FACULTY/COLLEGE	College of Business and Economics
SCHOOL	Johannesburg Business School
DEPARTMENT	Transport and Supply Chain Management
CAMPUS(ES)	APK
MODULE NAME	Supply chain operation management: a business process approach
MODULE CODE	BML9X03
SEMESTER	SECOND
ASSESSMENT OPPORTUNITY, **MONTH AND YEAR**	Supplementary Summative Assessment Opportunity January 2020

ASSESSMENT DATE	January 2020	**SESSION**	
ASSESSOR(S)	Prof. S Gupta Dr P Kilbourn		
MODERATOR(S)	Dr K Lambert		
DURATION	3 hours (180 min)	**TOTAL MARKS**	80

NUMBER OF PAGES OF QUESTION PAPER **(Including cover page)**	6

INFORMATION/INSTRUCTIONS:

- This is an open-book assessment. Non-cell phone based calculators are allowed in the exam venue.
- There are two sections of questions, Section A and B. Answer all questions. **Answer Section A and Section B in different exam books.**
- Number your answers clearly and correctly as per the question paper. Write neatly and legibly on both sides of the paper in the answer book, starting on the first page.

SECTION A 44 MARKS

Question 1 (12 Marks)

Give an example of two organisations that leverage operations for competitive success and briefly explain some detail of how those organisations do it and the specific trade-offs considered. Full marks are only possible with the identification and discussion of at least one South African organisation.

Question 2 (12 Marks)

Three hairstylists, Jenny, John and Lerato, run a fast service Hair Salon for busy professionals in Sandton. They stay open from 6:45 a.m. to 09:00 p.m. in order to accommodate as many people's work schedules as possible. They perform only shampooing and hairstyling activities. On average, it takes 10 minutes to shampoo, 15 minutes to style the hair, and 5 minutes to bill the customer. When a customer arrives, he or she first checks with the receptionist (Lerato's younger sister Lulu). This takes only 3 minutes. One of the three stylists then takes charge of the customer and perform all three activities – shampooing, styling, and billing – consecutively.

a) Draw a process flow diagram for the Hair Salon (2 marks)

b) What is the number of customers that can be serviced per hour in this hair salon? (5 marks)

c) An operations specialist has suggested that the billing operation be transferred to Lulu. Do you agree with this suggestion? What would be the impact on the theoretical capacity?

(5 marks)

Question 3 (10 Marks)

A manufacturer of auto parts has just learned about the Toyota Production System (TPS) and is trying to implement lean operations. Traditionally, there has been no control on the amount of work-in-process (WIP) inventory between stages (it has been known to exceed 500 parts between some stages). As a first step, the amount of WIP inventory between stages is limited to a maximum of 20 parts. What, if any, impact does this have on the output from the factory in the short term? Using lessons learned from the river analogy, how should the manufacturer manage buffers?

Question 4

Is there a difference between low inventories and fast inventory turnover? Critically explain your answer (10 marks)

SECTION B – 36 MARKS

Please use a different exam book

Question 5 Short Answers. (12 marks)

Provide short, succinct answers to each of the questions below.

a) In 2018, Mt. Seymour Hospital admitted 13,505 patients. In 2019, a 20% increase in admissions is expected. The hospital has 350 beds. Hospital operates 365 days a year.

i. If the average patient stays in the hospital 8 days, how many beds were empty, on average, in 2018?
ii. On average, how many beds do you expect to be empty in 2019? (Hint: Apply Little's Law.)

(4 marks)

b) It is Monday morning 8.30 am. You are stuck in traffic on the highway heading to downtown Johannesburg. Your 9 am meeting with a Venture Capitalist to decide on the amount of Series D funding for your venture now looks in jeopardy. You come up with two brilliant ideas to ensure that your children's commute, in that distant future, will be much less painful. Can you write those ideas down in a half page? Briefly explain how each idea may help address the congestion problem. (4 marks)

c) Zazz, a maker of a hot new MP3 player, is concerned about the availability of flash memory chips, a key component in the Zazz3 player. It is the start of April and Zazz must commit to a flash memory chip quantity for delivery in July. Each chip ordered now will cost Zazz $40. Zazz expects that demand for chips in July is normally distributed with a mean of 250,000 and a standard deviation of 200,000. If Zazz's demand in July exceeds its regular order (the amount ordered in April) then Zazz can obtain additional units on the spot market. The spot market price for these chips in July is estimated to be $50. Chips not used in July will certainly be used in August. However, chips ordered in May for August delivery are expected to cost $36. Furthermore, there is a $1 cost to hold each chip from one month to the next (due to the opportunity cost of capital and physical storage costs). How many chips should Zazz order in April? (Hint: Use Newsvendor Model.) (4 marks)

