United International University

School of Science and Engineering

Course Title: Simulation and Modeling Lab

Course Code: CSI 424

**The News Dealer’s Problem**

A classical inventory problem concerns the purchase and sale of newspaper.

The newsstand buys the paper for 33 cents each and sells them for 50 cents each. (The lost profit from excess demand is 17 cents for each paper demanded that could not be provided).

Newspapers not sold at the end of day are sold as scrap for 5 cents each. (The salvage value of scrap papers)

Newspapers can be purchased in bundles of 10.Thus the paper seller can buy 50, 60 and so on.

There are three types Newsday , “good” ,”fair” and “poor” , with probabilities of 0.35 , 0.45 and 0.20 respectively.

The problem is to compute the optimal number of papers the newsstand should purchase. This will be accomplished by simulating demands for 20 days and recording profits from sales each day.

The profits are given by the following relationship:

Profit = (revenue from sales)-(cost of newspaper)-(lost profit from excess demand) +(salvage from sale of scrap papers).

To solve this problem by simulation requires setting a policy of buying a certain numbers of paper each day (for example, 70 papers), then simulating demands for papers over the 20-day time period to determine the total profit. The policy (number of newspaper purchased) is changed to other values and the simulation repeated until the best value is found.

Table-1:

Random Digit Assignment for type of Newsday

|  |  |  |  |
| --- | --- | --- | --- |
| Type of Newsday | Probability | Cumulative probability | Random digit assignment |
| Good | 0.35 | 0.35 | 01-35 |
| Fair | 0.45 | 0.80 | 36-80 |
| Poor | 0.20 | 1.00 | 81-100 |

Table-2

Random Digit Assignments for Newspaper Demanded

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Cumulative Distribution | | | Random Digit assignment | | |
| Demand | Good | Fair | Poor | Good | Fair | Poor |
| 40 | 0.03 | 0.10 | 0.44 | 01-03 | 01-10 | 01-44 |
| 50 | 0.08 | 0.28 | 0.66 | 04-08 | 11-28 | 45-66 |
| 60 | 0.23 | 0.68 | 0.82 | 09-23 | 29-68 | 67-82 |
| 70 | 0.43 | 0.88 | 0.94 | 24-43 | 69-88 | 83-94 |
| 80 | 0.78 | 0.96 | 1.00 | 44-78 | 89-96 | 95-100 |
| 90 | 0.93 | 1.00 | 1.00 | 79-93 | 97-100 |  |
| 100 | 1.00 | 1.00 | 1.00 | 94-100 |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Day | Random Digit for type of news day | Type of news day | Random digit for demand | Demand | Revenue from sales | Loss profit from excess demand | Salvage from sale of scrap paper | Profit |
| 1 | 94 | Poor | 80 | 60 | 30 | 0 | 0.5 | 7.4 |
| 2 | 77 | Fair | 20 | 50 | 25 | 0 | 1.0 | 2.9 |
| 3 | 49 | Fair | 15 | 50 | 25 | 0 | 1.0 | 2.9 |
| 4 | 45 | Fair | 88 | 70 | 35 | 0 | 0 | 11.90 |
| 5 | 43 | Fair | 98 | 90 | 45 | 3.4 | 0 | 18.50 |
|  |  |  |  |  | 160 | 3.4 | 2.5 | 43.6 |
|  |  |  |  |  |  |  |  |  |

|  |  |
| --- | --- |
| Revenue from sales | 90 \* 0.50 = 45 |
| Salvage from scrap paper | 0 |
| Loss profit from excess demand | 20 \* 0.17 = 3.4 |
| Cost of newspaper | 70 \* 0.33 = 23.1 |

Profit = (revenue from sales)-(cost of newspaper)-(lost profit from excess demand) +(salvage from sale of scrap papers).

Paper : 70 ,Total profit(5 days) = 160 – (70\*0.33\*5) – (3.4) + (2.5) = 43.6

