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Solving Inventory Management Problems Through Mathematical Models: A New Paradigm For Industrial Growth

Shefali Choudhary[1], Dr. Pardeep Goel[2], Prof. (Dr.) Vikas Shrotriya[3]

Research Scholar, VGU, Jaipur[1], Associate Professor, Department of Mathematics, M. M. (PG) College, Fatehabad[2], Dean In-charge, Faculty of Management, VGU, Jaipur[3]

shefalichoudhary406@gmail.com[1], pardeepgoel1958@gmail.com[2], vikas.s@vgu.ac.in[3]

ABSTRACT

Inventories are actually raw materials, work-in-process goods and completely finished products which are regarded as to be the percentage of business's assets which are prepared or perhaps will be all set for sale. Formulating a suitable inventory design is actually on the list of main concerns for an industry. In the prior research, the many inventory models under inflationary circumstances have been designed. In these designs, the need fee, generally, has been deemed regular and well known, time varying, stock dependent or perhaps price dependent. Nevertheless, the need fee, generally, is actually unsure in the real world. This paper is all about the mathematical modeling of an inventory management system. Consequently, in this particular study, the brand new inflationary inventory models under stochastic demand situations have been designed. These elements include the dynamics of inventory use, the share of inventories in sales, the capability of means of transportation and, above all, the reliability of suppliers. The developed unit will be examined by way of a numerical example.

Key words: inventory models, mathematical models, inflationary circumstances,and stochastic demand.

I. INTRODUCTION

A business can run easily its operating exercises just when fitting measure of inventory is maintained. Inventory influences every operating action like manufacturing, warehousing, deals and so on. The measure of opening inventory and closing inventory ought to be sufficiently adequate so the different business exercises are not unfavorably influenced. Accordingly, inventory assumes a significant job in activities management.

Inventories infest the business world. Inventory alludes to sit goods or materials held by an association for use later on. The control and maintenance of inventories of physical goods is a typical issue to all undertakings in any segment of a given economy. For instance, inventories must be maintained in horticulture, industry, retail foundations, and the military. Maintaining inventories is fundamental for any organization dealing with physical items, including producers, wholesalers, and retailers. For instance, makers need inventories of the materials required to make their items. They

additionally need inventories of the finished items awaiting shipment. Additionally, the two wholesalers and retailers need to maintain inventories of goods to be accessible for buy by customers.

An Inventory framework is a framework wherein just the following three kinds of expenses are noteworthy, and in which any a few are liable to control:

1. The expense of carrying inventories.
2. The expense of incurring deficiencies.
3. The expense of replenishing inventories.

A production framework is one in which these expenses emerge, and are liable to control. In this framework the expenses might be controlled by making suitable choices about ordering crude materials, manufacturing semi-finished and finished goods and inventorying goods for shipment to customers.

Conventional inventory management techniques recommend stocking an inventory level for limiting the framework cost. This methodology doesn't deal with hazard or the time estimation of cash in the ongoing exceptionally unpredictable market circumstances. In a large portion of the exploration work, the time estimation of cash and expansion were ignored. (Tayal S. et al., 2014) [1]

In the event that the arranging skyline is short, it might be suitable to overlook the time estimation of cash to rearrange the choice procedure. In any case, if the arranging skyline is long, the time estimation of cash can't be overlooked (Sazvar Z. et al., 2013) [2]. To loosen up the supposition of no inflationary consequences for costs, first endeavor were of Buzacott and Misra who at the same time built up an EOQ model with a steady swelling rate for all related expenses. After that few analysts stretched out their way to deal with different practical circumstances by considering the time estimation of cash, distinctive swelling rates for the interior and outside costs, limited renewal rate, deficiencies, multiplying, and so on(Lin Y-J, 2010) [3].

Bierman and Thomas proposed an EOQ model under expansion that likewise fused the rebate rate. Misra expanded the EOQ model with various swelling rates for different related expenses. Examining inventory models while thinking about time and worth, Moon and Yun chipped away at the discounted cash stream way to deal with completely recognize the time estimation of cash and detailed a limited arranging skyline EOQ model in which the arranging skyline is an arbitrary variable(Ghiami Y., et al., 2013)[4]. Sarker and Pan studied the impacts of expansion and the time estimation of cash on request amount with limited renewal rate. Beam and Chaudhuri exhibited an EOQ model under expansion and time limiting permitting deficiencies. Small and Law utilized the idea of swelling and time estimation of cash into the model with value ward request and reasonable lack. Horowitz examined a straightforward EOQ model with an ordinary dissemination for the expansion rate. Further, Wee and Law displayed a heuristic way to deal with determine the close to ideal recharging and estimating approach that attempts to augment the absolute net present-esteem benefit(Behzadian M., 2005)[5].

