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More on Postponement Adapting Postponement to the Supply Chain

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Postponement is an operations and supply chain strategy that many companies are only beginning to see the full potential of. To better understand postponement lets look first at the definition. The Council of Logistics Management defines postponement as "the delay of final activities (i.e. assembly, production, packaging, tagging, etc.) until the latest possible time. A strategy used to eliminate excess inventory in the form of finished goods, which may be packaged in a variety of configurations." This means that postponement looks to take one specific step that comes early in the manufacturing process of a product, and moves it to the end. As the definition states, the general purpose of postponement is to lower or eliminate inventory by finishing a product directly before it is shipped.

Many people who understand postponement though, merely view the concept as an operational strategy. They see it as a process improvement in the manufacturing and assembly of a product similar to the definition provided above. Although it may certainly be effective in this way, we would also like to expand the discussion to include postponement as a supply chain strategy. Companies at the forefront of their industries are looking to understand how postponement can actually improve the performance of their supply chain overall. It is because of this fact that we believe this discussion is timely.

In Janus D. Pagh and Martha C. Cooper's "Supply Chain Postponement Strategies: How to Choose the Right Strategy" the authors look closely at postponement primarily in terms of two processes, manufacturing and logistics. Here is the basic diagram the authors present.[1] This diagram also importantly considers when the most effective time is to use these strategies.

		Logistics	
		Speculation	Postonement
Manufacturing	Speculation	**Full Speculation Strategy** •Low production costs •High inventory costs •Low distribution costs • High customer service	**Partial Postponement Strategy Logistics Postponement** •Low production costs •Low/Mid inventory costs •High distribution costs •Low/Mid customer service
	Postonement	**Partial Postponement Strategy Manufacturing Postponement** •Mid/High production costs •Mid/High inventory costs •Low distribution costs •Mid/High customer service	**Full Postponement Strategy** •Mid/High production costs •Low inventory costs •High distribution costs • Low customer service

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The speculation strategy presented above is one that follows the traditional model of supply chains. It is a make-to-stock process that follows the common process of supplying the manufacturer, product assembly, finished goods packaging, and transportation to the customer. One benefit to a full speculation strategy is the gains from economies of scale, as supplies can be ordered in larger quantities to fulfill high volume production. The reason many companies have moved to a partial or full postponement strategy are due to the risks of speculation. One example is obsolete products. Since the manufacturer is speculating on demand, i.e. common demand forecasting, these products may carry unnecessary costs if inventory is not sold. If forecasts for regularly produced products are incorrect, excess inventory may create increased holding costs, and tie up cash. Either risk creates challenges to operational efficiency.

With partial and full postponement, greater flexibility is developed in the supply chain. In general, postponement strategies are used to offset demand uncertainties because of this fact. Greater levels of customization can be achieved, lead times can be reduced, and inventory holding costs will be lowered as well. It is because of these efficiencies that companies are now turning to postponement strategies when considering their supply chain operations.

We will look more closely now at some of these strategies. What are companies doing to move early supply chain processes to the end, and how can these changes impact the overall effectiveness and efficiency of the supply chain. The three primary areas we will consider are 1. Looking at Costs Across the Supply Chain, 2. Moving from a Warehouse to a Distribution Center, and 3. Postponement in Packaging and Shipping.

Looking at Costs Across the Supply Chain

The supply chain model presented in this issue of K&A Review, *Learning From Supply Chains: Benetton Group S.p.A and the Apparel Industry*, clearly shows how a full postponement strategy can effect the total costs of production over the entire supply chain. Last months K&A Review also provided an example of logistics postponement with Hewlett-Packard (HP) printers in *The Marketing and Supply Chain Collaboration*. To better understand postponement, we'll consider a couple other examples, since these are only two ways in which companies are utilizing these strategies.

The Dell Computer Corporation is a strong example of manufacturing postponement. In the personal computer (PC) market historically products were made-to-stock. PC's were assembled as a finished product, shipped to the store, and kept in inventory. What Michael Dell saw as an opportunity became a new model for the entire industry. Instead of assembling a complete PC, Dell created a supply chain where the company would hold inventory of component parts in a few centralized locations, and as customer's placed their orders, a Dell computer would be assembled exactly to the customer's requirements. Distribution and

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shipping is direct to the customer.

