diagram of 'push' and 'pull' manufacturing systems).

Whirlpool also modified its production planning to adapt itself to the new 'pull' strategy. Whirlpool's production planning was earlier based on a statistical application called Distributed Resource Planning (DRP), which generated 52 weeks of unlimited resources for production. But in order to implement the 'pull' system, it modified its DRP to develop an application called Reality

Applied to Distributed Resource Planning (RAD). RAD was implemented using a technology called ILOG Solver,[13] which helped Whirlpool optimize its production planning based on the 'pull' manufacturing systems. Using this technology, appliances were built based on customer demand. Further, this technology helped Whirlpool to drastically reduce production costs and inventories of finished goods. The RAD system helped the company assign production priorities accurately.

According to Whirlpool, though the company wanted the 'pull' concept to be implemented, some of their partners and sales channels were more comfortable with the 'push' system. So, it developed a system that could provide the features of both. Eventually after a few months of its implementation, the 'pull' concept was modified to bring in a 'hybrid push/pull' concept,[14] which had the combined attributes of the 'push' concept and the 'pull' concept.

E- Initiatives

Whirlpool also introduced a number of electronic initiatives to improve its operations.

Inventory Management

In the late 1990s, Whirlpool used a forecasting package that predicted the nature of forecasting errors (assuming that errors were made in every forecast), in every location and Stock Keeping Unit (SKU).[15] The package helped the company "intelligently set its inventory levels."[16] Earlier, its demand forecasting package assigned equal inventory to every location. Dittmann said about their demand detecting system, "Our past approach was just a peanut butter spread where everybody got about a month and a half of inventory, or whatever the number would be. Now we think we have found a way to provide much greater granularity to that process, which would be a real breakthrough in reducing inventory."[17] Whirlpool's error forecasting process met with unprecedented success not only in North America but also across the globe. Prior to the plan, Argentina's warehouses stocked about 30 days of supply, but after the plan was implemented, they cut down their cycle times and inventory levels by a huge margin.

EDI

By early 1999, Whirlpool adopted EDI to enhance the efficiency of its supply-chain further and cut down on its expenses. It launched a scheme called Easy EDI, using which the company and its 600 suppliers could reduce paper work. This was done by using computer to computer, or electronic interface for the transfer of all documents. EDI was used for all major activities related to suppliers, including ordering, inventory and shipment confirmation and payment.

David Tibbitts, manager of strategy and planning in global procurement at Whirlpool, said Easy EDI was aimed at achieving two benefits — eliminate the paper work of Whirlpool's 300 smaller suppliers, and save Whirlpool up to $600,000 a year in operational costs for its data interchange. The project was carried out in stages. In January 1999, four small and medium sized suppliers began using the system. In March 1999, 26 more small and midsize suppliers were added, and finally, by the end of the year, the number of small suppliers transacting online rose to 300. From early 2000, the company started offering the service to 300 of its largest suppliers.

---

[13] ILOG is the world's leading provider of advanced software components for graphics and resource optimization. The company was founded in 1987 and operates in seven countries.

[14] In a hybrid push/pull system, the system is operated in a 'push' type fashion that uses forecasts for the initial period and then in a 'pull' type fashion that uses replenishment level for the remaining period.

[15] The unit of measure in which an item is stocked is referred to as stock keeping unit (SKU).

[16] Jean V. Murphy, Leveraging big "L" logistics across Whirlpool's global supply chain, www.supplychainbrain.com, February 1997.

[17] Jean V. Murphy, *Leveraging big "L" logistics across Whirlpool's global supply chain*, www.supplychainbrain.com, February 1997.

Online Shopping

Whirlpool's strategic plan in the early 2000s was to develop its electronic supply chain initiatives, set up an electronically-enabled organizational initiative and develop Internet enabled home appliances. In September 2002, Whirlpool launched a program to reduce the gap between the company and its retailers. The program was called the e-Partner Online Sales Program (The program was first conceptualized in 1996 when Whirlpool began helping dealers build their own web pages).

As a part of the program, Whirlpool launched a full online research and shopping site. To use e-Partners, prospective appliance buyers logged on to Whirlpool's site, which featured a brand comparison engine. If the customer found a washing machine he liked, Whirlpool offered the retail price and provided other product details. The buyer was then referred to a dealer locator link that sorted retailers by ZIP code. On clicking the link, the consumer was led to a Web page with retailers' names and addresses.

