Mr. BidyadharaBishi, DST-INSPIRE Fellow, JRF

Name of the Scholar	Mr. BidyadharaBishi
Contact Details	Mr. BidyadharaBishi C/O-Dr S.K Sahu P.G. Dept. of Statistics,Sambalpur University , Jyoti-Vihar,Burla E-mail:bidyabishi88@gmail.com Phone No: +917894492441
Registration Number	Registration Number:164/2016/stat
Name of the Department & Address	P.G. Dept. of Statistics, Sambalpur University , Jyoti-Vihar,Burla Sambalpur-768019,ODISHA
Name of the Supervisor & Correspondence address	DrSudhirKumarSahu Head P.G. Dept. of Statistics,Sambalpur University , Jyoti-Vihar,Burla Sambalpur-768019,ODISHA
Details of the funding Agency/Scheme	Department of the Science & Technology, NewDelhi,India. Letter No.DST/INSPIRE Fellowship/2014/IF150317 Dated 14th May 2015
Title of Research topic	INVENTORY REPLENISHMENT POLICY FOR DETYERIORATING PRODUCTS WITH DEPENDENT DEMAND
Abstract of the Research work(max. 300 words)	The objective of this work is to study the Demand Rate, power demand pattern, ramp-type demand, deteriorating products and partial backlogged shortages behavior of the following for differential equations: **i.** We have developed the pricing policy for seasonal deteriorating products with price and ramp type time-dependent demand. A production of inventory problem for a seasonal deteriorating product will be considered. It is assumed that the demand of price and ramp-type time-dependent. The selling season for the deteriorating product is fixed. The decision maker needs to set up the price and the production schedule at the beginning of the season. So, we

	assumed that the demand rate is a function of time and price within the selling period. We presume that $D(t.p) = Ae^{b[t-(t-\mu)H(t,\mu)]} - ap$, Where $A > o, a > 0$ and $b > 0$ are given constants. The Heaviside's function $H(t,\mu)$ is defined as $$H(t,\mu) = \begin{cases} 1 & if \quad t \ge \mu \\ 0 & if \quad t < \mu \end{cases}$$ The production process starts at $t = 0$ with a constant production rate K and continues up to $t = t_1$ when the inventory level reaches the maximum level. The production then stops at time t_1 and the inventory level gradually decreases during the period $[t_1, T]$ and ultimately depletes to zero at time $t = T$ due to demand and deterioration. I have assumed that the item deteriorates at a constant rate θ. Let c be the variable cost. Without loss of generality, results tacit that zero setup cost since there is only one production period. Denote by h the inventory holding cost per unit time. The purpose of this paper aims to maximize the total profit over the selling period by determining the length of the production period and the selling price p. Actually, the selling price p is the only decision variable. Once the price is known, the production period length t_1 can be calculated accordingly. In order to avoid triviality, suppose that the given selling season length $T > \mu$. First, suppose that production process is exactly from time 0 to time μ. The differential equations with respect to time t can be written as: $$\frac{dI(t)}{dt} + \theta I(t) = K - Ae^{bt} + ap, 0 \le t < \mu$$

	$$\frac{dI(t)}{dt}+\theta I(t)=-Ae^{b\mu}+ap\,,\ \mu\le t\le T$$ With the boundary condition $I(\mathrm{O})=I(T)=\mathrm{O}$ .From this modeling we find out the Pricing Model for the short production process and Pricing Model for the long production process. **ii. I**n this proposed work analyze an inventory system with power demand pattern, considering deterioration and allowing shortages completely backordered. Research could extend the current models to economic production quantity models with power demand pattern, deterioration and backlogged shortages, in which the replenishment rate is not necessarily infinite. Other research could study inventory systems for deteriorating goods with power demand pattern and allowing shortages, but where shortages are lost sales. Finally, it would also be interesting to analyze inventory models for deteriorating items where the customer demand depends on the price of the goods. $$\frac{dI(t)}{dt}+\alpha I(t)=-\frac{rt^{(1-n)/n}}{nT^{(1-n)/n}}\,,\quad 0\le t\le t_0.$$ $$\frac{dI(t)}{dt}=-\frac{rt^{(1-n)/n}}{nT^{(1-n)/n}}\,,\qquad t_0\le t\le T.$$ **iii.** We develop an economic order quantity inventory model for items with three-parameter Weibull distribution deterioration and ramp-type demand. Shortages are allowed in the inventory system and are completely backlogged. The demand rate is deterministic and varies with time up to a certain point and eventually stabilized and becomes constant. The instantaneous rate of deterioration is an increasing function of time. At the start of the cycle, the inventory level

