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Application of a Probabilistic Inventory Model to Industrial Band Families in the Supply Chain

Miguel Josué Heredia-Roldán [1], Erika Barojas-Payán [2], María Eloísa de la Asunción Gurruchaga-Rodríguez[1], Oscar Báez Sentíes [1]

[1]Tecnológico Nacional de México, Orizaba Instituto Tecnológico de Orizaba, Ver, Méx.
[2]Faculty of Engineering, Universidad Veracruzana, Ixtaczoquitlán, Veracruz, Mexico

miguel.hr@orizaba.tecnm.mx, ebarojas@uv.mx, eloisa.gr@orizaba.tecnm.mx, oscar.bs@orizaba.tecnm.mx

Abstract. Due to the high level of competitiveness that exists today, companies have the obligation to establish strategies that allow them to raise their customer service levels without incurring excessive costs. This study addresses the problems of a commercial company located in the state of Puebla, Mexico, which is in a period of restructuring, establishing strategies that allow it to reduce the losses generated from the empirical method of managing its inventories. For this purpose, the research determines the optimal lot quantity by means of the EOQ method of inventories in two of its models, eliminating the risk of shortage and comparing the results obtained in each model, being the News Boy Model with normal distribution.
Keywords: Industrial company, Inventories, Economic Order Quantity, Reorder Point, Shortages.

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1 Introduction

Nowadays, companies, regardless of the sector, field, or nature to which they belong, face an increasingly demanding, changing, and globalized market. This situation leads them to design strategies that allow them to provide an adequate level of service for each type of customer. Likewise, society and its concern for climate change urges organizations to extract, produce, and market environmentally friendly products and services. The methods to organize and achieve the objectives of the company vary according to the activities performed and the complexity and volume of its operations (Sánchez-Semprún & Martínez-Garcés, 2021). An efficient inventory control system treats all stock items differently, i.e., it applies control and analysis methods in correspondence with the relative economic importance of each product (Parada-Gutiérez, 2009). Among the most common methods for inventory management and control are *a)* Activity Based Costing (ABC); *b)* Economic Order Quantity (EOQ), and *c)* Just in Time (JIT) (Sánchez-Semprún & Martínez-Garcés, 2021). Proper inventory management will allow *a)* effective and efficient supply of raw materials and materials to production activities; *b)* balance between demand, inventory, and cash flow; *c)* an adequate level of service for each type of customer; *d)* avoidance of overstocking; *e)* adequate investment in facilities, and *f)* reduction of polluting protective elements that damage the environment, to mention a few.

Based on the importance of inventory management in organizations, this research is developed, it shows as initial content, on the inventory problem detected in a specialized commercial organization, followed by: *1. State of the art,* in this section basic concepts, classification of inventory methods, and inquiries of researchers who have conducted worldwide in terms of inventory management are presented; *2. Methodology,* here are presented the first inquiries of the models, the basic analysis for the application of the inventory method and their development; *3. Results*, comparative of Q's; *4. Conclusions* reached by the authors; and *5. Bibliographic references* present the sources of consultation for the development of the research

1.1. Problem

The *specialized commercial organization* is located in the State of Puebla, Mexico, and has been dedicated to the sale of industrial spare parts since 1999. With 2500 m^2 of constructed surface, it has more than 45000 references in stock, ready for immediate delivery.

Currently, the commercial organization is in a period of restructuring, establishing strategies that will allow it to reduce the losses generated from the empirical method of managing its inventories. Therefore, the main objective of the research presented is to apply a method extracted from the literature that allows order management appropriate to the characteristics of the organization. In this way, the research has its scope in the study of the B family of automotive industrial belts, selecting those with the highest monthly demand, being a total of 18 different belts from the historical record of units sold from the period June 2021 to May 2022. Derived from the description made, this research is categorized as a case study.

1.2. State of the art

When the word *inventory* is mentioned, whatever its nature, it refers to an ordered and valued list of a company's products, which reinforces the following processes: *a.* Procurement; *b.* Commercial, and c. Productive, favoring the level of response to the customer (Cruz-Fernández, 2017). *Stock* refers to the accumulation of material and/or products for later use or sale (Meana-Coalla, 2017). *Inventories* are the goods owned by a company that can be stored for sale or for incorporation into the production process, stocks are part of the stock and can be classified in several criteria, the most common is the accounting criterion (Cruz-Fernández, 2017; López-Montes, 2014).

