

**Cairo University**

**Faculty of Computers and Artificial intelligence**

**DS331/DS241 -** **Systems Modeling & Simulation**

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**Problem 2**

**Part(1)**

**Problem formulation :**

There is a newspaper seller who wants to buy a number of newspapers and wants to help us know what is the appropriate number of newspapers that he should buy every day in order to increase his profit and not to sell many of them for scrap

Profit = 0.7\* Revenue of selling – 0.5\* num of newspapers – 0.2\* lost profit from excess demand

+ 0.15 \* unsold newspapers

**The objectives :**

Need from this simulation is to make define the best situation that the newspaper can make max profit In his business days .

And eliminate the lost money .

**Part(2)**

**System component:**

* **Entity:** newspaper , seller .
* **Attribute :** Newsday new purchase of newspaper .
* **Activity:** (selling a newspapers – buy newspapers)
* **State :** number of newspaper .
* **Event :** (newspaper arrive – newspaper selling) .

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Day | Rand type | Type | Rand demand | demand | Num of  newspaper | Unsold  newspaper | Revenue of selling | Lost profit | Salvage  Scrap  paper | cost | Profit |
| 1 | 0 | EXCELENT | 39 | 80 | 40 | 0 | 56 | 8 | 0 | 20 | 28 |
| 2 | 68 | FAIR | 67 | 70 | 40 | 0 | 49 | 6 | 0 | 20 | 23 |
| 3 | 91 | FAIR | 1 | 40 | 40 | 0 | 28 | 0 | 0 | 20 | 8 |
| 4 | 24 | GOOD | 49 | 70 | 40 | 0 | 49 | 6 | 0 | 20 | 23 |
| 5 | 65 | FAIR | 17 | 50 | 40 | 0 | 35 | 2 | 0 | 20 | 13 |
| 6 | 47 | GOOD | 61 | 80 | 40 | 0 | 56 | 8 | 0 | 20 | 28 |
| 7 | 49 | GOOD | 28 | 60 | 40 | 0 | 42 | 4 | 0 | 20 | 18 |
| 8 | 63 | FAIR | 14 | 40 | 40 | 0 | 28 | 0 | 0 | 20 | 8 |
| 9 | 60 | GOOD | 43 | 70 | 40 | 0 | 49 | 6 | 0 | 20 | 23 |
| 10 | 83 | FAIR | 46 | 60 | 40 | 0 | 42 | 4 | 0 | 20 | 18 |

Tables of distribution :

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| demand | Excellent | Good | fair | poor | Excellent | Good | fair | poor | Excellent | good | fair | poor |
| 40 | 0.00 | 0.06 | 0.15 | 0.42 | 0.00 | 0.06 | 0.15 | 0.42 | 0 | 1-6 | 1-15 | 1-42 |
| 50 | 0.07 | 0.09 | 0.22 | 0.28 | 0.07 | 0.15 | 0.37 | 0.70 | 1-7 | 6-15 | 16-37 | 43-70 |
| 60 | 0.08 | 0.16 | 0.28 | 0.14 | 0.15 | 0.31 | 0.65 | 0.84 | 8-15 | 16-31 | 38-65 | 71-84 |
| 70 | 0.12 | 0.19 | 0.18 | 0.10 | 0.27 | 0.50 | 0.83 | 0.94 | 16-27 | 32-50 | 66-83 | 85-94 |
| 80 | 0.13 | 0.28 | 0.10 | 0.05 | 0.40 | 0.78 | 0.93 | 0.99 | 28-40 | 51-78 | 84-93 | 95-99 |
| 90 | 0.22 | 0.12 | 0.05 | 0.01 | 0.62 | 0.90 | 0.98 | 1 | 41-62 | 79-90 | 94-98 | 99-00 |
| 100 | 0.23 | 0.07 | 0.02 | 0.00 | 0.85 | 0.97 | 1 |  | 63-85 | 91-97 | 99-00 |  |
| 110 | 0.08 | 0.03 | 0.00 | 0.00 | 0.93 | 1 |  |  | 86-93 | 98-00 |  |  |
| 120 | 0.07 | 0.00 | 0.00 | 0.00 | 1 |  |  |  | 94-00 |  |  |  |

Part (3)

Experimental design :

Type of distribution of probability data :

1. Type of newspaper (
2. Type of demand (

**Justification of experimental parameters :**

Controllable input :

* Newspaper buying.
* Newspaper price .
* Number of newspaper in each bundle .

Probability input

* Demand .
* Type of news.

Part (4)

The question that needed in the project:

1- The optimal number of papers the seller should purchase to increase his profit = 40 newspaper (2 pandels).

2- The price of selling the newspaper : Because the higher the selling price, the higher the profit.

Chart, line chart

Description automatically generated

selling the unsold newspapers as a scrap affect your answer :

Because the fewer unsold newspapers that are sold as junk, the greater the profit

Chart, line chart

Description automatically generated

3- The size of bundle used to purchase newspapers affect your answer : Because the less the number of newspapers, the less the number of unsold newspapers, so the profit increases.

Chart, line chart

Description automatically generated

Histogram shows the result of 400 trials, each of 30 days :

Chart, histogram

Description automatically generated

Conclusion:

In this simulation project we need to simulate the process of the newspaper selling and get the most profit that newspaper seller can get and eliminate the salvage newspaper , we make the run for the simulation project by that the newspaper seller buy 40 and 60 and 80 and 100 and 120 , finally we get that in 40 newspaper get high profit , because this number eliminate the salvage number of newspaper .