Question 6 Angelina's Café (10 marks)

Angelina's Café in Johannesburg offers self-serve coffee to its customers. They also serve a variety of pre-packaged sandwiches and muffins. The Café employs 2 people to work at the counter from 8 am – 4 pm, each with its own cash register to serve customers. Customers line up in a single line and are served by the next available server. Demand during a typical day shows the following pattern:

Time	Average Customer Arrival rate (per hour)
8 am – 10 am	55
10 am - 12 noon	20
12 noon – 2 pm	55
2 pm – 4 pm	20

Demand however is highly variable. A server takes 2 mins on average to serve a customer (this includes greeting the customer, taking the order, picking up a sandwich or muffin if ordered, taking the payment, and pointing the customer to the self-serve coffee area if coffee is ordered). Time to serve a customer, however, is also highly variable depending on the customer, the order, and the type of payment. For this analysis, you may assume that both the inter-arrival time and the service time are exponentially distributed (recall that coefficient of variation of an exponential distribution is 1).

a) What is the expected wait time in queue during different times of the day? (5 marks)

b) An employee suggested that during the morning rush hours (8 am – 10 am), the Café should provide a convenient way to pay for coffee using the honor system:

The honor system was implemented and reduced the arrival rate to the servers at Angelina's from 55 people per hour during the peak to 40 people per hour. Of course, the average service time for the servers (during 8 am – 10 am when the honor system is implemented) now goes up from 2 minutes per person to 2.5 minutes per person, as the shorter-service-time customers (those getting coffee only and paying by cash) now serve themselves.

What happens to the expected wait time in queue during the 8 am – 10 am window? Was the honor system a good idea? (5 marks)

Question 7 Read passages below and answer two questions given at the end. (14 marks total)

What Went Wrong at Cisco in 2001?

There's Cisco Before and Cisco After, and the two crossed paths, awkwardly, this past April. Cisco Before was CFO Larry Carter writing in April's Harvard Business Review about the company's "virtual close" software. "We can literally close our books within hours," Carter boasted in the article. "More important, the decision makers who need to achieve sales targets, manage expenses and make daily tactical operating decisions now have real-time access to detailed operating data." Cisco's decision makers possessed a godlike ability to peer into every nook and cranny of the business, 24/7, which Carter says allowed the company to forecast a slowdown in Japan's economy and garner half of the switching market there. Cisco After was CEO John Chambers, admitting to The Economist that same month, "We never built models to anticipate something of *this* magnitude."

That something was what is now inelegantly referred to as the recent economic downturn. It created a major earnings surprise for the manufacturer of switches and routers – the company's first negative quarter in more than a decade. In the third fiscal quarter of 2001, sales plunged 30 percent. Chambers wrote off a mountain of inventory $2.2 billion high, and 8,500 people were laid off. On April 6, Cisco's stock sunk to $13.63. Thirteen months earlier, it had been $82. Chambers surveyed the wreckage and compared it to an unforeseeable natural disaster. In his mind, the economy - not his company's software nor its management - was clearly to blame.

But other networking companies, with far less sophisticated tools started downgrading their forecasts months earlier. They saw the downturn coming. Cisco did not. Other companies cut back on inventory. Cisco did not. Other companies saw demand declining. Cisco saw it rising.

CIO Peter Solvik defends his company's systems. He insists that without the forecasting software, that third quarter would have been even worse... It was just that "the speed of the swing caught everyone by surprise," Solvik says. Of course, surprise was exactly what Cisco's software systems were supposed to eliminate.