	reaches its maximum I_0 units of item at time $t=0$. During the time interval $[0,t_1]$, the inventory depletes due to mainly the demand and partly to deterioration. At time $t=\mu<t_1$, the inventory level depletes to S units and at t_1, the inventory level is zero and all the demand hereafter (i.e. $T-t_1$) is completely backlogged. The total number of backordered items will be replaced by next replenishment. The demand varies with time up to a certain time and become constant. The deterioration rate is described by an increasing function of time $\theta(t)=\alpha\beta(t-\gamma)^{\beta-1}$. The changes in the inventory at any time t are governed by the differential equations: $$\frac{dI(t)}{dt}+I(t)\alpha\beta(t-\gamma)^{\beta-1}=-at, \quad 0\le t\le\mu,$$ $$\frac{dI(t)}{dt}+I(t)\alpha\beta(t-\gamma)^{\beta-1}=-a\mu,\ \mu\le t\le t_1,$$ $$\frac{dI(t)}{dt}=-a\mu,\ t_1\le t\le T,.$$ The total inventory cost per unit time consists of the following components Deterioration cost (DC) in the cycle , Shortage cost (SC) in the interval ,Ordering cost (OC) and the inventory holding cost (HC).
Progress of the Research Work	**i)** The EOQ models for deteriorating items with equally multiple installments of α fractions of acquisition cost have two situations: one is without shortages and the other is with shortages and partial backordering. The retailer pays the supplier α fraction of the acquisition cost A by n equal installments in p years prior to the time of delivery. The supplier then delivers the order quantity Q units to the retailer at time zero, and receives the remaining unpaid

	balance $(1-\alpha)A$ immediately. Thereafter, the retailer's inventory level is gradually depleted to zero by the end of the replenishment cycle T, due to the combination of demand and deterioration. Hence, the inventory level at time t is governed by the following differential equation: $$\frac{dI(t)}{dt} = -D - \frac{1}{1+m-t} I(t),\ 0 \le t \le T$$ With boundary condition I(T) = 0 . The retailer pre-pays the supplier α A by n equal installments in p years prior to the time of delivery, and pays the remaining balance $(1-\alpha)A$as soon as they receive the order quantity of Q units at time zero. The inventory level is then gradually depleted to zero at time KT due to a combination of demand and deterioration. Thereafter, shortages are partially backordered at the rate of λ during the time interval [KT, T]. Similar to the results in the case of without shortages, the inventory level at time t is governed by the following differential equation: $$\frac{dI(t)}{dt} = -D - \frac{1}{1+m-t} I(t),\ 0 \le t \le KT\ ,$$ with boundary condition, $I(KT) = 0$.
Journal Publication (International)	1.Sahu, S.K.,&Bishi, B., "Deteriorating Items under Permissible Delay in Payments" International Journal of Research in Information Technology, Volume 5, Issue 12,2017 ,01-13.
Conference/Workshop/Seminar Attended	Attended on Research Methodology Work-shop (10 days),P.G Department of Statistics, UtkalUniversity, Bhubaneswar-2017.
Awards	1.**Gold Medal in Statistics** for Scoring the First Class First in M.A/M.Sc. Statistics(2011-2013) from Sambalpur University. 2. **JRF** by Department of Science & Technology, New Delhi,

	Govt. of India In the Year may, 2015.