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<b>ASSESSMENT DATE</b>	6 July 2020	<b>SESSION</b>	Afternoon
<b>ASSESSOR(S)</b>	Prof JH du Plessis		
<b>MODERATOR(S)</b>	Prof. M Naude		
<b>DURATION</b>	4 hours (240 min)	<b>TOTAL MARKS</b>	100

<b>NUMBER OF PAGES OF QUESTION PAPER (Including cover page)</b>	12
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#### INFORMATION/INSTRUCTIONS:

- This is an open-book assessment.
- Question papers must be handed in together with your answer book
- Read the questions carefully and answer only what is required.
- Write neatly and legibly on both sides of the paper in the answer book, starting on the first page.
- Structure your answers by using appropriate heading and subheadings. The general University of Johannesburg policies, procedures and rules pertaining to written assessments apply to this assessment.

**This paper consists of a case study. Read the case study carefully and answer the question on the last page.**

## **ZingPC**

### **Company Introduction**

In April 200X, Zippy Computer, Inc., merged with Binger International, Ltd. The new entity was named Zinger Electronics, Inc. and began trading on the NASDAQ. Zinger Electronics, Inc., produces a variety of high-tech goods and services—computers and servers, Internet services, Web hosting, and business-to-business e-commerce applications. Their award-winning computers are sold under the ZingPC brand to business, government, education, and consumer markets.

The ZingPC division designs and manufactures a broad range of computer products that ranks among the industry leaders in technology, innovation, price, and computing performance. These award-winning products are marketed under the following lines: Zinger Millennia desktop computers, Zinger TransPort notebook computers, Zinger ClientPro corporate computers, and HP NetServer servers. These product lines are manufactured exclusively at the company's facilities in Cheyenne, Wyoming. ZingPC products can be purchased directly from the company's Web site <http://www.ZingPC.com>, by calling a toll-free 800 telephone number, through company field sales representatives, and through leading national retailers.

### **Early Successes and Challenges**

As a new organization, ZingPC adopted a product-focused strategy. Its goal was to provide the fastest and most powerful PC on the market. ZingPC built a 216,000-square-foot facility in Laramie, Wyoming (more than doubling its original capacity), and dedicated a large portion of this multifunctional facility (120,000 square feet) to PC assembly. The company quickly increased production levels of the powerful PCs and pushed them into the marketplace in anticipation of a dramatic increase in sales volume and revenue.

The company experienced many early successes, as evidenced by strong sales and high levels of market acceptance. ZingPC finished fiscal 200X with \$1 billion in net sales. The brand name was well respected, and the company appeared to be poised for great success in the computer hardware and PC industries. However, the good times in the PC marketplace for ZingPC were short lived. The industry changed quickly as competitors ramped up capacity, enhanced customer service, and reduced prices. ZingPC, on the other hand, was hampered by poor customer support performance and an inability to deliver finished goods on time. As a result, ZingPC lost market share, and its reputation was tarnished.

## **The Computer Industry**

Over 95 percent of the computers in use today are PCs. Worldwide, yearly shipments of computers surpassed 90 million units in 200Y. Internet sales accounted for 5 million units in the United States that year. By 200Z, Internet sales were expected to double, prompting PC makers to focus on this distribution channel.

The computer hardware industry contains several major players including Dell, Toshiba, Hewlett-Packard (HP), Acer, Apple, Lenovo, and ZingPC. These companies serve slightly different niches. Companies like Apple, Dell, HP, and ZingPC tend to be PC-focused, while others derive the majority of their sales from outside the PC market. These companies also employ different marketing approaches. For example, Apple relies heavily on its retail network to generate sales, while Dell focuses on the direct sales model.

The direct model has emerged as a winning formula and has been adopted by many organizations. It is possible today for a customer to order a tailored PC online, at store kiosks, or over the telephone from multiple PC makers. This strategy, while profitable, flexible, and able to limit finished goods inventory, is challenging to organize. In order to experience success with the direct model, it is necessary to consistently adhere to several supply chain principles.

## **Computer Industry Supply Chain Practices**

## **Configure-to-Order and Standardization**

Heavy competition in the computer industry has driven many organizations toward a customer-focused product strategy. In an attempt to increase sales, several companies now manufacture computers on a configure-to-order (CTO) basis. The goal of a CTO system is to provide users with customized, lower-cost PCs while simultaneously addressing chronic supply problems on the vendor side. These PC vendors feel that CTO is a major part of the solution to recurring demand forecasting problems and the rapidly changing marketplace.