They applied the discounted cash flows (DCF) approach for issue examination. Balkhi considered a generation part size inventory model with decay and defective items, considering expansion and the time estimation of cash. At that point, Yang et al. gave a blended inventory model, in which the appropriation of lead time request is ordinary, to consider the time esteem(Banks J. et al., 1987) [6].

II. LITERATURE REVIEW

Mykhailo Luchko(2019)[7]The model of inventory management based on which the figurings of the proficiency of the utilization of inventories, limiting the all out expenses related with their conveyance, stockpiling and fines for absence of stocks within the sight of interest for them have been made and introduced in the article.

Dr.Tariq Sheakh(2018)[8] Inventory management is a challenging issue region in production network management. Organizations need to have inventories in distribution centers in request to satisfy client request, in the interim these inventories have holding expenses and this is solidified reserve that can be lost. In this manner, the assignment of inventory management is to find the amount of inventories that will satisfy the interest, avoiding overloads. This paper displays a contextual analysis for the steel manufacturing industry (Small Scale Industry) on inventory management. The connection between the inventory management and friends execution was determined dependent on inventory days and profit for resource (ROA) examination. The exploration found that organization X had a couple of inventory issues, for example, disorderly inventory course of action, enormous measure of inventory days/no cycle counting and no precise records money owed to incompetent specialists. The examination likewise demonstrated that there was a noteworthy connection between return on resource (ROA) and inventory days. This paper additionally gives proposal to the organization and for further research.

O. Erhun Kundakcioglu (2016)[9]in this paper, we present a survey and investigation of concentrates that attention on compassionate inventory arranging and management. In particular, we center around papers which create strategies and models to decide the amount to stock, where to stock, and when to stock all through the compassionate store network. We classify papers as indicated by the fiasco management cycle tended to; explicitly, we center on pre-debacle and post-catastrophe inventory management. We assess existing writing regarding issue viewpoints tended to, for example, leaders, partners, catastrophe types, products, office types, execution measures just as methodological perspectives (i.e., sorts of arrangements, models, and arrangement draws near). We recognize momentum holes in the writing and propose headings for future research.

Stephen Aro-Gordon(2016)[10]The paper gives a valuable outline of the significant inventory management techniques dependent on an ongoing survey of the writing in the field and meetings with management educators and specialists. Research in the field commonly will in general treat the developing methodologies techniques in storehouses; not many scholastic papers have endeavored to attempt an all encompassing survey of the few key rising techniques accessible to the present professional.

Ehab Bazan (2015)[11]the capable management of item return flows underway and inventory situations is a quickly expanding prerequisite for organizations. This can be credited to financial, ecological as well as administrative inspirations. Numerical demonstrating of such frameworks has helped basic leadership forms and gave a superior comprehension of the conduct of such creation and inventory conditions.

Serhii Ziukov(2015)[12]Inventories are crude materials, work-in-process products and totally completed merchandise that are viewed as the segment of business' advantages that are prepared or will be prepared available to be purchased. Detailing a reasonable inventory model is one of the significant worries for an industry. The most punctual logical inventory management inquires about go back to the second decade of the previous century; however the enthusiasm for this logical zone is as yet incredible. Again considering the unwavering quality of any procedure is a significant element in the exploration exercises. Estimations of certain components are difficult to characterize or practically unbelievable. In such cases, fluffy models of inventory management assume a significant position. This paper dissects potential parameters of existing models of inventory control. An endeavor is made to give an exceptional audit of existing writing, focusing on portrayals of the qualities and sorts of inventory control models that have been created.

Travis Tokar & Brent D. Williams (2008)[13] The motivation behind this paper is to give an audit of inventory management articles distributed in significant coordinations outlets, distinguish subjects from the writing and give future heading to inventory management research to be distributed in coordinations diaries. Structure/system/approach – Articles distributed in significant coordinations articles, beginning in 1976, which add to the inventory management writing are checked on and indexed. The articles are sectioned dependent on significant topics removed from the writing just as key suppositions made by the specific inventory management model. Findings – Two significant topics are found to rise up out of coordinations look into concentrated on inventory management. To begin with, coordinations scientists have concentrated on integrating customary coordinations choices, for example, transportation and warehousing, with inventory management choices, using conventional inventory control models. Second, coordinations scientists have all the more as of late centered around examining inventory management through collective models. Originality/esteem – This paper indexes the inventory management articles distributed in the significant coordinations diaries encourages the mindfulness and energy about such work, and stands to direct future inventory management look into by highlighting holes and unexplored themes in the surviving writing.

