

Homework 5

Plan.

Thurs – Look over Hw assignment

Fri – Work on problem 1 & 2

Sat – Work on problem 5 & 6

Sun – Look over Homework Assignment

Tues - submit homework Assignment

1. Problem 1: D 11.1,11.2

Define

D 11.1 What is the role of safety inventory in the supply chain?

D 11.2 Explain how a reduction in lead time can help a supply chain reduce safety inventory without hurting product availability.

Plan

What information is available for solving the problem?

- Lecture Notes
- The Textbook (Chapter 11)
- Structured Problem Solving

Execute

D 11.1 what is the role of safety inventory in a supply chain?

The role of having inventory in a supply chain is the fact that there is seasonality in demand for a company. Where demands for a product increases exponentially. So, to combat the situation of having no inventory. Safety inventory storage can make the company responsive in customer demand in the case where demand is more than the forecasted aka predicted demand would be. Though the company may have to pay for the storage, but it should be considered as an insurance policy in the sense that they will react more quickly to customers demands and not running out.

D 11.2 Explain how a reduction in lead time can help a supply chain reduce safety inventory without hurting product availability.

The way reduction in lead time can help a supply chain reduce safety inventory without hurting product availability is lead time is the time from which a company runs out of products to the point where they need to reorder. Having a lead time can help the company run things smoother in the sense that they will know when to reorder once the storage product decrease to a certain level. Therefore, reducing lead time means that the company has to reorder sooner meaning less products will be needed to be stored. The company can just reorder and put them out in stores rather than saving it in the inventory in case of sudden increase in demand.

Check your work

I checked work by making sure that I have answered all the questions. I then proceeded to go over my answers again and make sure that I had addressed the questions accordingly.

Learn and Generalize

After answering the two discussion problems, I have gained a better understanding of how safety inventory works in a supply chain. I also understand lead time in the sense how it helps the supply chain.

Problem 2 D 11.6, D11.7

Define

D 11.6 – Why can Home Depot with a few large stores provide a higher level of product availability with lower inventories than a hardware store chain such as true value with many stores?

D 11.7 – Why is Amazon able to provide a large variety of books and music with less safety inventory than a bookstore chain selling through retail stores?

Plan

What information is available for solving the problem?

- Lecture notes
- The textbook
- Structure Problem Solving

Execute

D 11.6 Why can Home Depot with a few large stores provide a higher level of product availability with lower inventories than a hardware store chain such as True Value with many stores?

Home Depot is a place for contractors and homebuilders who build take on large projects. Home Depot targets those who do a lot of hands on work. Home Depot provides everything single piece of these parts to their customers, From big pieces to small pieces. Customers at Home Depot care less about the brands they use because rather have a what they make as their product. Smaller stores customers care more about brand names and small niche things. Small stores cannot hold all kinds of brands and products in one store. This causes customers to go from store to store to find what they need. Everything a customer needs to make or complete is available at the Home Depot the one stop shop. Also, product from smaller stores have a shorter life span compared to the products provided in Home Depot.

D 11.7 – Why is Amazon able to provide a large variety of books and music with less safety inventory than a bookstore chain selling through retail stores?

The reason why Amazon is able to provide all kinds of books and music with a smaller inventory than that of a retail bookstore is the fact that Amazon is an online retail store which means that they don't need a safety inventory for every location. Since Amazon is an online retail store, they all require large inventories for their products where they choose which inventory to use depending on where the customer is ordering from. Unlike in store retailers they have safety for every store located because of convenience to have closer inventory due to responsiveness. Since there are many retailers, it adds a lot of safety inventories.

Check your work

I have checked my work by making sure that I have answered all of the questions. I then proceeded to go over my answers to make sure I addressed the questions accordingly.

Learn and Generalize

These exercises gave me an understanding of inventories and safety stock. It also gave me a real-life scenarios that allowed me to understand the safety inventory better.

Problem 3 exercise 10.3

Define

Harley purchases components from three suppliers. Components purchase from supplier A are priced at \$5 each and used at the rate of 20,000 units per month. Components purchased from supplier B are priced at \$4 and used at the rate of 2,500 units per month. Components purchased from supplier C are priced at \$5 each and used at a rate of 900 units per month. Currently, Harley purchases a separate truckload from each supplier. As part of JIT drive, Harley had decided to aggregate purchases from the three suppliers. The trucking company charges a fixed cost of \$400 for the truck with an additional charge of \$100 for each stop. Thus, If Harley asks for a pickup from only one supplier, the trucking company charges \$500; from two suppliers, it charges \$600; and from three suppliers; it charges \$700. Suggest a replenishment strategy for Harley that minimized annual cost. Compare the cost of your strategy with Harleys current strategy of ordering separately from each supplier, What is the cycle inventory of each component at Harley?

Plan

What information is available to use?

