International Journal of Education, Modern Management, Applied Science & Social Science (IJEMMASSS)
ISSN :2581-9925(Online), Impact Factor: 7.555, Volume 07, No. 04(II), October - December, 2025, pp. 31-39

Inventory Model for Decayable Items with Stocks under Inflation and Cost Dependent Demand to Address Supply Chain Challenges: After a Special Case

Ramkesh Meena*

Assistant Professor (Mathematics), Government College, Karauli, Rajasthan, India.

*Corresponding Author: rekhamkesh@gmail.com

Citation: Meena, R. (2025). Inventory Model for Decayable Items with Stocks under Inflation and Cost Dependent Demand to Address Supply Chain Challenges: After a Special Case.International Journal of Education, Modern Management, Applied Science & Social Science, 07(04(II)), 31–39.

ABSTRACT

Decayable item inventory model with cost-dependent demand and stocks under inflation to handle supply chain issues. The market and supply chain have suffered greatly as a result of the COVID-19 epidemic. In order to recover the post covid-19 disruptions, a model based on specific events becomes necessary. This article describes the development of an inventory model for non-instantaneous deteriorating commodities under inflation, where shortages are allowed and are presumed to be somewhat backlogged. The product's stock and pricing have an impact on demand. This study's main goal is to develop a recovery model that will raise overall average profit. The selling price and the overall cycle time are used as choice variables in this study. The graphical technique in Mathematica is used to determine the maximum average profit and the ideal values of the decision variables. The relationship between total profit and the choice variables is depicted in graphs. It has been noted that when the selling price increases, the total profit increases as well before declining once it reaches a particular price point. Additionally, the total profit rises in tandem with the rate of inflation. Sensitivity analysis has been carried out to examine the effects of various parameters on the best solutions, and numerical examples are provided to explain the model. The over all profit has been found to be least responsive to the backlog parameter and highly sensitive to the fundamental demand.

***Keywords**: EOQ, Inflation, Decayable Item, Fundamental Demand, Post Covid-19 Disruptions, Cost-Dependent Demand.*

Introduction

The highly contagious respiratory illness known as COVID-19, or Coronavirus Disease 2019, is brought on by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This sickness first appeared in Wuhan, China, in late December 2019, and it quickly spread throughout Asia, Europe, and North America. On March 11, 2020, the World Health Organization (WHO) formally proclaimed Covid-19 to be a pandemic due to the virus's rapid spread in various regions of the world. This epidemic brought with it a number of difficulties on a global scale. WHO implemented lockdowns in a number of nations to stop the virus's spread and safeguard public health. To stop people from moving around and interacting with one another, lockdowns and quarantines were implemented. Everyday life was significantly impacted by these lockdown tactics. There were detrimental effects on many facets of daily life, such as work, school, and social interactions. These modifications had social and psychological repercussions even though they were implemented to protect the public's health. The lockdown measures also had a major effect on the supply chains. The methods and processes used to transport commodities from the point of manufacturing to the consumer are collectively referred to as a supply chain. Supply chain disruption caused problems for industry, distributors, and retailing as a result of the restrictions on business and mobility. These limitations have a significant effect on enterprises, as we've already discussed. The majority reported decreased client demand, supply-chain interruptions, and operational issues. The economic repercussions affected several businesses' sustainability and profitability (Guan et al. [1]). High-tech equipment, volatile liquids, and perishable items like fruits and vegetables are all impacted by the process of deterioration (Wee [2]).

In the actual world, inflation has serious repercussions, particularly in poor countries with high inflation rates. Many facets of the economy and people's daily lives are impacted by the pervasive phenomena of inflation. A number of variables, such as weak institutions, unstable economies, and restricted access to financial products that lower the likelihood of inflation, can make the effects of inflation more severe in developing countries. Therefore, understanding, monitoring, and managing inflation is crucial for individuals, businesses, and governments in these countries (Yang et al. [3]). Furthermore, when making business decisions, the effect of price on demand is also important. Price-based pricing strategies are successful in increasing profits. Higher client demand and profit are usually the outcomes of lower selling prices. Businesses must continuously adjust their pricing strategy to take changing consumer preferences and market conditions into consideration in order to remain profitable and competitive. Inventory management models with price-influenced demand are frequently used (Yang et al. [4]).

In actuality, companies face a variety of restrictions and difficulties that might make it challenging to complete every purchase placed by customers. These obstacles are caused by things like restricted access to raw materials, supply chain interruptions, production capacity constraints, transportation issues, and variations in market demand. When there is more demand for a popular item than there is now supply, this is referred to as backlogging. If not, buyers will have to wait patiently until the product is once again available because it is limited on the market. Due to factors like pricing expectations, exclusivity, budgetary constraints, fashion trends, etc., some purchasers deliberately decide to wait for backlogs to form during a product shortage. Because it implies that consumers can miss out on using a product while they wait for a better offer or for it to become available again, opportunity cost must be considered. The amount of value lost when one course of action is chosen over another is known as opportunity cost. In this case, the opportunity cost is the sales and experiences that could have been had if the customer had bought the product when it was originally released (Chang and Lin [5]).