III. RESEARCH METHODOLOGY

1. Problem Modeling

To propose the inventory model, parameters and variables are first introduced and the proposed model is then presented.

- C: Cost of each order

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- D: Rate of demand (consumption rate per unit time)
- H: Cost of maintenance (cost of maintaining one item per unit time)
- U: unit price of an item
- Q = Qw: Quantity of each reorder (Wilson's point)
- Qs: Negative inventory (shortage)
- S: Cost of exposure to inventory shortage (cost induced by shortage of each unit item per unit time)
- d: Amount of undeterioration items
- P (d): stochastic of deterioration
- TOC: Total Ordering Cost (total cost of ordering per unit time)
- THC: Total Housing Cost (total cost of housing or storing per unit time)
- TMC: Total Paid Cost for purchasing items per unit time
- TDC: Total deterioration Cost (total deterioration, becoming unfashionable, per unit time)
- TSC: Total Shortage Cost (total cost of exposure to shortage per unit time)
- TIC: Total Inventory Cost (total cost of inventories per unit time)

Mechanical production lines are looked with different inventory costs and they attempt to actualize inventory control strategies somehow to limit all out costs. Costs caused to a framework by inventory incorporate requesting cost (Equation 2), lodging cost (Equation 3), and acquisition cost (Equation 4) (7).

$$Q_w = Q = \sqrt{\frac{2CD}{h}} \quad (1)$$

$$\mathbf{TOC} = \mathbf{C} \times \frac{D}{Q} \quad (2)$$

$$THC = h \times \frac{Q}{2} \quad (3)$$

$$TMC = D \times u \quad (4)$$

$$TIC = TOC + THC + TMC \quad (5)$$

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$$\mathbf{TIC = C \times \frac{D}{Q} + h \times \frac{Q}{2} + D \times u} \qquad \mathbf{(6)}$$

In this investigation, an inventory model was contemplated under no lack costs, in light of the fact that the deficiency cost is interminably high (Equation 6). In the main supposition, there is a rebate id offered on bigger requests. The markdown type for this situation is general; that is, by obtaining a specific amount, a rebate is gotten on all things. Along these lines, the buy cost is determined dependent on the arranged amount. The regulatory issues and general costs of warehousing (like cooling, lighting, and so on.) are basic for all things, likewise, the warehousing cost is additionally diminished, which we consider it a rebate too.

The second suspicion of the considered issue is crumbling, for which another cost is characterized as weakening cost. In this examination, crumbling is stochastic (Equation 7). Since, in advertise expectations, it is conceivable to affirm that a specific measure of materials would not die until reordering, the mean measure of break down things is considered. The all out cost can be resolved utilizing Equation 8 and Equation 9.

$$\boldsymbol{TDC = \left(P(d) \times \left(\frac{Q-d}{2}\right) \times u\right)} \qquad \mathbf{(7)}$$

$$\boldsymbol{TIC = TOC + THC + TMC + TDC} \qquad \mathbf{(8)}$$

$$\boldsymbol{TIC = \left(C \times \frac{D}{Q}\right) + \left(h \times \frac{Q}{2}\right) + (D \times u) + \left(P(d) \times \left(\frac{Q-d}{2}\right) \times u\right)} \qquad \mathbf{(9)}$$

With respect to Figure 1, so as to decide the practical reorder point, first, the TIC at Wilson's point and Qu focuses on the privilege of Qw, Qh values on the left of Qw, and the beginning stage of decaying (d) ought to be analyzed. At that point the estimation of Q for which TIC would be least can be chosen.

2. System characterization -

Our item in this undertaking is Quantity (Q) which is required to renew the inventory. In this specific model which we are taking, amount of espresso beans is just significant factor, other crude materials and ingredients relies upon measure of espresso beans, so we are taking just measure of espresso beans as an article.

a. Environmental factors

There are numerous ecological factors for this situation which influence the inventory arrangement of the organization. Like there are a few elements which influence the stock from maker, a few variables harm the inventory, similar to fire and cataclysmic events. There are numerous maintenance charges like power charges. Other condition factors like season which influences the interest of espresso, other than these, notices, populace, rivalry additionally influence the inventory framework. In our model we are not taking condition factors into account for example we are assuming that there is no interaction

among condition and the framework. So our contextual analysis model sort is shut. Likewise the degrees of subtleties are Black Box, since we are not going in profound structure.

b. Variables

We are taking three factors into account -

1. Amount Q which is required to recharge at once.
2. Time t after which the inventory is required to renew again.
3. Absolute Cost TC which is related with the inventory, which includes -

   A. Setup Cost (K),

   B. Holding Cost (h),

   C. Cost of coffee (c)

c. Parameters-

These are the parameters we are considering for our situation study

1. Ordering Cost - ordering cost is the aggregate of administrative cost and absolute expense of the considerable number of units of the item. Administrative expense doesn't rely upon the quantity of units, and per unit cost is likewise consistent.
2. Holding cost per unit-It speaks to the per unit stockpiling cost of the inventory. Complete holding cost is equivalents to per unit holding cost into number of units in the inventory, which is a variable.
3. Request: Demand in our model is considered as parameters since we are determining the interest from earlier year's interest information.