- Lecture notes
- Textbook

Execute

Given data

	Unit Cost	Monthly Demand	Yearly Demand
Supplier A	\$5	20,000	240,000
Supplier B	\$4	2,400	30,000
Supplier C	\$5	900	10,800

	Fixed price	Price per stop
Trucking	\$400	\$100

Holding Cost 20%

Equations given from the textbook:

D = Annual demand of the product

S = Fixed cost incurred per order

C = cost per unit

H = holding cost per year as a fraction of production cost

Optimize lot size = $Q^* = \sqrt{2DS/hC}$

Number of orders cost = (D/Q)

Annual order cost = $(D/Q)*S$

Annual holding cost = $(Q/2)*hC$

Total annual cost = Order Cost + Holding Cost

Ordering Separately from Suppliers

	# Order per Year	Order Size	Order Cost	Holding Cost	Total Cost
Supplier A	15.49	15491.93	7745.97	7745.97	15491.93
Supplier B	4.90	6123.72	2449.49	2449.49	4898.98
Supplier C	3.29	3286.34	1643.17	1643.17	3286.34
				Sume of Total Cost	23,677.20

Ordering Aggregately from Suppliers

	# Order per Year	Order Size	Order Cost	Holding Cost	Total Cost
Supplier A	14.01	17130.38	7005.10	8565.19	15570.29
Supplier B	14.01	2141.30	1401.02	856.52	2257.54
Supplier C	14.01	770.87	1401.02	385.43	1786.45
				Sume of Total Cost	19,614.28

Calculated these from the Excel equations. Comparing both tables, it seems that ordering separately from the suppliers is more expensive than ordering components all together and have the truck conduct multiple stops at once. There the strategy that Harley Davidson should use is ordering all the suppliers at once through single trip.

Check your Work

The work is checked by going over the answers again to make sure that I addressed the questions accordingly.

Learn and Generalize

After comparing the end costs in terms of holding cost, ordering cost, and transportation. This problem brought a better understanding of how companies calculate their costs.

Problem 4 Exercise 11.1

Define

Weekly demand for Motorola cell phones at a Best Buy store is normally distributed, with a mean of 300 and a standard deviation of 200. Motorola takes two weeks to supply Best Buy. Best Buy is targeting a CSL of 95 Percent and monitors its inventory continuously. How much safety inventory of cell phones should Best Buy carry? What should its ROP be?

Plan

What information is available for solving this problem?

- Lecture notes
- Textbook
- Equations & Appropriate tables
- Problem solving method

Execute

Equations:

D = demand

L = lead time

D_L = mean

σ = standard deviation

D_L = D * L

σ = Sqrt (Lσ_D)

ROP = Reorder Point = NORMINV($SL, \overline{DDL T}, \sigma_{DDL T}$)

Safety Inventory, ss = ROP – DL = $ROP - \overline{DDL T}$

Expected demand during lead time = D * L

CSL = the fraction of replenishment cycles that end with all the customer demand being met.

$$\sigma_{DDL T} = \sqrt{L * \sigma_D^2 + D^2 * \sigma_L^2}$$

Given Data:

D = 300 phones/week

σ_D = 200

L = 2 weeks

CSL = 95%

With the information given, I can now calculate the ROP and safety inventory for Best Buy in regards to Motorola.

D_L = D * L = 300 * 2 = 600 phones

$$\sigma_{DDL T} = \sqrt{L * \sigma_D^2 + D^2 * \sigma_L^2} = \sqrt{2 * 200^2 + 200^2 * 0} = \mathbf{283}$$

ROP = NORMINV($SL, \overline{DDL T}, \sigma_{DDL T}$) = NORMINV(95%, 600, 283) = **1,065**

ss = $ROP - \overline{DDL T}$ = 1,065 – 600 = **465**

The safety inventory of Motorola cell phones Best Buy should carry is **465 cell phones** and its ROP is **1,065 phones**.

Check your Work

Checked work by making sure that I have answered all the equations. I then proceeded to go over my answers again and make sure that I had addressed the equations accordingly. For this problem. I also had to look over the equations to make sure that I have used them correctly with the right calculations.

Learn and Generalize

This is Harley problem gave me a better understanding on how the mean and standard deviation can help a company figure out the safety inventory size and its reordering point.

Problem 5 Walmart

Define

Estimate Walmart's daily, weekly, monthly, and annual cycle inventory for toilet paper.

Plan

What information is available for solving the problem?

- Lecture notes
- Textbook
- Further Walmart research
- Tables & Equations
- Structured Problem Solving

Execute

Looking through Walmart's website for toilet paper, it seems that on average, watch toilet paper roll costs about \$0.80. This does not mean Walmart's profit but rather how much their customer pays for one roll of toilet paper. Assuming that Walmart profit is extracted from the \$0.80, it will leave them with a cost of \$0.05 per roll of toilet paper.

Doing research, I came across an article from New York Times that the average usage of toilet paper across the whole United States is \$2.4 billion. Taking this information, I assume that there is a demand of 27,000 billions rolls annually.

Since Walmart isn't the only retail store in America that sells toilet paper, I will assume that their holding cost is about 10%. Walmart is a big store which makes their inventory large.

