Title page

Inventory plan

1. Inventory plan for Martin-Pullin Bicycle Corporation

Throughout inventory planning general rule is used that allow an organization to determine the quantity of goods and services that is likely to be produced. Forecasting demand is the next step that saves the organization form running out of stocks by producing desires quantity. Inventory control is important because it offers flexibility for managing stocks and fulfilling the demands of customers (Render, Stair, & Hanna, 2013). The central purpose for building inventory planning is to decide how much bicycles must be developed based on the ordering assumptions. Major goal behind this is to minimize inventory cost by determining the cost of items, ordering cost, carrying cost, holding cost and cost of stockouts.

The chart shows the output obtained from the given data. Optimal order quantity is maintained for keeping the cost at lowest. The average inventory is estimated as 34.14 while the annual holding cost is $417.89. The cost of annual setup is also estimated as $417.89. Therefore the total inventory cost is calculated as 2 x $417.89 = $835.79. average demand is 439/12 = 36.58 bicycles per month. Standard deviation is 24.58 bicycles. Inventory plan is calculated as;

Order cost = 65/ order

Cost for each bicycle = 102(170\*60%)

Holding cost = 102 x 1% x 12 per year per bicycle

 = 12.24

Service level = 95% with respect to z value of 1.645

Lead time = 1 month = 4 weeks

Yearly demand = 439 units of bicycle

The chart represents the use of simple EOQ model that is based on recorder point and stocks safety. The seasonal nature of the demand is not considered for this purpose. Fluctuations are managed by relying on safety stocks based on variations of demand (Chan, Tasmin, Aziati, Rasi, Ismail, & Yaw, 2020). The table shows the forecasted demand for bicycles during the period of 12 months (Jan- Dec).

|  |  |
| --- | --- |
| **Months**  | **Forecasted demand**  |
| Jan | 8 |
| Feb | 15 |
| March  | 31 |
| April | 59 |
| May | 97 |
| June | 60 |
| July  | 39 |
| Aug | 24 |
| Sep | 16 |
| Oct | 15 |
| Nov | 28 |
| Dec | 47 |
| Total | 439 |

Economic Order Quantity Q\* is calculated as;

Q\* = $\frac{\sqrt{2 x Total demand x ordering cost}}{Holding cost}$

Holding cost and total demand are calculated on yearly basis.

Q\* = $\frac{\sqrt{2 x 439 x 65}}{12.24}$

= 68 bicycles

The table shows the inventory plan for the EOQ model based on these calculations.

|  |  |
| --- | --- |
| **Martin-Pullin Bicycle Corporation** |  |
| **Inventory plan** | **EOQ model** |  |
|  |  |  |
| **Input**  |  |  |
| D | Demand rate | 439 |
| Co | Ordering cost | $65 |
|  Ch | Carrying cost | $12.25 |
| P | Cost per unit purchase |   |
|  |  |  |
| **Output** |  |  |
| Q\* | Economic order quantity | 68.28 |
| I avg | Average inventory | 34.14 |
| Imax | Maximum inventory | 68.28 |
| N | Number of orders | 6.43 |
|   |   |   |
| Hc | Total holding cost | $417.89 |
| Oc | Total ordering cost | $417.89 |
| Pc | Total purchase cost | $0 |
| C | Total cost | $835.79 |

1. Reorder Points (ROP) and total costs

Recorder Point (ROP) is used for determining the demand which requires standard deviation. Total forecast of 2011 is considered for this purpose. The simplest way of computation is dividing the forecast with the number of months and standard deviation (Lancioni & Howard, 1978).

ROP = (average demand during lead time) + z (standard deviation during lead time)

ROP = 36.58 + 1.6425 (24.581)

 = 76.89 bicycles that is approximately 77.

Demand standard deviation and safety stock gives the value of ROP as 76.89. This is the value at which the order must be placed (Render, Stair, & Hanna, 2013). Total cost is calculated by considering annual inventory holding cost, purchase cost and setup cost. It gives the value of $835.79.

Safety stock is calculated as;

SS = z (standard deviation during lead time) σ (standard deviation)

 = 1.6425 x 24.58

 = 40 bicycles approximately

Inventory cost is estimated as;

Total annual inventory cost = annual ordering cost + annual holding cost

 = 1/2 Q\* (Holding cost) + SS (Holding cost) + Total demand/ Q\* (ordering cost)

 = $416 + $489.60 + $416 = $1321.60

It is also possible to trace inventory behavior by assuming the forecast figures estimated are accurate. This relies on ignoring the forecasting errors for determining total stocks throughout. Lost profit can also be estimated by considering stock out and that can be added to total cost (Chan, Tasmin, Aziati, Rasi, Ismail, & Yaw, 2020).

|  |
| --- |
| **Martin-Pullin Corporation Safety Stocks**  |
| **Inventory** |  |  |
|  |  |  |
| **Input data** |  |  |
| μ | Mean DDLT | 36.58 |
| σ | Standard deviation | 24.58 |
| SD | Desired service level | 95% |
| Ch | Carrying cost | $12.24 |
|  |  |  |
| **Output data** |  |  |
| SS | Safety stock | 40 |
| ROP | Recorder point | 76.58 |
| CC | Carrying cost of SS | $489.60 |

1. Addressing demand

Demand for bikes at the end of month are calculated as leveling demand over planning horizon. EOQ is not used throughout the year for seasonal sales as it is not appropriate. This is because a level demand over planning horizon is missing for determined demand (Chan, Tasmin, Aziati, Rasi, Ismail, & Yaw, 2020). Planning horizon is quarterly planned because it makes it more evenly distributed and helps in making plan for each segment. It is better to use segments for the creation of planning horizon. This is done in a way that demand is distributed evenly and inventory plan is developed for each segment independently. The best approach is making quarterly inventory planning. When segment is selected a common challenge faced is managing transition among planning periods.

References

Chan, S. W., Tasmin, R., Aziati, A. H., Rasi, R. Z., Ismail, F. B., & Yaw, L. P. (2020). Factors Influencing the Effectiveness of Inventory Management in Manufacturing SMEs. *Materials Science and Engineering*.

Lancioni, R. A., & Howard, K. (1978). Inventory Management Techniques. *International Journal of Physical Distribution & Materials Management, 8* (8), 385-428.

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