IV. RESULT AND DISCUSSION

A. Formulation

Seasons or climate significantly affects request of espresso, so it would likewise influence the inventory. So we are dividing a year into four seasons. As referenced previously, we are assuming that request is known from the earlier year information and would be steady for whole seasons yet unique for various seasons. A straightforward model representing this circumstance is the following financial request amount model or, for short, the EOQ model. (It is sometimes likewise alluded to as the financial parcel size model.) EOQ Model EOQ is the request amount that minimizes the complete

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holding expenses and ordering costs. In this model it is expected that there is consistent interest (a kg/day) for the item. This model is legitimate for consistent interest for infinite time.

The accompanying costs and terms are cited by a vender for a given ware: The all out utilization of this thing is assessed at 23000. The cost of each requesting is 7500 unit money and warehousing cost is 56 unit monetary standards, which is limited by 3 unit cash for every unit thing for each 5000 things or more. As indicated by the forecasts, 1700 non-died things would stay in the stockroom and in excess of 1700 things would die as indicated by Poison's conveyance.

The prudent amount for each request is:

$$\boldsymbol{D = 23000, C = 7500}$$

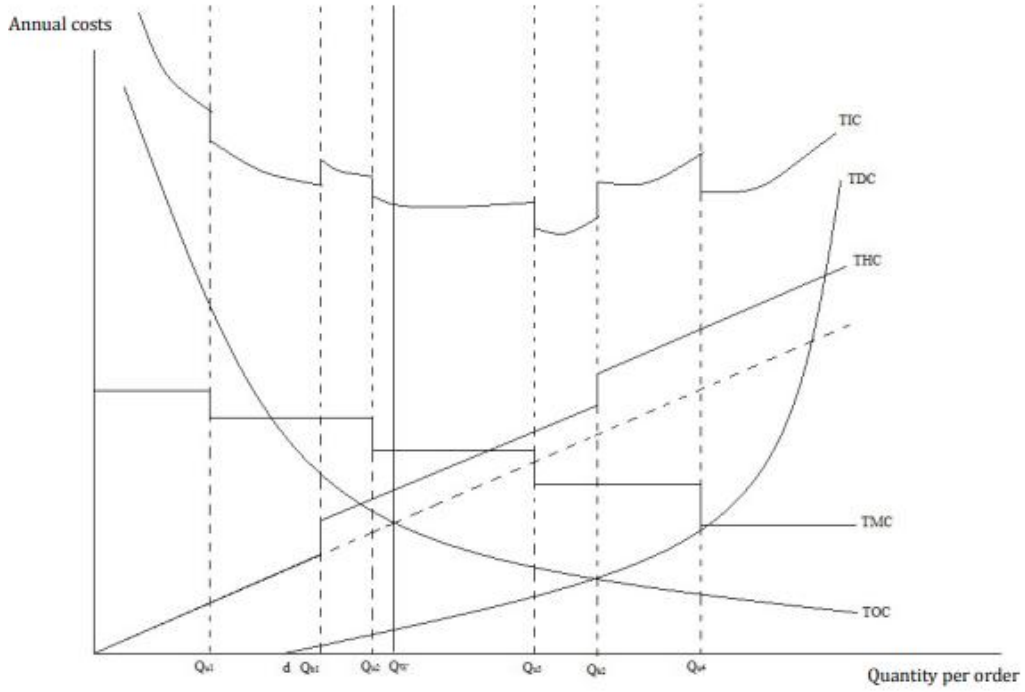

Figure 1: Annual costs for the quantity of each reorder (7).