The program then took the customer to a store web site wrapped inside a navigation bar. The customer could then go over details such as the dealer's price for the product, prices for extended warranties and delivery costs. If the prospective buyer decided to go to a store to buy the product, he could print a specification sheet for the washing machine, including price and product details. But if the consumer decided to buy online, he could get an online shopping cart, complete the purchase and arrange for shipping and warranties.

The company also developed a site called WhirlpoolWebWorld.com, which was a doorway for all its partners, vendors, trade suppliers and sales agents. The site was aimed at setting up a Business-to-business link. WhirlpoolWebWorld procurement let Whirlpool purchase all the items it required through a common online catalog from its suppliers. It also enabled all its retailers around the world to order from Whirlpool.

Demand management

Whirlpool also wanted to improve its demand management system. Earlier, it used old techniques like spreadsheets and home grown systems to determine demand. But those systems could not accurately manage the various inputs and consumer variables. After a careful review, the management decided to use the i2[18] Demand Planner to track demand in 1997. Whirlpool implemented the Demand Planner in North America, Australia and Europe. The technology helped Whirlpool in its forecasting. With the help of the database, it could determine the overall needs of the market, the number of repair parts to order and also prepare product forecasts.

J. B. Hoyt (Hoyt), Whirlpool's Director of Global Logistics Integration, said, "Demand Planner is not just helping us to forecast demand, but to manage the inputs we receive from specific customers. Then we can build an aggregate forecast in a way that assures that we are building the right product at the right time to meet all our customers' needs."[19] The implementation of the Demand Planner provided significant benefits to the company. Whirlpool's business in Australia doubled after it began implementing the Demand Planner. At the same time, customer service improved by 10 percent and product availability improved from less than 60 percent to more than 70 percent.

---

[18] i2, a leading supply chain optimization company, utilizes a radical process methodology to help companies deal with the variability that comes from the gap between managing supply and demand. This methodology combines integrated planning and execution to allow customers to integrate disparate planning systems with workflow management systems to optimize their businesses performance in real time.

[19] www.i2.com

Move Towards Outsourcing

Until early 2000, Whirlpool was apprehensive about outsourcing although other companies were shifting their logistics to third parties at that time. Until then, Whirlpool's warehousing and domestic freight were divided into three parts. The first two parts, shifting the raw materials and components into assembly plants and transporting the finished goods to trading partners and distribution centers, was managed by Ryder Logistics. The third part, known as Quality Express, included the management of eight regional distribution centers of Whirlpool and a network of approximately 60 cross docks across the USA. Till 1998, the responsibility of Quality Express was divided between two parties — ERX, managed six of the eight regional Distribution Centers; the remaining two, in Atlanta and Orlando, were managed by Kenco Logistics Services (KLS). Transportation to and from the regional distribution centers was handled by Whirlpool's private fleet.

But by early 2000, the company decided to revamp its entire distribution strategy. It decided to have its private fleet managed by a third party. Steve Whalen (Whalen), director of supply chain operations at Whirlpool, said, "Our bid included the desire to get trucks and trailers off our books." Whirlpool also decided to consolidate its warehouse operations and outsource it to Penske Logistics of Green Hills, Pennsylvania (Penske).

In 2000, Penske took over the Quality Express network. It purchased ERX, and subcontracted the Atlanta and Orlando operations from KLS, which had managed the distribution centers till then. Whirlpool had developed a software for hand-held personal data assistants,[20] using which it collected proof of delivery and information on product damage. This technology was also handed over to Penske. Penske, in return, made several contributions to Quality Express including a logistics management system (LMS) to track shipments at the order level on a real-time basis and a route optimization system known as 'Route Assist and communications software.'

The agreement with Penske brought several benefits to Whirlpool. Whirlpool concentrated on the manufacture of white goods, while Penske's Quality Express network took care of the logistics. Whalen said Whirlpool's customers were very demanding about on-time delivery and the quality of installation services. Towards this end, Whirlpool started a new website in 2001 that tracked real-time information on customer orders. The company hoped this initiative would reduce the number of phone queries it received and improve customer service.

CONCLUSION

By 2003, after more than a decade in logistics planning, Whirlpool's supply chain was 50-60 percent complete. Although the company ensured that it consistently improved its quality levels and reduced its cycle time and costs, there was still a lot of scope for improvement. Selling its products on a global platform was a very difficult and challenging task. Its warehouses had to get faster, its transportation carriers had to reduce transit time, factories had to change schedules faster and run with smaller lot sizes so that they could produce several SKUs every day. And for this, it realized that its entire supply chain had to be made more flexible.