"For the last year, Cisco and John [Chambers] have said over and over again how their information systems make them so efficient and so on the ball," says Jeffrey Young. Cisco had enjoyed more than 40 straight quarters of stout growth. In its immediate past were three quarters of extreme growth as high as 66 percent. The numbers the virtual close presented to the eye of the beholders - the Cisco executives - painted a picture of the present as lovely and pleasant as a Monet landscape. According to many observers, Cisco's fundamental blunder was to rely on that pretty picture to assume the future would be equally pretty.

Cisco rose above a crop of small networking companies through two strategies: outsourced manufacturing and growth through acquisition. From the time it went public 11 years ago, Cisco was never not growing. Sometimes its growth was staggering. Its stock split 12 times in the '90s. Its revenues went from millions to billions to tens of billions as fast as the Internet would let it. At its height, 44,000 people worked at Cisco, and thousands of them were millionaires. If growth continued at the same pace for another decade - and why wouldn't it? - Cisco would be as big as the U.S. economy. Without a hint of irony, analysts suggested Cisco might be the first company to have a trillion-dollar market capitalization.

In May 2000, Fortune put Chambers on its cover and asked if he was the best CEO in the world. At the same exact time, a few components for Cisco's networking equipment were rumored to be in short supply. Privately, Cisco was already twitchy because lead times on delivering its routers and switches were extending. Eventually those lead times would reach nearly six months on some products. Not having the components could push those delivery dates out even further. So Cisco decided to build up its components inventory. Doing that would accomplish two things: It would reduce the wait time for its customers, and it would give the manufacturers of Cisco's switches and routers a reserve to draw on if components makers ran out.

Of course, everyone else wanted those components and the manufacturing capacity to build the networking devices too. So in order to get both, to make sure they would have them when they needed them (and they knew they'd need them; the virtual close told them so), Cisco entered into long-term commitments with its manufacturing partners and certain key components makers. Promise us the parts, Cisco said, and we promise to buy them. No matter what. "Our forecasts were still dramatically high," recalls a retired Cisco executive. "We wanted to make sure our growth was strong, so we ordered up big time," he says.

That seemed to work. Year-over-year growth was robust, 55 percent for the last quarter in 2000, and then a whopping 66 percent in the first quarter of 2001. As late as September, Cisco looked at its virtual close and saw plenty of bookings. It also had the pleasant problem of not being able to deliver products to customers fast enough. Combined, those numbers were enough to convince executives who literally had never seen a down quarter that everything was fine.

But some Cisco suppliers were not so sanguine. "People see a shortage and intuitively they forecast higher," says Ajay Shah, CEO of Silicon Valley-based Solectron Technology Solutions Business Unit, a company that manufactures parts for the networking industry and for Cisco. "Salespeople don't want to be caught without supply, so they make sure they have supply by forecasting more sales than they expect," Shah explains. "Procurement needs 100 of a part, but they know if they ask for 100, they'll get 80. So they ask for 120 to get 100."

In the summer of 2000, Solectron's Shah had customers from every corner begging for more manufacturing capacity. Even so, his forecasts were slowly diverging from his networking partners', including Cisco. His were less optimistic, based on what he saw in the general economy. There were meetings about it, but nothing was resolved about the growing disparity between what Shah and his customers thought was happening and what Cisco said was happening.

"You try to talk it over. Sometimes it doesn't work. Can you really sit there and confront a customer and tell him he doesn't know what he's doing with his business? The numbers might suggest you should. At the same time," Shah laughs, trying to picture it, "I'd like to see someone in that conference room doing it."

There's also the possibility that despite what Fortune said, Cisco's supply chain was not quite as wired as was hyped. Cisco, Solectron and others do plenty of business with companies that still fax data. Some customers simply won't cater to the advanced infrastructure, making it harder to collect and aggregate information.

a) Explain the causes of Cisco's problems circa 2001 as described in the article. Draw upon and link to course concepts as applicable. Limit your answer to one page. (8 marks)

b) Suggest at least three solutions you think could have prevented the problems Cisco faced as described in the article. Be specific as to how your suggested solutions would help solve the problems. Limit your answer to one page. (6 marks)

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