This work develops a model for materials that deteriorate gradually, like iron. This paradigm allows for shortages, which are somewhat backlogged. The consequences of inflation, a significant element influencing the supply chain in the actual world, are also included in this model. Additionally, the product's demand rate is calculated so that it varies in response to changes in the item's price and inventory level. By considering all these crucial elements, this work seeks to offer a restoration model to address inventory management issues in the post-COVID-19 period. The model has been solved using a graphical approach. The goal of this essay is to determine the price and cycle time parameters that will maximize total profit.

Literature Review

For non-instantaneous deteriorating items with partially backlogged shortages, advanced and delayed payments, cash discounts, and investments in preservation technology where demand is impacted by price under inflation for the post-Covid-19 recovery, Mashud et al. [6] developed an inventory model. Mondal et al. [7] developed an inventory model for enhancing products in which price changes have an impact on the demand rate. An inventory model for deteriorating goods with predictable rates of degradation and stock-dependent demand was developed by Lee and Dye [8]. Avinadav et al. [9] offered an optimum inventory strategy for a perishable product in which the demand for an item changes as the item's time and price change. An inventory model for degraded items with shortages and partial backlogs was introduced by Wang [10]. A finite horizon inventory paradigm was developed by Datta and Paul [11], according to which the selling price and stock level of an item determine the demand rate. An inventory model for instantly deteriorating items where the demand rate depends on stock level was proposed by Chang et al. [12]. The optimal replenishment approach for non-instantaneously deteriorating items combining demand impacted by stock with a partial backlog rate was proposed by Wu et al. [13]. A restocking policy was developed by Uthayakumar and Geetha [14] taking into account a partially backlogged and non-instantaneously degraded inventory system. Using the additive manufacturing process, Sharma et al. [15] developed an EOQ model for non-instantaneously deteriorating products that took into account price-based demand, partial backlog, and the effects of COVID-19. Hou [16] developed an inventory model for deteriorating products that takes stock-based demand rates, time discounting, and inflation into account. Hou and Lin [17] developed an EOQ model for degrading goods by taking into account growing prices, the duration value of money, and selling rates that change based on stock and price. Chakraborty [18] looked into the impact of inflation and COVID-19 on supply chain disruptions. For degrading commodities, Narang et al. [19] proposed a production inventory model with three levels of production and demand, where price, stock, and advertising affect demand. In order to enhance sustainability, Khatun et al. [20] investigated a system for degrading commodities based on repurposing outdated items, which lowers the system's overall cost and reliance on new inputs. In an inflationary environment where demand is influenced by time, Yang et al. [21] developed a number of inventory models. The multistep Laplace optimized decomposition technique (MLODM) is a novel approach proposed by Maayah et al. [22] for using the CFD to find analytical approximation solutions for the Covid-19 model. Arqub et al. [23] presented a continuous genetic algorithm as a powerful solver of second-order boundary value problems in which the programme's evolution employs smooth solution curves to identify nodal values and its technique relies on finite difference approximations for derivatives. Momena et al. [24] developed a two-storage inventory model that takes into account trade credit, discounts, and partially backlogged shortages. The demand rate is influenced by commodity sales prices and advertisements. In order to investigate the combined impacts of memory, selling price, and displayed inventory on a retailer's decision to maximize profit, Rahaman et al. [25] proposed an inventory model with selling price and displayed inventory dependent demand.

Notation and Assumptions

The following notations has been used in this model:

Table 1

Notations	Unit	Description
A	$/order	Cost of an order
α	-	Stock-based demand rate parameter
γ	-	Fundamental demand in the market
β	-	Price-based demand rate coefficient
γ_P	$/unit	Purchase cost per unit item
γ_H	$/unit	Holding cost per unit item
γ_{SH}	$/unit	Shortage cost per unit item
γ_{LS}	$/unit	Lost sale cost per unit item
D	units/year	Demand rate
I(t)	units	The stock level at any time t, where $0 \le t \le T$
r	%/year	Inflation rate
R	units	Maximum shortage quantity per cycle
S	units	The initial inventory level at $t = 0$
t_1	year	Time when there is no degradation of commodity
t_2	year	Time when the stock becomes empty
v	-	Backlog parameter, v > 0
Φ	%	Constant rate of deterioration
p	$/unit	Selling price per unit item
T	year	Total cycle time
SR	$/unit	Sales revenue
BOC	$	Backorder cost
HC	$	Holding cost
OPC	$	Opportunity cost
TPC	$	Total purchase cost
TC	$	Total cost
Q	units	Order quantity
TAP	$/year	Total average profit