In order to maintain quality in its logistics process, Whirlpool used the Malcolm Baldridge Award Quality Criteria.[21] The efficiency of the entire process was measured in terms of the quality, cost and cycle time. Whirlpool constantly tried to update and adapt to the latest best practices, ideas and

[20] Personal Digital Assistants (PDAs) are portable computers that are designed to act as organizers, note takers and/or communication devices. Due to the small physical size of these devices they often possess the latest and most compact user interfaces such as touch screens, hand writing recognition, or miniature keyboards.

[21] Established in 1987, and considered as America's highest honor for performance excellence, the Baldridge Award is presented annually to U.S. organizations by the President of the United States. Awards are given in manufacturing, service, small business, and, starting in 1999, education and health care. In conjunction with the private sector, the National Institute of Standards and Technology designs and manages the award and the Baldridge National Quality Program.

innovations. The restructured operations yielded considerable benefits to Whirlpool. Hoyt said, "We're seeing reductions in finished goods inventory and improvement in our ability to respond to customers. This has already led to a $4.8 million reduction in standing inventory in Australia alone over just seven months. Our benefits in North America have been substantially greater – in the double-digit millions of dollars in inventory savings."[22]

QUESTIONS FOR DISCUSSION:

1. Whirlpool launched several initiatives in operations management in the 1990s and early 2000s, as a result of which, by the early-2000s, its product availability, inventory and lead times improved. Give a brief description of operations at Whirlpool. Critically discuss the initiatives.
2. Whirlpool launched several e-initiatives to sort its operations. How far did these initiatives contribute to the success of Whirlpool? Also discuss the importance of integrating e-initiatives with other organizational processes.
3. Whirlpool changed its manufacturing from 'push' to 'pull'. What are the relative merits and demerits of the push and pull manufacturing strategies? Also discuss Whirlpool's outsourcing initiatives.

[22] www.i2.com

Exhibit I

Major Home Appliance Companies (In 2002)

Global Players	Whirlpool, General Electric (U.S.); AB Electrolux (Sweden)
Global Aspirants	Bosch-Siemens (Germany), Haier (China), LG Electronics (Korea)
Strong Regional Players	Matsushita, Sharp, Toshiba, and Hitachi (Japan), Samsung and Daewoo (Korea) in Asia; Maytag (U.S.) in North America; Candy and Merloni (Italy) in Western Europe; Miele (Germany) in Western Europe
Strong Local Players with Some Regional Presence	Arcelik (Turkey), Mabe (Mexico), Multibras (Brazil), Fisher & Paykel (New Zealand)
Domestic and Niche Players	Sub Zero/Wolf (U.S.), Guangdong Midea Group (China)

Source: www.bus.iastate.edu.

Exhibit II

Appliance Industry in the US

The appliance industry in the US, in comparison with other industries, was reasonably successful in keeping its prices low and steadily improving the quality of its products. In 1945, there were about 300 major home appliance industries in the US. However, by 2002, four major players emerged. They were Whirlpool, General Electric, Maytag and Electrolux. These companies together held nearly 99 percent of the US appliance market. There was severe competition among each of these companies with all of them focusing on quality, durability, reasonable prices and satisfied customers.

Most of the major automobile and consumer appliance industries were involved in the appliance industry at some point of time. Some of the major auto, electronics, and diversified companies active at one time in the appliance industry were General Motors (Frigidaire), Ford (Philco), American Motors (Kelvinator), Studebacker (Franklin), Bendix, International Harvester, General Electric, RCA, Emerson Electric, Westinghouse, McGraw Edison, Rockwell, United Technologies, Raytheon, Litton, Borg-Warner, and Dart & Kraft.

Before World War II, most appliance manufacturers produced only a limited set of appliances. General Electric made refrigerators, Maytag focused on washing machines, Hotpoint produced electric ranges. Each of these companies provided only variations of their basic product. By 1955, the major appliance industry began experiencing overcapacity, leading to mergers and acquisitions and a proliferation of national and private brands.

The industry almost doubled in size during the 1960s as sales of several products grew rapidly. Dishwasher unit sales almost quadrupled. Unit sales of clothes dryers more than tripled.