Table 1: Item's unit price for different quantities

Ordered quantity (unit item)	Price of unit item for total ordered quantity

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0 to 1999	5000
2000 to 4999	4750
5000 to 9999	4450
10000 and more	4125

From the outset, we decided Wilson's point, gave that the warehousing cost is variable. Hence, we analyzed Wilson's point at each cost range:

$$\boldsymbol{Q_{0-1999} = \sqrt{\frac{2CD}{h}} = \sqrt{\frac{2 \times 7500 \times 23000}{56}} = 2482.07 \cong 2482}$$

Acceptable

$$\boldsymbol{Q_{2000-4999} = \sqrt{\frac{2CD}{h}} = \sqrt{\frac{2 \times 7500 \times 23000}{56}} = 2482.07 \cong 2482}$$

Acceptable

$$\boldsymbol{Q_{5000-9999} = \sqrt{\frac{2CD}{h}} = \sqrt{\frac{2 \times 7500 \times 23000}{53}} = 2551.36 \cong 2551}$$

Unacceptable

$$\boldsymbol{Q_{>10000} = \sqrt{\frac{2CD}{h}} = \sqrt{\frac{2 \times 7500 \times 23000}{50}} = 2626.78 \cong 2627}$$

Unacceptable

Since just the request amount of 2482 units is in the worthy range, the efficient point is 2482. Next, the stochastic of disintegration is resolved. Since the decay capacity is Poison's, its stochastic is resolved as pursues:

$$\boldsymbol{P\,(d\ =\ 1700)\ =\ 0}$$

$$\boldsymbol{P\,(1700 < d\ \leq 2000)\ =\ 0.05}$$

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$$\boldsymbol{P}\ (\mathbf{1700} < d\ \leq 2482)\ =\ \mathbf{0.1}$$

$$\boldsymbol{P}\ (\mathbf{1700} < d\ \leq 5000)\ =\ \mathbf{0.3}$$

$$\boldsymbol{P}\ (\mathbf{1700} < d\ \leq 10000)\ =\ \mathbf{0.6}$$

For the third step, the estimation of TIC from Equation 8 was analyzed for every Wilson's worth and qualities on the privilege of Wilson's. At that point, the qualities on the left of Wilson's point to the point weakening were additionally analyzed.

$$\boldsymbol{TIC\ =\ TOC + THC\ + TMC + TDC}$$

$$\boldsymbol{TIC} = \left(\boldsymbol{C} \times \frac{\boldsymbol{D}}{\boldsymbol{Q}}\right) + \left(\boldsymbol{h} \times \frac{\boldsymbol{D}}{\boldsymbol{Q}}\right) + (\boldsymbol{D} \times \boldsymbol{u}) + \left(\boldsymbol{P}(\boldsymbol{d}) \times \left(\frac{\boldsymbol{Q} - \boldsymbol{d}}{\mathbf{2}}\right) \times \boldsymbol{u}\right)$$

$$\boldsymbol{TIC_W} = \left(\mathbf{7500} \times \frac{\mathbf{23000}}{\mathbf{2482}}\right) + \left(\mathbf{56} \times \frac{\mathbf{2482}}{\mathbf{2}}\right) + (\mathbf{23000} \times \mathbf{4750})$$

$$+ \left(\boldsymbol{P}(\mathbf{1700} < d \leq 1700) \times \left(\frac{\mathbf{2482} - \mathbf{1700}}{\mathbf{2}}\right) \times \mathbf{4750}\right)$$

$$\boldsymbol{TIC_W} = \mathbf{109574721}$$

TIC was then analyzed for 5000 unit items:

$$\boldsymbol{TIC_{5000}} = \left(\mathbf{7500} \times \frac{\mathbf{23000}}{\mathbf{5000}}\right) + \left(\mathbf{53} \times \frac{\mathbf{5000}}{\mathbf{2}}\right) + (\mathbf{23000} \times \mathbf{4450})$$

$$+ \left(\boldsymbol{P}(\mathbf{1700} < d \leq 5000) \times \left(\frac{\mathbf{5000} - \mathbf{1700}}{\mathbf{2}}\right) \times \mathbf{4450}\right)$$

$$\boldsymbol{TIC_{5000}} = \mathbf{103251250}$$

Then for 10000 unit items:

$$\boldsymbol{TIC_{10000}} = \left(\mathbf{7500} \times \frac{\mathbf{23000}}{\mathbf{10000}}\right) + \left(\mathbf{53} \times \frac{\mathbf{10000}}{\mathbf{2}}\right) + (\mathbf{23000} \times \mathbf{4125})$$

$$+ \left(\boldsymbol{P}(\mathbf{1700} < d \leq 10000) \times \left(\frac{\mathbf{10000} - \mathbf{1700}}{\mathbf{2}}\right) \times \mathbf{4120}\right)$$

$$\boldsymbol{TIC_{10000}} = \mathbf{105413500}$$

At last, TIC was determined for 1700 unit items:

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$$TIC_{1700} = \left(7500 \times \frac{23000}{1700}\right) + \left(53 \times \frac{1700}{2}\right) + (23000 \times 5000)$$

$$+ \left(P(1700 < d \leq 1700) \times \left(\frac{1700 - 1700}{2}\right) \times 5000\right)$$

$$TIC_{1700} = 115149070$$

Looking at the decided TICs indicated that the complete cost would be limited for 5000 unit things. So**,** the most significant and essential duties of each mechanical unit are inventory arranging and control. In such manner, the duty of generation and inventory control faculty is to embrace the best approaches that limit costs, while thinking about all elements.