In this same area, it is worth mentioning that the demand for products that can generate a stock can be of two types: *1. Independent demand*, which depends on the market and not on the company and its production system, and *2. Dependent demand*, which is determined by the production system (Cuatrecasas-Arbós, 2012). In this same area, *inventory management* ensures the supply of materials in the operations and allows the balance between demand, stocks, and capital flow, *stock management* is the ability and organization to control the physical and computerized quantity of each product at a given time (Ladrón-de-Guevara, 2020). Stock management must be optimal for effective procurement; investments in stock immobilize economic resources for a certain period of time, so the effective rotation of products must be taken into account (Meana-Coalla, 2017).

An important factor in formulating and solving an inventory model is whether the demand for an item (per unit of time) is *deterministic* (known with certainty) or *probabilistic* can be described by a probability distribution (Taha, 2004). The nature of the inventory problem is to repeatedly place and receive orders of given sizes at set time intervals. An inventory policy answers questions such as how much to order and when to order? The general inventory model is based on minimizing the following cost model (1):

$$\text{TIC(Total inventory cost)} = \text{Pc(purchase cost)} + \text{Sec(setup cost)} + \text{Soc(storage of cost)} + \text{S(shortage cost)} \quad (1)$$

Where:

Pc = Purchase cost, is based on the unit price of the item.
Sec = Setup cost, fixed cost incurred when placing an order.
Soc = Storage of cost, cost of maintaining an inventory stock.
Sc = Shortage cost, the penalty incurred when stocks are depleted.

An inventory system can be based on *a) periodic review*, when new orders are received at the beginning of each period, or *b) continuous review* when new orders are placed and the number of inventories drops to a certain level, which is called the *reorder point* (Taha, 2004). In the following paragraphs, the classification of inventory models is presented.

Fig. 1 shows the different inventory management models, under the demand classification criterion (Bustos-Flores & Chacón-Parra, 2012).

Deterministic models for independent demand arise from the assumption that the demand for an item in inventory is independent of its demand. The estimation of demand is calculated from forecasts or purchase orders and can be divided into Single lot methods; 2. Lot-by-lot technique; 3. Economic order quantity model; 4. Silver-Meal algorithm; 5. Minimum unit cost; 6. Fragmented period balancing; and 7. Wagner-Whitin algorithm (Bustos-Flores & Chacón-Parra, 2012). *Probabilistic models with independent demand*, assume that only the probability of distribution is known during the production time, so the possibility of inventory depletion is present (Rios et al., 2008). The classification of such models, according to the frequency of revision is: 1. Periodic revision models, and 2. Continuous revision models: continuous revision models with new orders and continuous revision models without new orders (Mathur, Solow & Domínguez-Reyes, 1996).

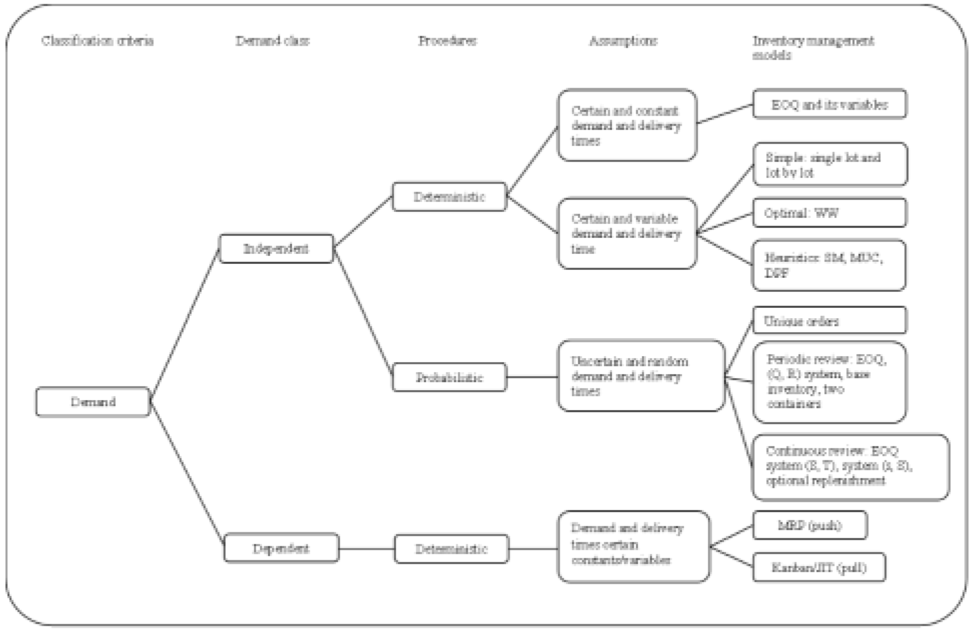

Fig. 1. Inventory models (Bustos-Flores & Chacón-Parra, 2012).