The following assumptions has been used in this model:

- Lead time is constant, whereas the rate of replenishment is infinite.
- The demand of the product is influenced by the selling price and stock level. i.e., D = αI(t) – βp + γ, where α >0, β >0.
- The planning horizon is considered to be infinite.
- There is no deterioration in the period $0 \le t \le t_1$, but there is a deterioration with a constant rate θ in $t_1 \le t \le t_2$.
- Shortages are allowed and are partially backlogged.
- The rate of partial backorder is taken to be $e^{-v(T-t)}$.

Description of the Model

This section presents the mathematical formulation of the suggested inventory model using the notations and presumptions previously mentioned. This work seeks to optimize the overall profit of the proposed inventory model where demand rate is price and stock-dependent by maximizing the selling price and the complete cycle duration while accounting for the post-pandemic impacts. A model for non-instantaneous deteriorating items in an inflationary environment where shortages are permitted with partial backlogs is presented in this paper. Based on the previous assumptions, the inventory level is shown graphically in **Fig. 1.**

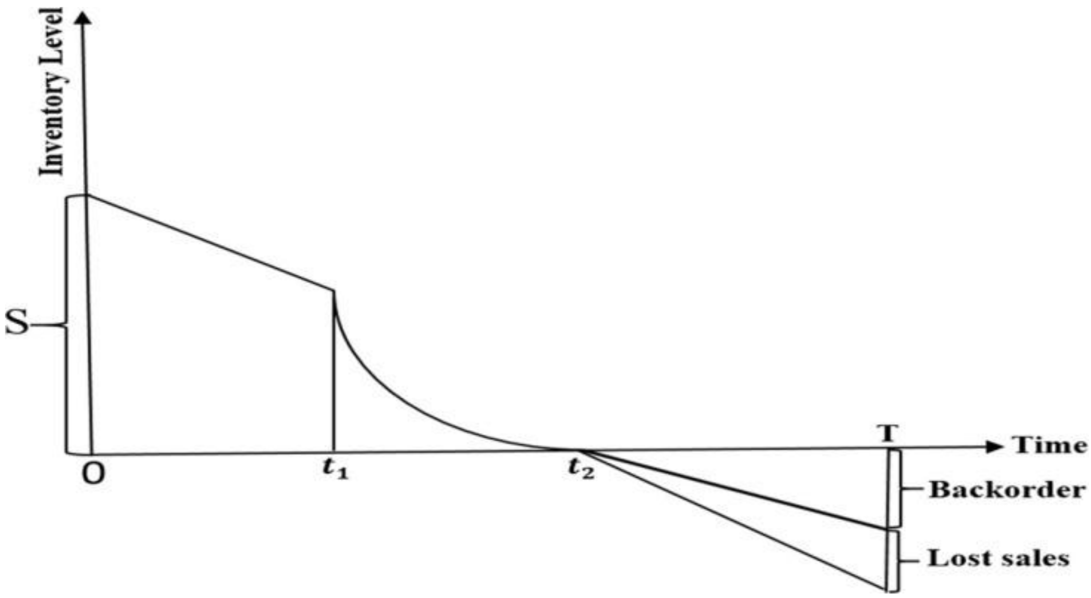


Fig. 1: I(t)vstime.

Formulation of Mathematics

Demand causes the inventory level I(t) to decrease during the period [0, t_1], and both demand and deterioration cause the stock level to decrease during the period [t_1, t_2], reaching zero at t = t_2.There is a partial backlog in demand for the whole period [t_2, T].

The following is the expression for the inventory level differential equations:

$$\frac{dI(t)}{dt} = -[\alpha I(t) - \beta p + \gamma], \quad 0 < t < t_1 \quad (1)$$

$$\frac{dI(t)}{dt} + \Phi I(t) = -[\alpha I(t) - \beta p + \gamma], t_1 < t \le t_2 \quad (2)$$

$$\frac{dI(t)}{dt} = -[\alpha I(t) - \beta p + \gamma]e^{-v(T-t)}, \quad t_2 < t \le T \quad (3)$$

Using the conditions I(t) = S at t = 0; I(t) = 0 at t = t_2, we solve the Eqs. (1), (2) and (3) to obtain the following solutions:

$I(t) = \frac{(-\beta p+\gamma)}{\alpha}(e^{-\alpha t}-1) + Se^{-\alpha t}, \quad 0 < t < t_1$ (4)