B. Cost Optimization in EOQ model-

Ordering cost per cycle = $c*Q$

Holding cost per cycle = $h*Q_{avg}*t$; $Q_{avg} = Q/2$; $t = Q/a$

Total Cost per cycle (TC) = $K+c*Q+(h*Q2)/(2*a)$

Total cost per unit time (T) = TC/((Q/a)) ; For Optimization DT/DQ=0

Optimal Quantity (Q*) = sqrt(2aK/h)

Corresponding cycle time (t*)= Q*/a= sqrt(2K/ah)

We are using EOQ model in each season and after toward the finish of each season (excluding last season), there are more than one ways or procedures which are conceivable, we examined every single way and evaluated the expense related with that way. Finding the ideal way which has the minimum expense related with it, would be our answer for the issue. Our calculation shows how we seek after in this model-

C. Algorithm

In this model we have utilized unique programming approach. Through this methodology we looked at cost everything being equal and picked minimum cost way. We are assuming that in the last season, inventory should get zero (termination point).

There are twenty-nine (P1 to P29) subpaths and eleven hubs (C0 to C10) for four seasons [see Figure 1& 2]. These can shift according to number of seasons. These subpaths shows conceivable way/cases that how initial inventory level finish or remains toward the finish of any season. Where hubs represent all out minimum expense of conceivable subpaths those have same finishing point at end of

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season. Which implies Ci hub include minimum expense of conceivable subpaths that span to Ci, where Co have zero expense.

Example:

C1 = C0 + minimum (Cost of P1, Cost of P2) = 0 + minimum (Cost of P1, Cost of P2)

C2 = C0 + minimum (Cost of P1) = 0 + Cost of P1

For C3 cost

C3 node has four possible subpaths, two coming from C1 node and other two coming from C2

So - C3 = min[{C2+min(Cost of P7, Cost of P9)}, {C1+min(Cost of P4, Cost of P5)}]

For remaining nodes procedure is the same.

We can do the same thing using recursion method, which would be an alternative way to find the optimistic path. In this way we start from the ending point (C10) and minimize cost of subpaths by adding costs for nodes and going to backward at starting point (C0). In this case C10 has zero cost.

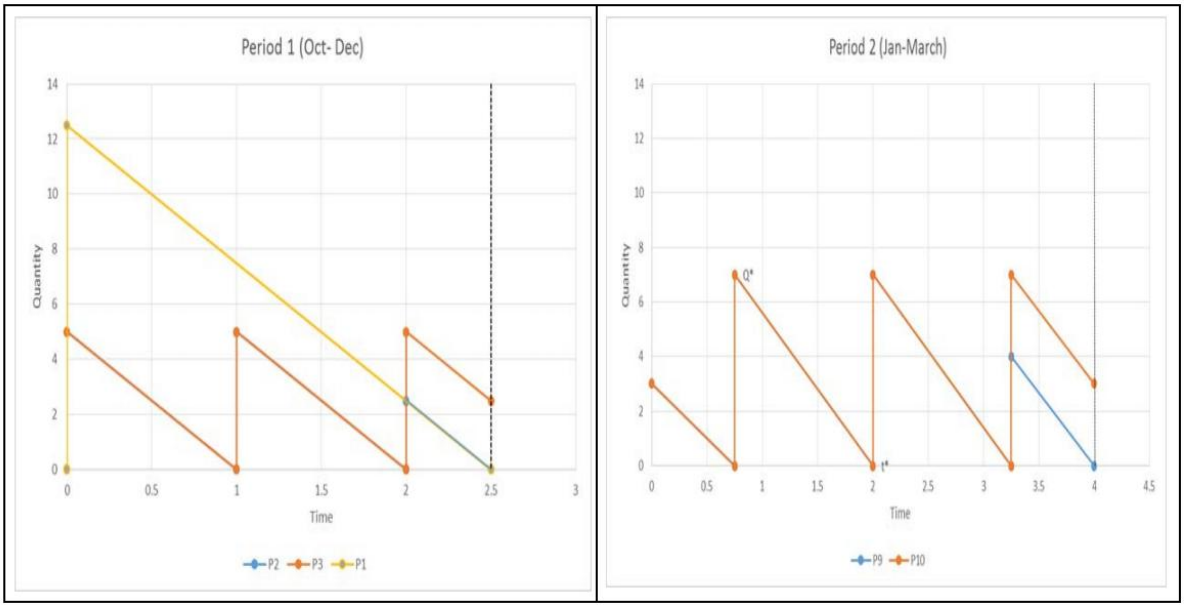

Figure 2: Cases for first two seasons

To find the optimal path, our model uses numerical values for the variables (demand) and parameters.