In the 1970s, the appliance industry continued to expand in spite of high inflation and interest rates. The market continued to expand in the 1980s, mainly due to the popularity of the microwave oven in the US. By the 1990s, U.S. appliance manufacturers offered a full range of appliances. A company would fill the gaps in its line by putting its own brand name on products it purchased from another manufacturer. For example, Whirlpool made trash compactors for Frigidaire (A.B. Electrolux), In-Sink-Erator (Emerson Electric), Jenn-Air, Magic Chef (Maytag) and Sears. Caloric (Amana) not only made gas ranges for its in-house Amana brand, but also for Whirlpool. General Electric made some microwave ovens for Caloric (Amana), Jenn-Air (Maytag), Magic Chef (Maytag) and its own Hotpoint and RCA brands.

In 2001, the leading white goods manufacturers in the United States appliance market were Whirlpool, GEA, Maytag and Electrolux, which had market shares of 39.2%, 23.2%, 21.6% and 15% respectively.

Adapted from www.bus.iastate.edu.

Exhibit III

Whirlpool's Brands

NORTH AMERICA	
Brands	Whirlpool, KitchenAid, Roper, Estate, Gladiator, Inglis, Acros, Supermatic, Crolls
Principal Products	Air Purifiers, Automatic Dryers, Automatic Washers, Built-in Ovens, Dehumidifiers, Dishwashers, Freezers, Hot Water Heaters, HVAC, Microwave Ovens, Ranges (gas and electric, free standing, built-in and surface units), Refrigerators (top-mount freezer, bottom-mount freezer, side-by-side), Room Air Conditioners, Trash Compactors, Washers
KitchenAid® products	Blenders, Food Processors, Hand Mixers, Hot-Water Dispensers, Stand Mixers, Toasters, Coffee Makers, Juicers
EUROPE	
Brands	Whirlpool, Bauknecht, Ignis, KIC
Principal Products	Built-in Ovens, Cookers (gas and electric, freestanding, built-in and surface units), Dishwashers, Dryers, Freezers (upright and chest), Microwave Ovens, Refrigerators (built-in, combis and side-by-side), Washers (front and top loading)
LATIN AMERICA	
Brands	Brastem, Consul, Eslabon de Lujo, Embraco
Principal Products	Freezers, Gas and Electric Ranges, Microwave Ovens, Refrigerators, Room Air Conditioners, Washers, Compressors
ASIA	
Brands	Whirlpool, Bauknecht, Ignis, KitchenAid, Raybo, Narcissus, SMC, TVS
Principal Products	Automatic and Semi-automatic Washers, Microwave Ovens, No Frost Refrigerators

Adapted from www.whirlpoolcorp.com.