$I(t) = \frac{(-\beta p+\gamma)}{\Phi+\alpha}\left[e^{(\Phi+\alpha)(t_2-t)}-1\right], \quad t_1 < t \le t_2$ (5)

$I(t) = \frac{(-\beta p+\gamma)}{\alpha}\left(e^{\alpha(t_2-t)}-1\right), t_2 < t \le T$ (6)

Now considering the continuity of I(t) at t = t_1, we get the initial stock as

$S = \frac{(-\beta p+\gamma)}{\Phi+\alpha}e^{\alpha t_1}\left[e^{(\Phi+\alpha)(t_2-t_1)}-1\right] - \frac{(-\beta p+\gamma)}{\alpha}\left[1-e^{\alpha t_1}\right]$ (7)

The maximum shortage is obtained at T and is given by R = −I(T). So the value of R is

$R = \frac{(-\beta p+\gamma)}{\alpha}\left[1-e^{\alpha(t_2-T)}\right]$ (8)

The total order quantity for the retailer is obtained as Q=S+R. Therefore the value of Q is $Q = \frac{(-\beta p+\gamma)}{\Phi+\alpha}e^{\alpha t_1}\left[e^{(\Phi+\alpha)(t_2-t_1)}-1\right] - \frac{(-\beta p+\gamma)}{\alpha}\left[1-e^{\alpha t_1}\right] + \frac{(-\beta p+\gamma)}{\alpha}\left[1-e^{\alpha(t_2-T)}\right]$ (9)

The different costs associated with the model are evaluated as follows:

- Orderingcost : ORC=A (10)
- Holding cost: $HC = \gamma_H\int_0^{t_1} I(t)e^{rt}\,dt + \gamma_H\int_{t_1}^{t_2} I(t)e^{rt}\,dt$

$=\left[\frac{(\gamma-\beta p)}{(\alpha+\Phi)}\left\{\frac{e^{rt_1}-e^{rt_2}}{r} - \frac{e^{rt_2}-e^{-(\alpha-r-\Phi)t_1+(\alpha+\Phi)t_2}}{\alpha-r-\Phi}\right\} - \frac{(\gamma-\beta p)}{\alpha(\alpha+\Phi)}\left\{-\frac{\alpha+\Phi}{r} - \frac{\alpha e^{-\Phi t_1+(\alpha+\Phi)t_2}+e^{\alpha t_1}\Phi}{\alpha-r}\left(\frac{e^{\alpha t_1}(\alpha+\Phi)}{r} + \frac{\alpha e^{-\Phi t_1+(\alpha+\Phi)t_2}+e^{\alpha t_1}\Phi}{\alpha-r}\right)\right\}\right]\gamma_H$ (11)

- Purchasing cost: TPC= $\gamma_P S + \gamma_P R e^{rT}$

$=\left[\frac{e^{rT}(1-e^{\alpha(-T+t_2)})(\gamma-\beta p)}{\alpha}\right]\gamma_P + \left[-\frac{(1-e^{\alpha t_1})(\gamma-\beta p)}{\alpha} + \frac{e^{\alpha t_1}(-1+e^{(\alpha+\Phi)(-t_1+t_2)})(\gamma-\beta p)}{\alpha+\Phi}\right]\gamma_P$
(12)

- The backorder cost is given by

$BOC = \gamma_{SH}\int_{t_2}^{T} -I(t)e^{rt}\,dt$

$=\frac{(\gamma-\beta p)}{\alpha(\alpha-r)r}\left[\alpha(e^{rT}-e^{rt_2}) + e^{rT}(-1+e^{\alpha(-T+t_2)})r\right]\gamma_{SH}$ (13)

- The opportunity cost is given by

$OPC = \gamma_{LS}\int_{t_2}^{T}(\alpha I(t)-\beta p+\gamma)\left[1-e^{-v(T-t)}\right]e^{rt}\,dt$

$=\frac{e^{\alpha t_2}(\gamma-\beta p)}{(\alpha-r)(\alpha-r-v)}\left[e^{(-\alpha+r)T}v - e^{(-\alpha+r+v)t_2}(e^{-Tv}(\alpha-r)+e^{-vt_2}(-\alpha+r+v))\right]$
γ_{LS} (14)