Leading PC makers appear to have concluded that the best approach is to build final products only after specific orders are placed. Dell and ZingPC offer a broad array of CTO systems, while several other PC makers (HP and Lenovo) offer limited choice CTO options. This strategy has already paid off for Toshiba. In the first six months of its basic CTO program, finished goods and parts inventories have dropped more than 65 percent. Even with this vast reduction in inventory, stockout and delivery time performance have improved significantly.

CTO is a viable option because manufacturers have reduced and standardized the number of parts in their products—many of which are provided by component and subassembly suppliers. These actions make it possible to manufacture PCs in a very short timeframe at a reasonable cost. Typically, only a few key unique components (e.g., processor, hard drive, memory, video card, etc.) need to be selected by customers to create a "customized" product. Standardization also provides production efficiencies and lower-cost components for the manufacturer. Ultimately, this reduces purchase and maintenance costs for the consumer.

## **Supplier Alliances**

Forging strong, long-term strategic alliances with key suppliers is another trend in the computer industry. In an alliance, the focus is on building relationships rather than executing individual transactions. These collaborative relationships allow organizations to develop mutual goals, transfer information efficiently, share risks and rewards, and coordinate strategic plans. Often, suppliers bring expertise and or economies to the relationship that may not exist in-house for the buying organization.

These relationships also allow the organization to focus on its core competencies, build supply chain flexibility and capacity, and conserve resources.

These expanded, interlocking relationships effectively support a CTO system. PC manufacturers would be hard pressed to make CTO a reality without the technical expertise, infrastructure, and resources of component suppliers. These companies provide vendor-managed inventory services; assist in demand forecasting; and/or supply production-ready components, pre-kitted materials, and pre-assembled modules. As a result of these external services, PC manufacturers can concentrate on their core competency—assembling customized machines within short lead times.

## **Logistics Outsourcing**

Supplier-manufacturer alliances alone are not enough to make CTO systems work for most PC makers. They also require the expertise of third-party logistics (3PL) firms and transportation providers who facilitate the flow of materials through the supply chain. 3PL firms can ensure inventory availability for JIT assembly processes, manage logistics operations, and provide an array of finished goods delivery services. Doing such activities in-house is possible, but it would require a significant investment in information technology, warehouse capacity, and personnel. It is often far more time- and cost-efficient to outsource these activities to 3PL experts.

Logistics outsourcing is used throughout the technology industry. For example, Hewlett-Packard has outsourced U.S. warehouse operations. It also uses 3PLs to manage its PC supply chain in Britain and Ireland. Others partner with 3PLs to provide e-fulfillment services (including some product assembly and CTO services) for their product lines.

## **Push versus Pull Supply Chains**

The third component of an effective CTO system is a pull-based supply chain. In this type of supply chain, all activities are demand driven rather than forecast driven. This requires the manufacturer to have short production lead times and ready access to customer demand information. If product were built to forecast (a push-based supply chain), the manufacturer would have to build product of every conceivable

configuration in order to provide customers with the exact product that they wanted. This is a very costly and near impossible task unless the PC maker were to offer very limited CTO options.

A pull-based supply chain with CTO capabilities allows the manufacturer to postpone production until actual orders are received. This creates multiple benefits for the manufacturer and its supply chain members. Inventories can be streamlined, variation and risk reduced, and customer responsiveness increased (due to the speedy availability of customized products). Also, the manufacturer develops a low-cost ability to respond to marketplace demand changes. It should be no surprise that many CTO PC manufacturers have made significant investments of time and effort to establish pull-based supply chains.

## **ZingPC's Supply Chain Practices**

While the PC industry was becoming more competitive and more supply chain driven, ZingPC stuck to its original intense focus on the product and build-to-forecast processes. Although it had a high-quality product, its failure to adopt a supply chain orientation was a major error. ZingPC did not collaborate with suppliers effectively, did not strategically outsource its logistics functions, and did not communicate well internally or with customers. The results were a very disjointed supply chain, product lead times ranging from 10 to 30 days, and growing customer dissatisfaction.

### **Supplier Management**

In contrast to the competition, ZingPC failed to develop strategic relationships with its supplier base. ZingPC relied on arm's length transactions with more than 150 different suppliers of components, accessories, and software. Key managers felt that most, if not all, of these suppliers were needed due to the extensive number of component parts and accessories used in the ZingPC product line. This problem existed largely because the organization failed to standardize parts when possible and control the variety of options offered to customers.