This system allowed Dell to become more flexible in their supply chain and created efficiencies that other companies in the industry were slow to enjoy. One such efficiency was reduced lead times. As many pre-assembled PC's were manufactured overseas, the lead time for shipping to the customer was 4-6 weeks. With the Dell model, a PC could be fully assembled in one to two days, and the customer would receive their order by the end of the week. This process alone significantly reduces the holding costs incurred during shipping as well as improving customer satisfaction.

With this strategy of postponement, Dell commonly holds inventory for less than 4 days. By using a postponement assembly strategy, Dell is able to minimize their inventory, generate cash much faster and reinvest this cash into improving their supply chain model. A quick comparison of 2005, shows Dell carried $459 million in total inventory with $173 million in finished goods inventory, compared to the Hewlett-Packard Compaq Corporation, which carried $6.87 billion. Consider how much faster Dell can create a return on their investment in supplies compared to HP-Compaq.

Lets look at another postponement strategy. This example is a little less obvious and it is found in the paint industry. Historically companies would manufacturer each color of paint at an offsite facility, package the different colors in paint cans, and ship the product to the retail store. This created large inventories as paint takes up a lot of storage space especially with such a variety of colors. This speculation strategy was also subject to large demand risks, as paint colors were selected prior to the new season and some colors would not sell potentially. This means high inventory holding costs, and decreased margins or a loss, if a particular color had to be discounted or simply was eliminated.

What one company figured out though was these unnecessary costs could be eliminated if paint was mixed onsite. The company decided to use smaller quantities of colors that could be mixed to create the entire palette of colors. This enabled customization at the point of sale. Think about the inventory holding cost of this reduction. Now a store no longer had to store large inventories of every color, they were only required to carry the primary colors for mixing. Demand was better satisfied, as the product was prepared specific to the color request of the customer. This process also greatly reduced shipping costs as less inventory would need to be sent. At the same time, this increased customer satisfaction as they could be assured their color was in stock, and lead times were immediate. The customer could purchase their paint color and leave the store. By moving the process of mixing to the end, postponement created huge efficiencies for this industry, dramatically reduced costs, and improved customer satisfaction. This is the power of postponement.

Moving from a Warehouse to a Distribution Center

Many companies today use the terms *warehouse* and *distribution center* interchangeably.

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They see these two physical spaces as one in the same, but what is important to note is the purpose of each is actually fundamentally different. Let us first clarify how they are different then explain more about the postponement strategy involved in moving from one to the other.

A warehouse, by definition, is a location to store, stock, and maintain inventory. It is a holding area for made-to-stock products that have yet to move to the customer. In general, warehousing is seen merely as a cost center, although a necessary one in some cases. If a company wants to ensure demand is met, stockouts are minimized, and a higher level of control is maintained, then a warehousing system will work well.

A distribution center, on the other hand, does what the words imply. It is a central location by which the company distributes product, and here may be where the confusion comes from. Unlike a warehouse, a distribution center maintains minimal if any inventory. The purpose of a distribution center is to act as a dispersal location, where products enter one side direct from the manufacturer, and almost immediately are sent on to the customer through another loading bay. Here speed and efficiency are critical. Although a cost center, a distribution center can act as a powerful value added tool for protecting and creating higher profit margins if a high level of customer service is also maintained.

As supply chains have developed over time, many companies are now moving from the traditional warehousing network, to more of a distribution center model. Although on the surface this doesn't seem like a typical postponement strategy there is a definite connection. What is unique here is that the company is not delaying a process, as postponement commonly means, but rather moving a process earlier in the supply chain to a later stage. Consider what is being postponed, the inventory.

In a warehouse network system, in theory, it is easy to monitor inventory. After all, it is right there in the warehouse or on its way if a recent order has been placed. This means that the company can control its own inventory levels, prevent stockouts by maintaining higher safety stock levels, and ensure the customer receives exactly the products they require. It is a controlled system that protects the customer as the warehouse also bears the costs of holding these inventory levels.

With a distribution center however, there is no inventory. Where did it go? The answer is inventory holding was postponed to the customer or retail site. With warehousing models, you'll generally see retail outlets with low or no levels of inventory. This is because the warehouse acts as the safety mechanism to ensure every retail location is stocked in full with product, even at an offsite location. With a distribution center however, one will generally find the retail outlet will carry more inventory. The reason here is fairly simply.