The total cost is given by

$TC = ORC + HC + TPC + BOC + OPC$

$=A + \left[\frac{(\gamma-\beta p)}{(\alpha+\Phi)}\left\{\frac{e^{rt_1}-e^{rt_2}}{r} - \frac{e^{rt_2}-e^{-(\alpha-r-\Phi)t_1+(\alpha+\Phi)t_2}}{\alpha-r-\Phi}\right\} - \frac{(\gamma-\beta p)}{\alpha(\alpha+\Phi)}\left\{-\frac{\alpha+\Phi}{r} - \frac{\alpha e^{-\Phi t_1+(\alpha+\Phi)t_2}+e^{\alpha t_1}\Phi}{\alpha-r}\left(\frac{e^{\alpha t_1}(\alpha+\Phi)}{r} + \frac{\alpha e^{-\Phi t_1+(\alpha+\Phi)t_2}+e^{\alpha t_1}\Phi}{\alpha-r}\right)\right\}\right]\gamma_H + \left[\frac{e^{rT}(1-e^{\alpha(-T+t_2)})(\gamma-\beta p)}{\alpha}\right]\gamma_P + \left[-\frac{(1-e^{\alpha t_1})(\gamma-\beta p)}{\alpha} + \frac{e^{\alpha t_1}(-1+e^{(\alpha+\Phi)(-t_1+t_2)})(\gamma-\beta p)}{\alpha+\Phi}\right]\gamma_P + \frac{(\gamma-\beta p)}{\alpha(\alpha-r)r}\left[\alpha(e^{rT}-e^{rt_2}) + e^{rT}(-1+e^{\alpha(-T+t_2)})r\right]\gamma_{SH} + \frac{e^{\alpha t_2}(\gamma-\beta p)}{(\alpha-r)(\alpha-r-v)}\left[e^{(-\alpha+r)T}v - e^{(-\alpha+r+v)t_2}(e^{-Tv}(\alpha-r)+e^{-vt_2}(-\alpha+r+v))\right]\gamma_{LS}$ (15)

The sales revenue is given by the following expression

$SR = p\left[\int_0^{t_1}(\alpha I(t)-\beta p+\gamma)e^{rt}dt + \int_{t_1}^{t_2}(\alpha I(t)-\beta p+\gamma)e^{rt}dt\right] + p\left[\frac{\beta p-\gamma}{\alpha}\left\{e^{\alpha(t_2-T)}-1\right\}\right]e^{rT}$

$$=\frac{p(\gamma-\beta p)}{\alpha}\Big[e^{rT}\big(1-e^{\alpha(-T+t_2)}\big)\Big]+p\Big[\frac{(\gamma-\beta p)}{(\alpha-r)(\alpha+\Phi)}\Big\{\big(e^{\alpha t_1}-e^{rt_1}\big)\big(\alpha e^{(\alpha+\Phi)(-t_1+t_2)}+\Phi\big)\Big\}+\frac{(\gamma-\beta p)}{(\alpha+\Phi)}\Big\{\frac{(-e^{rt_1}+e^{rt_2})\Phi}{r}-\frac{\alpha(e^{rt_2}-e^{-(\alpha-r-\Phi)t_1+(\alpha+\Phi)t_2}}{\alpha-r-\Phi}\Big\}\Big] \quad (16)$$

The total profit is obtained as

$$\text{TAP} = \frac{1}{T}[SR-TC]$$

$$=\frac{1}{T}\{[\frac{p(\gamma-\beta p)}{\alpha}\Big[e^{rT}\big(1-e^{\alpha(-T+t_2)}\big)\Big]+p\Big[\frac{(\gamma-\beta p)}{(\alpha-r)(\alpha+\Phi)}\Big\{\big(e^{\alpha t_1}-e^{rt_1}\big)\big(\alpha e^{(\alpha+\Phi)(-t_1+t_2)}+\Phi\big)\Big\}+\frac{(\gamma-\beta p)}{(\alpha+\Phi)}\Big\{\frac{(-e^{rt_1}+e^{rt_2})\Phi}{r}-\frac{\alpha(e^{rt_2}-e^{-(\alpha-r-\Phi)t_1+(\alpha+\Phi)t_2}}{\alpha-r-\Phi}\Big\}\Big]\mathbf{]}-\mathbf{[}A+\Big[\frac{(\gamma-\beta p)}{(\alpha+\Phi)}\Big\{\frac{e^{rt_1}-e^{rt_2}}{r}-\frac{e^{rt_2}-e^{-(\alpha-r-\Phi)t_1+(\alpha+\Phi)t_2}}{\alpha-r-\Phi}\Big\}-\frac{(\gamma-\beta p)}{\alpha(\alpha+\Phi)}\Big\{-\frac{\alpha+\Phi}{r}-\frac{\alpha e^{-\Phi t_1+(\alpha+\Phi)t_2}+e^{\alpha t_1}\Phi}{\alpha-r}\Big(\frac{e^{\alpha t_1}(\alpha+\Phi)}{r}+\frac{\alpha e^{-\Phi t_1+(\alpha+\Phi)t_2}+e^{\alpha t_1}\Phi}{\alpha-r}\Big)\Big\}\Big]\gamma_H+\Big[\frac{e^{rT}\big(1-e^{\alpha(-T+t_2)}\big)(\gamma-\beta p)}{\alpha}\Big]\gamma_P+\Big[-\frac{(1-e^{\alpha t_1})(\gamma-\beta p)}{\alpha}+\frac{e^{\alpha t_1}\big(-1+e^{(\alpha+\Phi)(-t_1+t_2)}\big)(\gamma-\beta p)}{\alpha+\Phi}\Big]\gamma_P+\frac{(\gamma-\beta p)}{\alpha(\alpha-r)r}\Big[\alpha\big(e^{rT}-e^{rt_2}\big)+e^{rT}\big(-1+e^{\alpha(-T+t_2)}\big)r\Big]\gamma_{SH}+\frac{e^{\alpha t_2}(\gamma-\beta p)}{(\alpha-r)(\alpha-r-v)}\Big[e^{(-\alpha+r)T}v-e^{(-\alpha+r+v)t_2}\big(e^{-Tv}(\alpha-r)+e^{-vt_2}(-\alpha+r+v)\big)\Big]\gamma_{LS}\mathbf{]\}}$$