D. Parameters for given problem

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- Setup Cost (K) = 15000 Rs.
- Holding Cost (h) = 0.85 Rs. per kg per day
- Cost (c) = 500 Rs. per kg
- Demand rate

Period	**Demand Rate**
Oct.-Dec.	50 Kg/Day
Jan.-March	70 Kg/Day
April-June	45 Kg/Day
July-Sept.	60 Kg/Day

After using the dynamic programming approach with numerical values of all the variables and parameters, we find out that Optimum Path would be- P3-P10-P20-P23, and our findings from the model are-

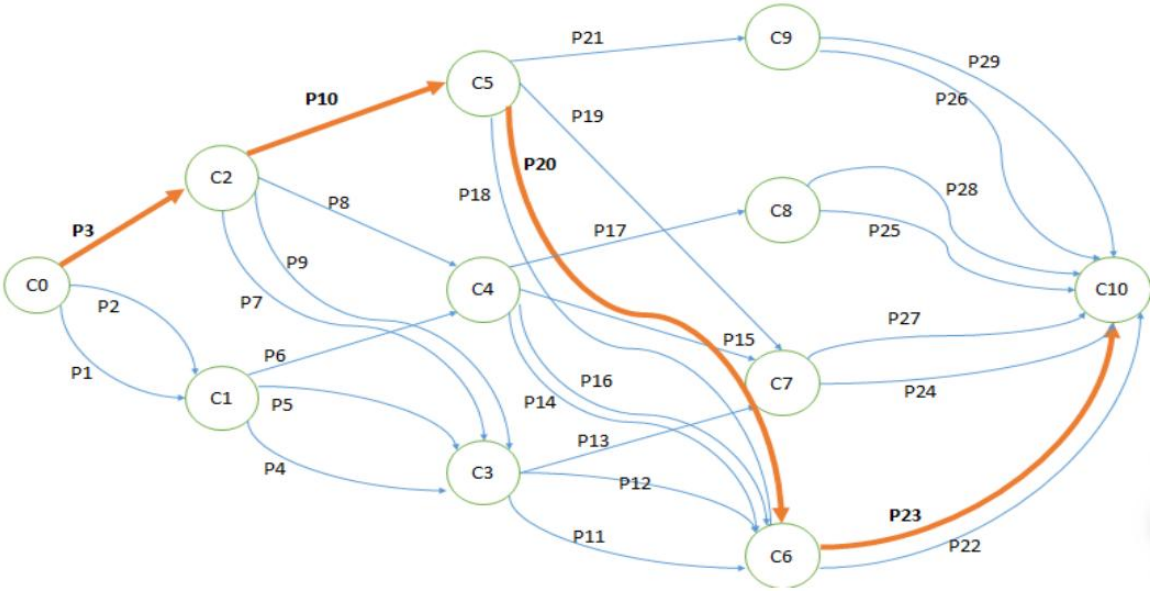

Figure 3: Optimum Path (in red lines)

Results after numerical calculations-

Solution Cost = Rs 10847921 (using Optimum Path: P3-P10-P20-P23)

Cost without the model = Rs 11112541

Saving (profit) = Rs 264620

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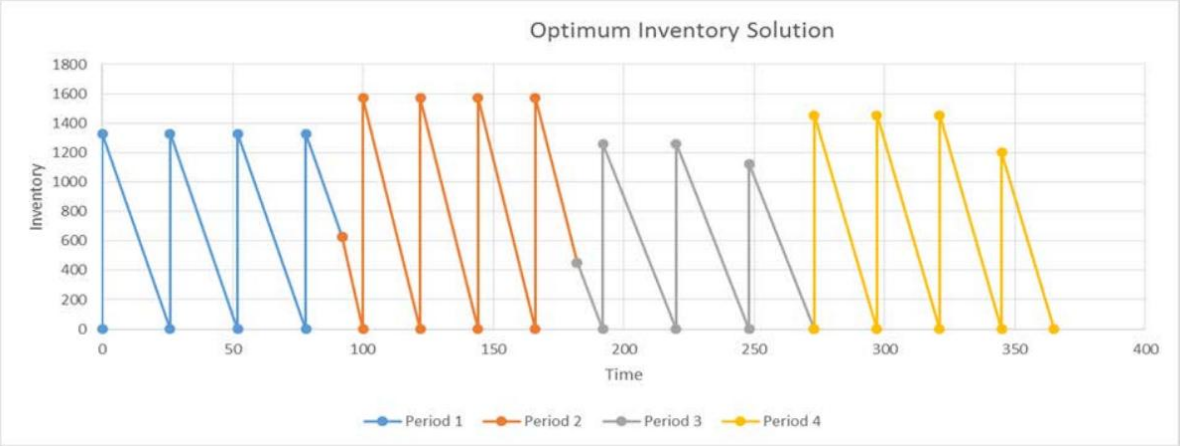