Likewise, different applications in the field of inventory management can be found in the literature, among which the following can be mentioned:

The researchers (Gutiérrez & Vidal, 2008), review management models for the design of finished product and raw material inventory policies in supply chains, taking into account the variability of demand and supply times. The review scheme is classified into (1) Demand randomness models; (2) Supply time randomness models; (3) Inventory policy models; and (4) Integrated models for inventory management. The authors conclude that in order for companies to maintain their competitiveness, it is necessary to define a methodology for estimating inventory control policies for finished products and raw materials throughout the supply chain.

In the article (Bustos-Flores & Chacon-Parra, 2012), the researchers compare the deterministic methods EOQ, SM, CUM, fragmented period balancing (BPF), and Wagner-Whitin (WW) algorithm for obtaining the lot size of letter and legal paper batches, determining that the methods (BPF) and (WW) are the ones that minimize the total costs. Meanwhile, in the research of (Causado-Rodríguez, 2015), the authors propose an improvement in the inventory system of a trading company, starting with the classification of products with the ABC method and then the EOQ model, obtaining as results different lots (Q*) for each product belonging to the A classification. Similarly, the article by (Arango-Marin, Giraldo-García & Castrillón-Gómez, 2013) presents an inventory management model with stochastic demand and service levels, the authors apply the Holt-Winters method for the calculation of forecasts and the ABC classification by product volume. Its implementation in commercial and service companies has produced satisfactory results.

Inventory management is important in every type of industry, therefore, the article (Manzo et al., 2017), the authors conduct a qualitative, descriptive, non-experimental, cross-sectional, descriptive study, for which the researchers select luxury hotels and two first-class hotels to determine what kind of inventory models the hotels handle, the results show similarities in application. In the same field, the researcher (Parada-Gutiérez, 2009), applies an alternative multi-criteria approach to the application of the ABC method and the acquisition/rotation index matrix, in the classification of products for efficient supply management in Cuban tourism service companies.

For their part, researchers (Coronel-Montoya, Gavidia-Mondragón & Oblitas-Otero, 2021) propose an inventory control system for a Peruvian company based on the ABC method of inventory management to determine the size of merchandise stock, identifying those products that have a higher demand. While researchers (Jara-Cordero, Sánchez-Partida & Martínez-Flores, 2017) present the application of the method to calculate the economic order quantity and reorder point of each and every product of an international wholesale trading company, to facilitate purchasing management.

2 Methodology

Fig. 2 shows the methodology used to solve the aforementioned problem. The first step is to determine the inventory strategy, which is achieved by collecting information, establishing the inventory policy, and then determining the inventory models to be used. Secondly, the inventory models determined in the previous step are applied, and finally, the results are compared.

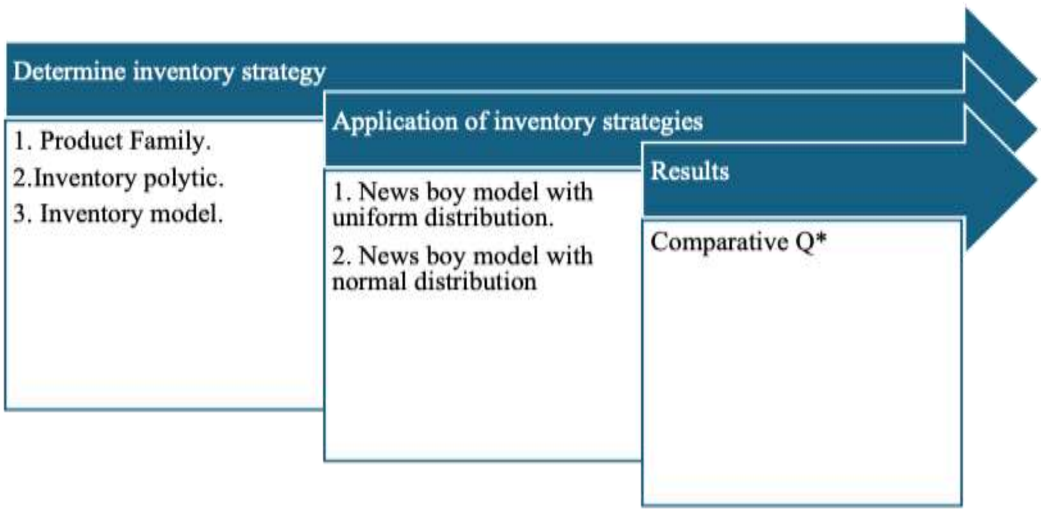

Fig. 2. Methodology.