(17)

Numerical Analysis

This section examines the effects of the model's primary parameters and provides a numerical demonstration of the model's behavior. The research in the literature provided the set of numerical example data used in this work (Mashud et al. [9]). Certain variables are assumed based on the underlying assumptions of the proposed model. The model's utility and logical results are demonstrated by the data sample. The numerical analysis makes use of the following data sets:

A=800; α=2; β=1.6; γ=500; γ_P=50;γ_H= 5; γ_{SH}= 50; γ_{LS}=60; Φ=0.75; r=0.18; v=0.7; t_1=0.6; t_2=1.

Table 2

Optimal values of the decision variables.

T^*	Total Average Profit	(TAP^*)
183.036	1.6	69,731

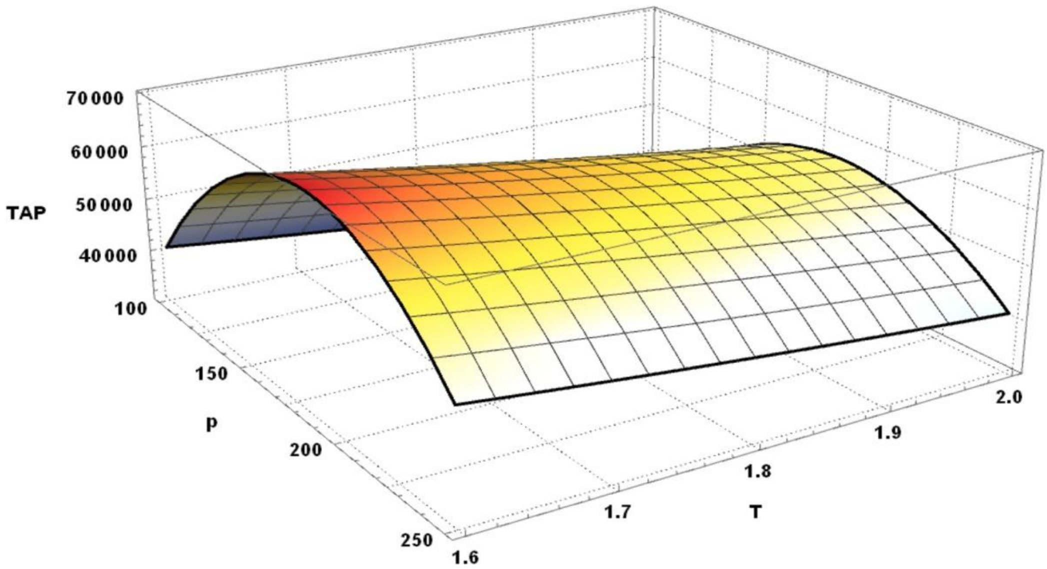
Result and Discussion

Using the aforementioned parametric parameters, we determine the ideal selling price, total cycle duration, and overall average profit, as shown in **Table 2.**

The concavity of the total average profit with respect to the selling price and the whole cycle duration is shown in **Fig. 2.** A function's concavity reveals how its rate of change behaves. In this case, it shows how changes in the selling price (p) and the whole cycle time (T) impact the average profit. The graph's concavity indicates that when these factors vary, the overall average profit might not rise or fall linearly. Instead, there may be increasing profits or decreasing returns, depending on the exact values of p and T.

Fig. 3 shows the relationship between the selling price of an item and the total average profit of this model. It illustrates how, as the selling price rises, the overall average profit first rises up to a certain point.

The relationship between the model's total average profit and the inflation rate is seen in **Fig. 4.** The graph indicates that when the rate of inflation rises, so does the overall average profit. This relationship demonstrates that inflation may occasionally have a positive impact on earnings.