Figure 4: Optimum Inventory Solution

V. CONCLUSION

In this investigation, an inventory model under plausible disintegration and markdown conditions was created, through which the affordable amount of requests can be resolved. Results uncovered that, under investigation conditions, the measure of deteriorative things and in this way the last costs increment with bigger request amounts. Be that as it may, then again, higher limits are offered for bigger request amounts. As needs be, choosing the best reorder point can lessen caused costs to an association. Notwithstanding stochastic disintegration, future research may incorporate stochastic utilization and additionally accepting rates in the inventory model, or inspect this model while every one of the three is stochastic. Besides, the inventory model can be explored with various items. As referenced previously, inventory management attempts to find the best systems and approaches which give the responses to the two generally significant and key inquiries for the inventory management- when to request and the amount to arrange. Our model is a humble exertion to find the best promising, practical and gainful responses to these two inquiries, as should be obvious from the outcomes that using our model gives great benefit to the organization. So inventory management is a key factor for the development and achievement of the organization. This dynamic and numerical model and approach we are presenting in our task has a helpful characteristic that it tends to be applied for any dissemination and manufacturing organization having comparable inventory framework and request.

VI. REFERENCES

[1]. Tayal S, Singh S, Sharma R. Multi Item Inventory Model for Deteriorating Items with Expiration Date and Allowable Shortages. Indian Journal of Science and Technology. 2014; 7(4):463–71.

[2]. Sazvar Z, Baboli A, Jokar MRA. A replenishment policy for perishable products with non-linear holding cost under stochastic supply lead time. The International Journal of Advanced Manufacturing Technology. 2013; 64(5–8):1087–98.

[3]. Lin Y-J. A stochastic periodic review integrated inventory model involving defective items, backorder price discount, and variable lead time. 4OR. 2010; 8(3):281–97.
[4]. Ghiami Y, Williams T, Wu Y. A two-echelon inventory model for a deteriorating item with stock-dependent demand, partial backlogging and capacity constraints. European Journal of Operational Research. 2013.
[5]. Behzadian M. Inventory planning and control (1). 1, editor. Amol: nashr shomal paydar; 2005. 1–112 p.
[6]. Banks J, Fabrycky WJ. Procurement and inventory systems analysis: Prentice-Hall; 1987.
[7]. Luchko, Mykhailo & Lukanovska, Iryna & Ratynsky, Vadym. (2019). Modelling inventory management: Separate issues for construction and application. International Journal of Production Management and Engineering. 7. 117. 10.4995/ijpme.2019.11435.
[8]. Sheakh, Dr.Tariq. (2018). A Study of Inventory Management System Case Study. Journal of Dynamical and Control Systems. 10. 1176-1190.
[9]. Balcik, Burcu & Bozkir, Cem & Kundakcioglu, O.. (2016). A literature review on inventory management in humanitarian supply chains. Surveys in Operations Research and Management Science. 10.1016/j.sorms.2016.10.002.
[10]. Aro-Gordon, Stephen & Gupte, Jaydeep. (2016). Review of modern inventory management techniques. The Global Journal of Business and Management. 1. 1-22.
[11]. Bazan, Ehab & Jaber, Mohamad & Zanoni, Simone. (2015). A review of mathematical inventory models for reverse logistics and the future of its modeling: An environmental perspective. Applied Mathematical Modelling. 10.1016/j.apm.2015.11.027.
[12]. Ziukov, Serhii. (2015). A literature review on models of inventory management under uncertainty. Business Systems & Economics. 5. 10.13165/VSE-15-5-1-03.
[13]. Williams, Brent & Tokar, Travis. (2008). A Review of Inventory Management Research in Major Logistics Journals. The International Journal of Logistics Management. 19. 212-232. 10.1108/09574090810895960.