2.1. Determine inventory strategy

a) Product family

As mentioned in the problem statement, the present case study only involves the inventory management of 18 types of belts sold from the period June 2021 to May 2022 belonging to Family B of automotive industrial belts, which are presented in Table 1.

Table 1. Historical record of units for the period June-2021 to May-2022.

Product Bands SKU	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22
GATB103	26	18	9	35	18	7	4	20	30	21	29	12
GATB105	45	29	33	10	22	15	9	13	21	20	3	27
GATB118	138	36	56	7	24	7	10	20	4	10	30	32
GATB36	4	10	14	16	8	21	18	45	30	16	27	21
GATB46	26	29	11	23	19	19	14	21	39	6	8	14
GATB48	28	55	30	24	37	38	16	27	27	6	27	10
GATB52	25	34	8	25	13	14	13	17	27	13	13	33
GATB54	46	19	10	30	23	3	18	33	18	20	18	21
GATB56	44	37	19	40	46	18	29	22	29	18	30	15
GATB57	11	16	17	4	12	21	1	16	29	6	52	46
GATB68	27	29	15	24	18	9	40	16	34	37	45	12
GATB70	17	14	6	10	21	30	8	11	8	14	34	35
GATB74	24	11	0	26	21	0	22	30	5	6	16	31
GATB75	24	17	11	23	37	37	30	11	26	43	26	9
GATB80	18	41	9	5	29	6	25	13	24	19	22	10
GATB86	46	14	16	25	18	20	20	19	56	18	19	4
GATB90	27		19	32	20	18	33	25	12	79	38	23
GATB92	21	24	10	43	18	6	11	2	22	1	18	46

b) Inventory policies

The data collection allows the establishment of policies and initial inventory data, *a)* selling price; *b)* cost of the bands; *c)* production area; *d)* warehouse area; *e)* storage costs; *f)* cost of placing an order; and *g)* lead time of 4 working days. Table 2 includes the product up to the period Dec-21 and Table 3 shows the remaining periods and the Total.

Table 2. Initial demand and price information.

Product Bands SKU	Cost	Price	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
GATB103	100	188.7	26	18	9	35	18	7	4
GATB105	100	188.7	45	29	33	10	22	15	9
GATB118	100	207.9	138	36	56	7	24	7	10
GATB36	38	79.9	4	10	14	16	8	21	18
GATB46	45	100.2	26	29	11	23	19	19	14
GATB48	45	104.5	28	55	30	24	37	38	16
GATB52	45	108.8	25	34	8	25	13	14	13
GATB54	50	111	46	19	10	30	23	3	18
GATB56	50	113.5	44	37	19	40	46	18	29
GATB57	50	113.9	11	16	17	4	12	21	1
GATB68	55	128.8	27	29	15	24	18	9	40
GATB70	55	131.4	17	14	6	10	21	30	8
GATB74	55	138.5	24	11	0	26	21	0	22
GATB75	55	139.1	24	17	11	23	37	37	30
GATB80	63	148.9	18	41	9	5	29	6	25
GATB86	65	160.6	46	14	16	25	18	20	20
GATB90	65	166.8	27		19	32	20	18	33
GATB92	90	171	21	24	10	43	18	6	11

Table 3. Initial Demand and Price Information (Part Two).

Product Bands SKU	Cost	Price	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Total
GATB103	100	188.7	20	30	21	29	12	229
GATB105	100	188.7	13	21	20	3	27	247
GATB118	100	207.9	20	4	10	30	32	374
GATB36	38	79.9	45	30	16	27	21	230
GATB46	45	100.2	21	39	6	8	14	229
GATB48	45	104.5	27	27	6	27	10	325
GATB52	45	108.8	17	27	13	13	33	235
GATB54	50	111	33	18	20	18	21	259
GATB56	50	113.5	22	29	18	30	15	347
GATB57	50	113.9	16	29	6	52	46	231
GATB68	55	128.8	16	34	37	45	12	306
GATB70	55	131.4	11	8	14	34	35	208
GATB74	55	138.5	30	5	6	16	31	192
GATB75	55	139.1	11	26	43	26	9	294
GATB80	63	148.9	13	24	19	22	10	221
GATB86	65	160.6	19	56	18	19	4	275
GATB90	65	166.8	25	12	79	38	23	326
GATB92	90	171	2	22	1	18	46	222

c) **Inventory model to be applied.**

With the above information through the demand and calculating the coefficient of variability of the demand, the inventory model to be used is determined according to the literature, either a deterministic model if it is less than 0.20, otherwise if it is greater than 0.20 a probabilistic inventory model will be used in order to structure the strategy to be followed by the specialized trading company. From the demand data, the standard deviation and the average of the different bands are calculated, thus obtaining the coefficient of variability (CV) of each band. Tables 4 and 5 present the calculation of the coefficient of variability of demand.