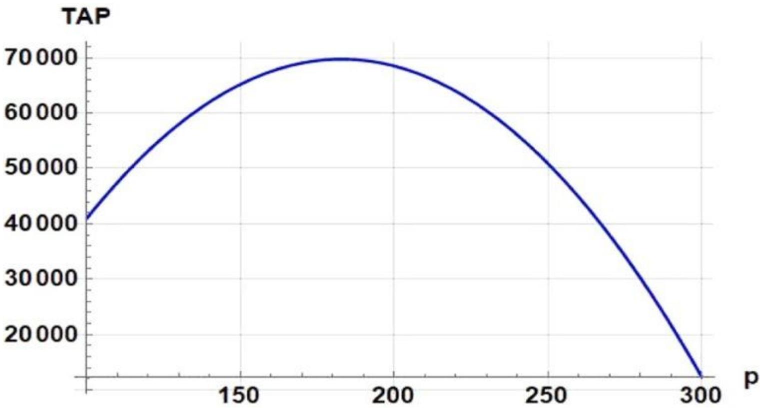


Fig. 2: Total average profit vs. selling price (p) and total cycle time (T).

Fig. 3: Total Average Profit vs. Selling Price (p).

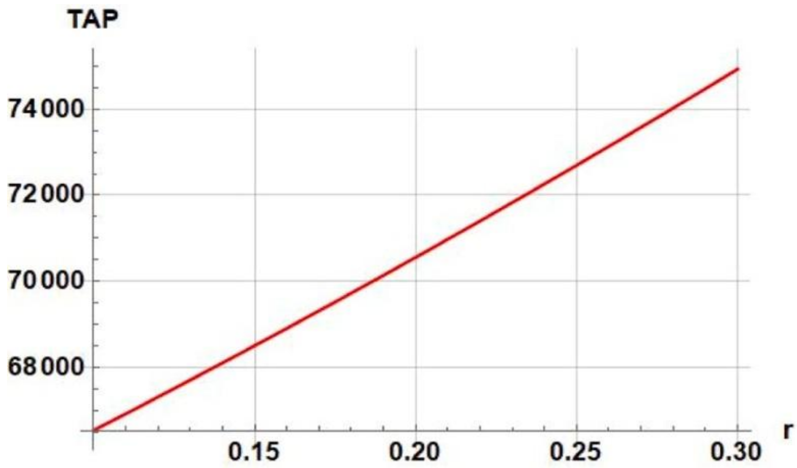


Fig. 4: Total Average Profit vs. Inflation Rate(r).

Conclusion

This study offers an inventory model that addresses products that don't deteriorate instantly while taking into account a drop in sales as a result of disruptions brought on by the post-COVID-19 era. In this study, we also take into account the impacts of inflation, which have impacted numerous countries, particularly emerging nations with limited access to facilities and resources. This model accounts for shortages when there is a partial backlog, which occurs when there is more demand for a popular product than there is currently supply. Price and supply level have an impact on this model's demand. Selling price and overall cycle length are taken into consideration as choice variables in this article. Finding the ideal selling price and total cycle time values that will maximize the total profit function is the primary goal of this study. The graphical method is used to solve the research model.

The important findings of this study are:

- By using this model, the store can choose the best selling price and cycle duration to optimize overall profit.
- It has been noted that when the price at which commodities are sold rises, the overall average profit first rises to a certain amount before beginning to fall. Additionally, if the rate of inflation rises, so does the overall average profit.
- Sensitivity analysis is also offered for this model, and we found that the total profit is least sensitive to the backlogging parameter (v) and strongly sensitive to the fundamental demand (γ).
- This article's management implications and sensitivity analysis will help manufacturers and researchers analyze how each of the research's parameters affects overall profit.
- As the inflation rate, basic demand, and stock-dependent consumption rate parameters grow, the overall profit rises; however, as the backlogging parameter and model costs rise, the overall profit falls.