With a distribution center, because it functions more as an inventory flow hub, product does not wait to be shipped. A product will be received from the manufacturer, may be repackaged or immediate sent to the distribution area, will receive new shipping documents, and off it goes to the customer. Because there is far less control over this system in general,

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(actually companies with successful distribution centers such as FedEx have extensive control over the system) retail outlets will commonly hold safety stock of high sales volume products to ensure that stockouts do not occur.

Here the cost savings of postponement are in the reduced inventory holding costs a warehouse incurs, improved demand fulfillment across the supply chain, and shipping cost reductions. This is a bit of a unique way to view postponement, however it considers customer demand as the driver in the supply chain to pull from the manufacturer made-to-order, as opposed to a push system for products that are made-to-stock.

Postponement in Packaging and Shipping

Zinn and Bowersox first introduced many ideas that have lead to modern postponement strategies in supply chain management, specifically as it applies to shipping and transportation. In their research they considered shipping strategies, which moved labeling specific processes, such as language required product stickers and user manuals, to the final phase of packaging. These processes reduced inventory levels for the manufacturer by creating generic product, which were later customized upon receipt of an order. Similar to the paint example, multiple product inventory was eliminated, and risks of mispicking were minimized.

With these ideas spreading across the manufacturing industry, companies began to look even closer at their supply chains to increase flexibility and improve efficiencies. HP again is a strong example here, with postponement strategies related to shipping and transportation of the printers themselves. Commonly in the industry, and in many industries, once a product is manufactured it goes straight into the final packaging. The packaging for most electronic products is oversized, has a large amount of wasted space, and includes bulky padding. What HP realized was the printers themselves were strong enough to endure minimal vibration, hence shipping could be done with the printers alone. In this strategy, final packaging of the printers could be postponed until the product was ready to be sent to the customer.

HP identified this new innovation by first testing the products strength and then considering alternative shipping designs. What the company settled on was 5 layers of 16 printers standing on end that would be separated by protective trays to spread the weight evenly. Without the added packaging, HP estimates they save $3 million per month in shipping costs, and reduced bulk shipping density by 250%. At the same time, this shipping method reduced inventory requirements by 60%.[2]

Another postponement strategy with packaging and shipping is the Amazon.com supply chain model. In the traditional system, bookstores merely carry inventory to supply in-store demand. Their focus was not on supplying mail order customer purchases, but along

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came Amazon. What the company realized was that by coordinating and postponing the shipment of and order, they could coordinate multiple product segment ordering, package the products together, and ship directly to the customer in under a week. Many people look at Amazon.com as an online retailer, however in reality they are simply a postponement supply chain provider to thousands of smaller retailers around the world.

Think of the total cost if every retailer shipped each individual product to all their customers by themselves. The costs would be extremely large and unnecessary. Amazon therefore is able to create packaging postponement solutions to gain cost efficiencies through purchasing in large volumes, and saves on transportation costs by repackaging products for a specific order. Demand is more accurately assessed and satisfied by tracking product purchase ratings as well as customer feedback tools. Lastly, inventory levels are minimized as customer orders create a pull system to move stock from the supplier to the distribution center on to the customer. It is a highly efficient process that utilizes the power of technology to mask a behind-the-scenes complex supply chain that is extremely profitable.

Although we've presented a number of examples here, postponement strategies are only beginning to develop in the supply chain management field. What was originally identified over 50 years ago rarely became more than an academic interest for those studying manufacturing processes. It seems today some are revisiting their textbooks, but even fewer are out looking for proven models that have been around for years and implemented sparingly. As supply chains become more extensive and complex, postponement models are sure to become more commonplace. The ability to improve demand responsiveness and accuracy, lower costs across the supply chain, and improve efficiencies are areas many companies will need to consider as the business environment only becomes more competitive.

We would like to state though that our analysis here is not meant to suggest that postponement is necessary for any and all products. This deeper look at postponement is merely provided for the purpose of considering how certain aspects of these strategies may relate to potential solutions and alternative approaches in multiple contexts. This is certainly an evolving field that will continue to grow as global supply chains develop in the future. Keeping in mind these supply chain concepts can only broaden ones appreciation for the complexity of business today, and provide insights into the future demands on material flow.

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[1]Pagh, Janus D., and Martha C. Cooper. "Supply Chain Postponement Strategies: How to Choose the Right Strategy." Journal of Business Logistics 19.2 (1998): 13-33.
[2]Dority, Jack. "Newsletter - HP Saves $3 Million Per Month." Lansmont. 29 Apr. 2007 <http://www.lansmont.com/NewsLetters/HTML%5C94-10-p1.HTM>.