Walmart can front large sums of money in order to decrease their overall cost. I assume the shipment cost will be 550 per truck because Walmart orders in bulk which makes it less expensive.

D = 27,500,000 unites

C = \$0.05 per roll

S = \$550 per shipment

H = 10% = .10

D = Annual demand of the product

S = Fixed cost incurred per order

C = Cost per unit

h = Holding cost per year as a fraction of product cost

Optimal lot size = $Q^* = \sqrt{(2DS)/hC}$

Number of orders per year = D/Q

Annual ordering cost = $(D/Q)*S$

Annual holding cost = $(Q/2)*H = (Q/2)*hC$

Total annual cost = Order Cost + Holding Cost

	Annual	Monthly	Weekly	Daily
Annual Demand, D	27,500,000	2291666.67	528846.15	75342.47
Material Cost, C	\$0.05	\$0.05	\$0.05	\$0.05
Shiping Cost, S	\$550	\$550	\$550	\$550
Holding Cost, h	10%	10%	10%	10%
EOQ, QL*	245967.48	71004.69	34109.55	12874.53
# Order per...	111.80	32.27	15.50	5.85
Annual Order Cost	\$61,491.87	\$17,751.17	\$8,527.39	\$3,218.63
Cycle Inventory	122983.74	35502.35	17054.78	6437.26
Annual Holding Cost	\$614.92	\$177.51	\$85.27	\$32.19
Total Inventory Cost	\$62,106.79	\$17,928.69	\$8,612.66	\$3,250.82

These were similar steps and equations done in problem 3. Monthly = 12, Weekly = 52, Daily = 365. I tried to make the numbers as realistic as possible. However, but looking at the numbers calculated, it seems that some didn't seem as accurate as it should be,

I think that I gave a higher estimate for Walmart. I believe that by looking at the table provided. Walmart should have smaller values than the ones I provided.

Check your work

I have checked my work by making sure that I have answered all of the equations. I then proceeded to go over my answers again and making sure that I have addressed the equations accordingly. For this problem, I also had to look over the equations to make sure that I have used them correctly with the right calculations.

Learn and Generalize

In order to give an estimate on Walmart's weekly, monthly, and annual cycle inventory, I did research for prices of toilet paper. I created guesses on other values such as holding cost, transportation cost, total demand annually ect.

Problem 6 Plantronics

Define

What is Plantronics core product line? What is Plantronics competitive strategy?

Explain Plantronics traditional approach to supply chain management? Explain Plantronics current global supply chain management? Describe Plantronics dream SCM Scenario for the future? Is this dream realizable?

Explain the role of software and information technology in the managing of Plantronics global product development effort and its global supply chain network.

Summarize 5-10 key lessons learned from studying Kai Hypko 2009 SCM presentations

Plan

What information is available for solving the problem?

- Lecture notes
- Tom Gill Presentation
- Kai Hypko presentation
- Further research on Plantronics
- Structured problem solving

Execute

What is Plantronics Core Product line? What is Plantronics Competitive strategy.

Plantronics has many different product lines but there in focuses is in their unified communications where most of their products are based off the use of telecommunications via Bluetooth and other sorts of headsets. Plantronics have a wide variety of headsets such that it tangles form universal access to office use to home use to hand carry easy go access. Even though they only have a focus, Plantronics has been a successful in their market.

Plantronics competitive strategy is a focused strategy where they are the are focused on headset technology. Even though they do sell technical products, headsets is there main

business. They have a variety of headsets for different customer needs. Even though Plantronics is a medium sized company They offer a variety of products that are industry standard and compatible with other products. This strategy makes them favorable.

Explain Plantronics traditional approach to supply chain management? Explain Plantronics current global supply chain management? Describe Plantronics dream SCM Scenario for the future? Is this dream realizable?

Plantronics puts their focus in simplicity and quality. This allows their products to be more appealing to their customers as a core usage equipment; easy and high quality.

The dream of Plantronics is to have their product line expand further out across the nation. Even though their products are high in quality, they lack brand recognition. Many people do not know about Plantronics. Until Plantronics is well known and respected competitors will have more products against theirs.

Explain the role of software and information technology in the managing of Plantronics global product development effort and its global supply chain network.

The role of software and information technology in the management of Plantronics global product development effort and its global supply chain network focuses on the key ideas of investments in the field of networks and connectivity, voice communication, email and messaging, servers, and storage ect .. Their role is global approaches is to have improved communication throughout many locations just as UK, China, and Mexico.

Summarize 5-10 key lessons learned from studying Kai Hypko 2009 SCM presentations

- Plantronics focus are their headsets
- Plantronics started manufacturing headsets in Mexico as a part of the Maquiladora program
- Plantronics Main distributor center is in China
- Kai Hypko is the senior director of supply chain systems

Check your work

Answered all aspects of the questions asked within the problem.

Learn and Generalize

Looking over the presentations for Plantronics have gave me a better understanding of Plantronics in terms on how their supply chain is doing. Both presentations gave me information that I did not know about which I found interesting. Having a focus like Plantronics lead to variety and longevity of the company till this day.