Table 4. Calculation of the demand variability coefficient.

Product Bands SKU	Cost	Price	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
GATB103	100	188.7	26	18	9	35	18	7	4
GATB105	100	188.7	45	29	33	10	22	15	9
GATB118	100	207.9	138	36	56	7	24	7	10
GATB36	38	79.9	4	10	14	16	8	21	18
GATB46	45	100.2	26	29	11	23	19	19	14
GATB48	45	104.5	28	55	30	24	37	38	16
GATB52	45	108.8	25	34	8	25	13	14	13
GATB54	50	111	46	19	10	30	23	3	18
GATB56	50	113.5	44	37	19	40	46	18	29
GATB57	50	113.9	11	16	17	4	12	21	1
GATB68	55	128.8	27	29	15	24	18	9	40
GATB70	55	131.4	17	14	6	10	21	30	8
GATB74	55	138.5	24	11	0	26	21	0	22
GATB75	55	139.1	24	17	11	23	37	37	30
GATB80	63	148.9	18	41	9	5	29	6	25
GATB86	65	160.6	46	14	16	25	18	20	20

GATB90	65	166.8	27		19	32	20	18	33
GATB92	90	171	21	24	10	43	18	6	11

Table 5. Calculation of Demand Variability Coefficient, Part II.

Product Bands SKU	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Total	Average	Standard deviation	C.V of demand
GATB103	20	30	21	29	12	229	19.08	9.77	0.51
GATB105	13	21	20	3	27	247	20.58	11.71	0.57
GATB118	20	4	10	30	32	374	31.17	36.97	1.19
GATB36	45	30	16	27	21	230	19.17	11.04	0.58
GATB46	21	39	6	8	14	229	19.08	9.40	0.49
GATB48	27	27	6	27	10	325	27.08	13.06	0.48
GATB52	17	27	13	13	33	235	19.58	8.77	0.45
GATB54	33	18	20	18	21	259	21.58	10.98	0.51
GATB56	22	29	18	30	15	347	28.92	10.82	0.37
GATB57	16	29	6	52	46	231	19.25	15.88	0.82
GATB68	16	34	37	45	12	306	25.50	11.77	0.46
GATB70	11	8	14	34	35	208	17.33	10.37	0.60
GATB74	30	5	6	16	31	192	19.20	11.30	0.71
GATB75	11	26	43	26	9	294	24.50	11.09	0.45
GATB80	13	24	19	22	10	221	18.42	10.59	0.57
GATB86	19	56	18	19	4	275	22.92	14.18	0.62
GATB90	25	12	79	38	23	326	29.64	18.02	0.61
GATB92	2	22	1	18	46	222	18.50	14.36	0.78

As can be seen, the Coefficient of Variability of all demands is greater than 0.20, therefore, *a probabilistic inventory model* is used to propose a strategy for the control of its orders. Tables 6 and 7 present the data analysis of the initial problem obtaining the strategy to be followed for the calculation of a probabilistic inventory model.

Table 6. Initial data.

Data	GATB103	GATB105	GATB118	GATB36	GATB46	GATB48	GATB52	GATB54	GATB56
d=	19.08	20.58	31.16	19.16	19.08	27.08	19.58	21.58	28.91
σ=	9.77	11.71	36.96	11.03	9.4	13.05	8.77	10.08	10.81
LT=	4	4	4	4	4	4	4	4	4
C=	100	100	110	38	45	45	45	50	50
p=	188.7	188.7	207.9	79.8	100.2	104.5	108.8	111	113.5
D=	229	247	374	230	229	325	235	259	347
T=	15	15	15	15	15	15	15	15	15
I=	7	8	15	10	10	13	10	10	14

Table 7. Initial data.