References

1. D. Guan, D. Wang, S. Hallegatte, S.J. Davis, J. Huo, S. Li, P. Gong Global supply-chain effects of COVID-19 control measures Nat Hum Behav, 4 (6) (2020), pp. 577-587
2. H.M. Wee Deteriorating inventory model with quantity discount, pricing and partial backordering Int J Prod Econ, 59 (1–3) (1999), pp. 511-518
3. H.L. Yang, J.T. Teng, M.S. Chern An inventory model under inflation for deteriorating items with stock-dependent consumption rate and partial backlogging shortages Int J Prod Econ, 123 (1) (2010), pp. 8-19
4. C.T. Yang, L.Y. Ouyang, H.H. Wu Retailer's optimal pricing and ordering policies for non-instantaneous deteriorating items with price-dependent demand and partial backlogging Math Probl Eng (2009)
5. J.H. Chang, F.W. Lin A partial backlogging inventory model for non-instantaneous deteriorating items with stock-dependent consumption rate under inflation Yugoslav J Oper Res, 20 (1) (2010), pp. 35-54
6. A.H.M. Mashud, M.R. Hasan, Y. Daryanto, H.M. Wee A resilient hybrid payment supply chain inventory model for post Covid-19 recovery Comput Ind Eng, 157 (2021), Article 107249
7. B. Mondal, A.K. Bhunia, M. Maiti An inventory system of ameliorating items for price dependent demand rate Comput Ind Eng, 45 (3) (2003), pp. 443-456
8. Y.P. Lee, C.Y. Dye An inventory model for deteriorating items under stock-dependent demand and controllable deterioration rate Comput Ind Eng, 63 (2) (2012), pp. 474-482
9. T. Avinadav, A. Herbon, U. Spiegel Optimal inventory policy for a perishable item with demand function sensitive to price and time Int J Prod Econ, 144 (2) (2013), pp. 497-506
10. S.P. Wang An inventory replenishment policy for deteriorating items with shortages and partial backlogging Comput Oper Res, 29 (14) (2002), pp. 2043-2051
11. T.K. Datta, K. Paul An inventory system with stock-dependent, price-sensitive demand rate Prod Plann Control, 12 (1) (2001), pp. 13-20

12. C.T. Chang, J.T. Teng, S.K. Goyal Optimal replenishment policies for non-instantaneous deteriorating items with stock-dependent demand Int J Prod Econ, 123 (1) (2010), pp. 62-68

13. K.S. Wu, L.Y. Ouyang, C.T. Yang An optimal replenishment policy for non-instantaneous deteriorating items with stock-dependent demand and partial backlogging Int J Prod Econ, 101 (2) (2006), pp. 369-384

14. R. Uthayakumar, K.V. Geetha A replenishment policy for non-instantaneous deteriorating inventory system with partial backlogging Tamsui Oxford J Math Sci (2009), pp. 313-332

15. S. Sharma, A. Tyagi, S. Kumar, P. Kaushik Additive manufacturing process based EOQ model under the effect of pandemic COVID-19 on non-instantaneous deteriorating items with price dependent demand Additive manufacturing in industry 4.0, CRC Press (2022), pp. 229-244

16. K.L. Hou An inventory model for deteriorating items with stock-dependent consumption rate and shortages under inflation and time discounting Eur J Oper Res, 168 (2) (2006), pp. 463-474

17. K.L. Hou, L.C. Lin An EOQ model for deteriorating items with price-and stock-dependent selling rates under inflation and time value of money Int J Syst Sci, 37 (15) (2006), pp. 1131-1139

18. O. Chakraborty Inflation and COVID-19 supply chain disruption Managing inflation and supply chain disruptions in the global economy, IGI Global (2023), pp. 10-23

19. P. Narang, M. Kumari, P.K. De Production inventory model with three levels of production and demand for deteriorating item under price, stock and advertisement dependent demand Applications of Operational Research in Business and Industries: Proceedings of 54th Annual Conference of ORSI, Springer Nature Singapore, Singapore (2023), pp. 49-68

20. A. Khatun, S. Islam, A. Garai Enhanced environmental and economic sustainability of VMI-CS agreement-based closed-loop supply chain for deteriorating products Res Control Optim (2023), Article 100321

21. H.L. Yang, J.T. Teng, M.S. Chern Deterministic inventory lot-size models under inflation with shortages and deterioration for fluctuating demand Naval Res Logist (NRL), 48 (2) (2001), pp. 144-158

22. B. Maayah, A. Moussaoui, S. Bushnaq, O. Abu Arqub The multistep Laplace optimized decomposition method for solving fractional-order coronavirus disease model (COVID-19) via the Caputo fractional approach Demonstr Math, 55 (1) (2022), pp. 963-977

23. O.A. Arqub, Z. Abo-Hammour Numerical solution of systems of second-order boundary value problems using continuous genetic algorithm Inf Sci (Ny), 279 (2014), pp. 396-415

24. A.F. Momena, R. Haque, M. Rahaman, S.P. Mondal A two-storage inventory model with trade credit policy and time-varying holding cost under quantity discounts Logistics, 7 (4) (2023), p. 77

25. M. Rahaman, R.M. Abdulaal, O.A. Bafail, M. Das, S. Alam, S.P. Mondal An insight into the impacts of memory, selling price and displayed stock on a retailer's decision in an inventory management problem Fract Fraction, 6 (9) (2022), p. 531.

❑❑❑