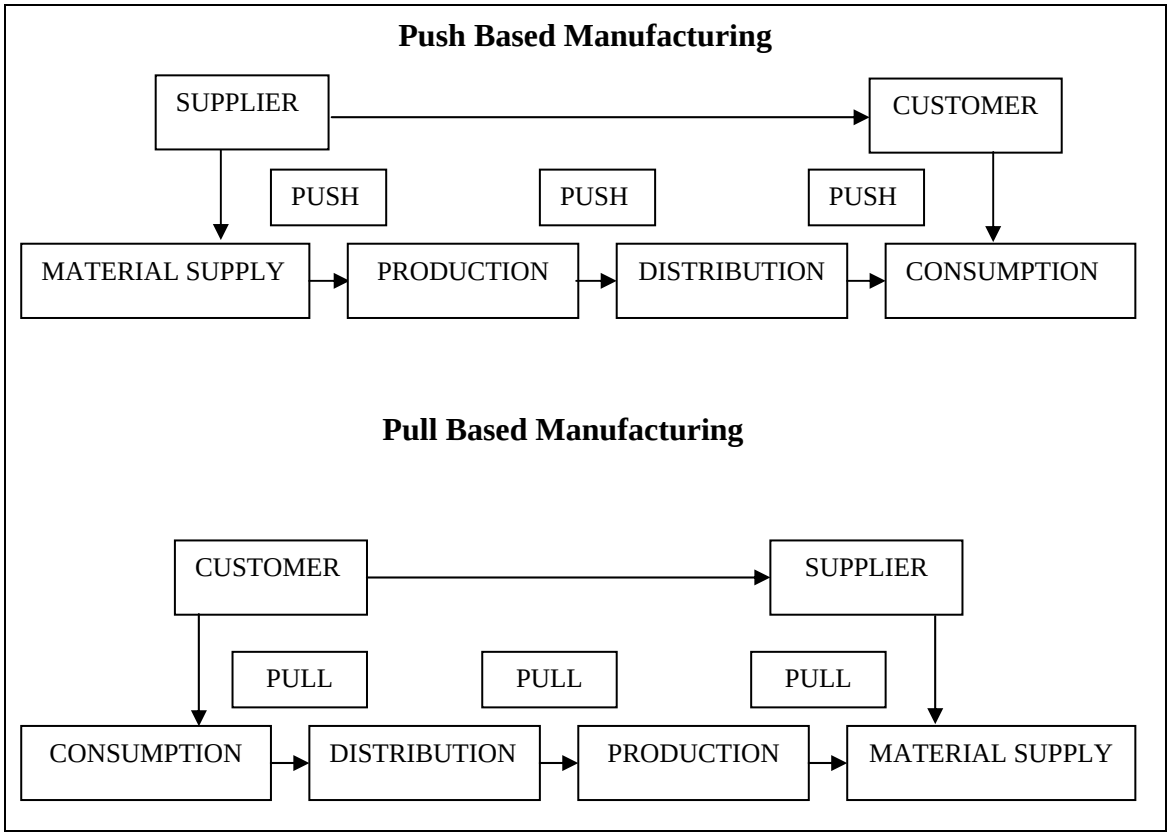
Exhibit IV

Whirlpool Corporation in 2002

2002 Net Sales	$7.3 billion in 2002 in North America
	$2.2 billion in 2002 in Europe
	$1.27 billion in 2002 in Latin America
	$391 million in 2002 in Asia
Position	14 countries, 4 continents, and 170+ global markets
Employees	68,000 worldwide
Regional Market Positions	Number 1 in North America
	Number 1 in Latin America
	Number 3 in Western and Central Europe
	Strong position for growth in Asia
	Number 1 in India

Source: www.appliancemagazine.com.

Exhibit V



Source: ICMR.

Additional Readings & References:

1. Tom Field, **Going for more of the same**, www.cio.com, August 1, 1996.
2. Jean V. Murphy, **Leveraging big "L" logistics across whirlpool's global supply chain**, www.supplychainbrain.com, February 1997.
3. Tom Davey, **They are still sold on the EDI**, www.informationweek.com, September 22, 1997.
4. Marianne Kolbasuk McGee, **Whirlpool jumps on the net**, InformationWeek, December 14, 1998.
5. Bhavana Kaul, **Products get smarter on the internet**, www.businessworldindia.com, May 22, 2000.
6. **General Motors and Whirlpool: two approaches for developing performance benchmarks**, HR Focus, June 2000.
7. Robert J. Bowman, **Whirlpool: connecting pieces of a big puzzle**, www.supplychainbrain.com, July 2000.
8. Paul McDougall, **Collaborative Business**, www.informationweek.com, May 7, 2001.
9. Tim Wilson, **Host apps join web supply chains,** www.internetweek.com, August 3, 2001.
10. Tom Stundza, **Whirlpool aims to cut costs 5% annually**, www.purchasing.com, August 9, 2001.
11. **Ryder consolidates Whirlpool's packaging operations into new, single facility to improve its after-sales service parts supply chain**, Businesswire, October 2, 2001.
12. William J.Holstein and Jodie T. Allen, **Old dogs, new tricks**, Businesswire, October 2, 2001.
13. Larry Greenmeier, **Appliance maker outsources application support to Keane**, www.informationweek.com, November 19, 2001.
14. Beth M. Schwartz, **Asia's bumpy road to recovery**, Transportation and distribution, Business source premier.
15. Garrett F. Johnston, **The Internet Refrigerator**, www.appanet.org, November-December 2003.
16. Centhis Yeldell, **Business forum stresses forecasts**, bus.utk.edu
17. Tim Clark, **Swimming in the deep end**, www.consumergoods.com
18. www.whirlpoolcorp.com
19. www.appliancemagazine.com
20. www.fineground.com
21. www.thrivetech.com
22. www.bus.iastate.edu
23. www.internetweek.com
24. www.i2.com
25. www.manufacturing.net
26. specials.ft.com
27. www.3-ibm.com
28. www.logis.cz
29. newsroom.cisco.com
30. www.ilog.com
31. media.corporate-it.net
32. www.strategos.com