Managing this large collection of suppliers was extremely resource intensive. Human resources were drained as a tremendous amount of man-hours were spent maintaining communication and building relationships with each supplier. Financial resources were sacrificed as ZingPC paid higher prices for components than its competitors. It made far too many small purchases from this wide array of suppliers and did not often qualify for quantity discounts. And, other internal resources were taxed as ZingPC received few value-added services from these suppliers. Few suppliers viewed ZingPC as a key customer, and most were unwilling to provide extra services that were given to Dell and HP

### **Inventory Woes**

Poor internal communication regarding inventory availability and production planning set the stage for ineffective procurement and severe inventory problems. The purchasing department, forced to make its best guesses at component requirements, often entered into purchase agreements for components that were not in demand. It also tended to overbuy in a rarely successful quest for volume discounts. As a result, un-needed inventory was flowing into ZingPC and stacking up in the system. This created bottlenecks and a glut of unneeded components that would soon become obsolete.

The ZingPC logistics operation bore the brunt of the poor procurement decisions. Its limited storage facilities were already inundated with incorrect inventory and product kept arriving! In a desperate attempt to manage the inbound flow, the logistics department chose not to unload some trailers, instead using these trailers as temporary warehouses.

This outside storage strategy worked for a short time until carriers started charging ZingPC detention fees. Also, the activity quickly became too difficult to manage as freight continued to arrive. Trailers were being dropped in the yard without the loads being checked for accuracy, quality, or damage; paperwork was misplaced; and inventory records were not kept up to date. Additionally, the receipt of products into the inventory system was delayed dramatically. In the worst cases, the receipt of a vendor invoice was the first and only indication that ZingPC had the product on site.

The inventory situation became so dysfunctional that needed materials could not be located in the computer system and/or in ZingPC's storage areas. If a manufacturing request for line delivery of a specific component could not be filled immediately, a new purchase order was placed (even before an attempt to locate the products was undertaken). This further compounded storage problems and cash flow challenges. Even worse was ZingPC's inability to produce PCs in a timely fashion (despite having over \$130 million in inventory). Manufacturing operations were constantly slowed due to stockouts (real or merely misplaced quantities) of key components. Partially completed PCs were taken out of production and placed in temporary storage until the key component could either be located or reordered and received.

## **Manufacturing Operations**

Obviously, the problems discussed above had a tremendous downstream effect on the manufacturing operation. While these long supplier lead times and a lack of inventory control contributed heavily to ZingPC's production problems, the manufacturing operation had some self-induced problems and bottlenecks. Poor design of the assembly floor layout was the primary problem. Component parts would enter the manufacturing area at random places and at varying times, disrupting product flow. Also, work in process had to be moved around the facility in illogical patterns (e.g., not in a straight, unidirectional flow) in order to complete manufacturing. As a result, excessive materials handling and movement were needed, efficiency was reduced, and valuable time was lost.

PC production was severely restricted by these manufacturing bottlenecks and inefficiencies. Fewer than 1,000 PCs were being manufactured per day in a facility that had a projected capacity of 2,100 units per day. This limited production schedule contributed to a dramatic increase in product lead time (elapsed time from order placement to shipping) and customer order cycle time (lead time plus transit time). ZingPC's lead times ranged from 1 to 30 days versus under seven days from its major competitors. As a result of its supply chain and manufacturing woes, ZingPC quickly gained a poor reputation in the marketplace. Customers felt that ZingPC had a great product—if you could ever get your hands on it.



## **Outbound Product Movement**

Another costly area for ZingPC was customer delivery of finished goods. Given its long production cycles, this last link in the supply chain presented the only opportunity to make up some of the lost time. ZingPC management believed they had to use overnight shipments to remain somewhat competitive with Dell, Apple, and others who possessed a dramatic order cycle advantage over ZingPC. Under normal circumstances, customers bear the cost of expedited shipping, but ZingPC was not in a normal operating mode. It had to incur this great expense in order to placate and hold on to impatient customers.

## **Early Recovery Initiatives**

In an attempt to battle back to a more competitive position, ZingPC undertook two strategic initiatives during 200Y. The first effort focused on streamlining the flow of inbound materials. The second effort was geared toward better responsiveness and shorter customer order cycle times.

## **Supply Logistics Center**

In an effort to alleviate product receipt problems and coordinate the inbound delivery process to the manufacturing facility, ZingPC established a supplier logistics center (SLC) adjacent to the manufacturing facility. The SLC was designed to receive supplier deliveries, update the inventory system, and hold the inventory until the manufacturing facility requested replenishment. The SLC concept was intended to improve operational efficiency and inventory control, separate the receipt and storage of component parts inventories from the actual computer assembly process, and propel the organization toward implementation of a just-in-time (JIT) inventory system at the manufacturing facility.

The new SLC was tested with a few select suppliers. Early results were encouraging, and the concept appeared to have merit. The ongoing challenge was to identify appropriate suppliers and convince them to work with the SLC. This was not an easy task, and low participation limited the success of the SLC concept.

## **Computers Now**

In an attempt to combat the cycle time advantages of other PC makers, ZingPC's management launched a program called "Computers Now." The program was focused around the holiday season when peak demand was forecast. ZingPC's effort involved prebuilding several hundred systems and staging the inventory in ZingPC-owned facilities in Memphis, Tennessee, and Salt Lake City, Utah. The company envisioned a situation where customers would place an order, the order would be picked from stock and it would be shipped overnight to the customer.

Unfortunately, the program was a cash-flow failure. It turned out that none of the product could be configured to order, fewer orders were placed than were projected, and ZingPC was stuck with the inventory after the holidays. This strategy typified the push inventory mentality that enveloped ZingPC management.

## **The Need for a Shakeup**

Unfortunately, the recovery initiatives were too little, too late. Sales continued to flounder as financial difficulties, supply chain inefficiencies, and poor customer service took their toll on ZingPC. Increasingly, disenfranchised shareholders clamored for major changes in hopes of saving the company from imminent failure. The company's board of directors responded in January 200Z by terminating the ZingPC division president and a number of top officials. Included in this group were a number of key supply chain executives—the divisional vice president of operations, the director of logistics, and the director of purchasing.

The newly named division president wasted little time in assembling a new supply chain management team. This team was tasked with revitalization of the ZingPC supply chain. This was no small task, given the magnitude of the problem. The new management team quickly uncovered major inventory, cash-flow, and service challenges. As one industry analyst put it, ZingPC was "stuck in the mud and spinning its wheels in the highly competitive PC manufacturing industry." Quick fixes and tweaking of the current system would not do.

Over the next few weeks, the new supply chain management team began to dig into the details of the situation. They analyzed the organization's business strategies and

practices, reviewed manufacturing processes, studied existing supplier relationships, and assessed current performance.

These efforts validated the team's initial thoughts and concerns—ZingPC was entrenched in a supply chain crisis of major proportions. Key problems included the following:

- Finished goods inventories in excess of \$130 million were gathering dust in ZingPC facilities—more than a month's worth of PCs at current sales rate.

TABLE A1-1	200Y Year-End Statistics for ZingPC
PC sales	\$1.5 billion
Manufacturing space	120,000 sq.ft.
Manufacturing capacity	2,100 units per day
Product lead time*	
Notebook PC	10-14 days
Desktop PC	12-21 days
Servers	21-30 days
Sales forecast accuracy	38%
Average Inventory on hand	\$130.7 million
*Product lead time = elapsed time from order placement to shipping	

Given the rapid rate at which technology was improving, product obsolescence was a critical concern for this supposedly leading edge maker of powerful PCs.

- A cash liquidity crisis existed—invoices for purchased components were coming due long before ZingPC was able to generate revenue from them. ZingPC's cash flow was so poor that it struggled to meet payment due dates and could not take advantage of early payment discount provisions in its contracts.
- Customer service levels were anemic—ZingPC's order cycle time and order processing lead times dramatically lagged behind industry leaders. Customer orders sat in the queue for nearly two days before processing began (e.g., if an order was placed at 1:00 PM Tuesday, it was 11:00 AM Thursday before it was

released for assembly or fulfillment from stock), order-to-ship time was weeks rather than days, and specific delivery times could not be provided. Also, despite the excessive inventory in the system, ZingPC could not assure customers that the component parts necessary to build their PC were available!

Additionally, the management team discovered that a bloated, inflexible supplier base had built up over the years, excessive operating expenses were being incurred, limited production capacity was available, and poor demand forecasting performance was the norm. Table AI-1 provides additional information regarding ZingPC's woes in early 200Z.

After completing their initial assessment, the supply chain team knew that the original ZingPC strategy—build leading-edge PCs to inventory and push them to the marketplace—would not work against highly efficient, demand-driven, CTO PC assemblers like Dell and HP. New strategies, processes, and goals would be needed.

**QUESTION:****100 marks**

Formulate a new supply chain strategy for Zing PC, highlighting the design considerations of the new strategy.