Data	GATB57	GATB68	GATB70	GATB74	GATB75	GATB80	GATB86	GATB90	GATB92
d=	19.25	20.5	17.3	19.2	24.5	18.41	22.91	29.63	18.5
σ=	15.88	11.76	10.36	9.36	11.09	10.58	14.18	18.02	14.36
LT=	4	4	4	4	4	4	4	4	4
C=	50	55	55	55	55	63	65	65	90
p=	113.9	128.8	131.4	138.5	139.1	148.9	160.6	166.8	171
D=	231	306	208	192	294	221	275	326	222
T=	15	15	15	15	15	15	15	15	15
I=	9	10	8	9	12	8	10	15	9

Based on the above data, an analysis is performed, and a strategy is established to apply *the single purchase model with standard deviation* (News Boy Model) uniform distribution, in which at the beginning of the day an estimate of the number of pieces to be ordered must be carried out because the order times are not fixed, this model considers an uncertain demand. Similarly, when performing the second analysis of inventory models, it is determined that the necessary data is available for the application of *the single purchase model with standard deviation* (News Boy Model) normal distribution, in order to make a comparison of both methods and select the best strategy, which fits the actual uncertain demand.

2.2. Implementation of inventory strategies

a) Single Standard Deviation Purchase Model (News Boy Model) Uniform distribution

The News Boy Model gets its name from the scenario of a newspaper delivery boy, who at the beginning of the day must make an estimate of the number of newspapers to be picked up. One of its important aspects is that it considers that demand is uncertain, so if he picks up too many newspapers, he may find that several of them do not sell. These periods at the end of the day represent a loss. Therefore, it considers a purchase cost and a sale value for the items in inventory. In this work, the strategy for using such a model was generated because it considers orders with non-fixed times, uncertain demand due to the characteristics of the automotive market, as well as both costs and an estimate of parts to order for the inventory and an inverse cumulative probability distribution function of the demand for the product in inventory [19], [20]. Formula 2, belongs to the Single Purchase Model.

$$Q = q = F^{-1}\frac{p-c}{p} = (Dmin) + (Dmax - Dmin)\left(\frac{p-c}{p}\right) \tag{2}$$

Where:
Q = number of units to be ordered in inventory.
p = the sales value of each unit in inventory.
C = purchase cost of each unit in inventory.
F^{-1} = inverse cumulative inverse probability distribution function of demand D.
D = product demand in inventory.

If D ~ Uniform [Dmin, Dmax].

Table 10 presents the number of units to be ordered for the inventory, obtained through the single purchase model with uniform distribution.

Table 10. Calculation of Q of the single purchase model with uniform distribution.

Uniform Distribution	
Product Bands (SKU)	$Q = q = (D_{min}) + (D_{max} - D_{min})\left(\frac{p-c}{p}\right)$
GATB103	19
GATB105	23
GATB118	67
GATB36	25
GATB46	24
GATB48	34
GATB52	23
GATB54	27
GATB56	32
GATB57	30
GATB68	30
GATB70	23
GATB74	21
GATB75	30
GATB80	26
GATB86	35
GATB90	53
GATB92	22

b) Single Purchase with Standard Deviation Model (News Boy Model) Normal distribution

Formula 2 belongs to the Single Purchase Model, while the determination of Z^{-1} is presented in Table 11.

$$Q = q = F^{-1}\frac{p-c}{p} = (\mu) + (\sigma Z^{-1})\left(\frac{p-c}{p}\right) \qquad (3)$$

Where:
q = number of units to be ordered in inventory.
p = the sales value of each unit in inventory.
c = purchase cost of each unit in inventory.
F^{-1} = inverse cumulative inverse probability distribution function of demand D
D = product demand in inventory

If D ~ Normal [μ, σ]

Table 11. Calculation of Z^{-1} with the inverse distribution formula using Excel.

Product Bands (SKU)	Calculation of Z	
GATB103	Z=	-0.07512333
GATB105	Z=	-0.07512333
GATB118	Z=	-0.07300902
GATB36	Z=	0.0597171
GATB46	Z=	0.12793098
GATB48	Z=	0.1747908
GATB52	Z=	0.21828651
GATB54	Z=	0.12452337
GATB56	Z=	0.14962907
GATB57	Z=	0.15355182
GATB68	Z=	0.18396965
GATB70	Z=	0.20555503
GATB74	Z=	0.26082972
GATB75	Z=	0.26527453
GATB80	Z=	0.19396217
GATB86	Z=	0.24111691
GATB90	Z=	0.28013166
GATB92	Z=	-0.06601181

Table 12 presents the number of units to order for the inventory, obtained through the single purchase model with normal distribution.

Table 12. Calculation of Q of the single purchase model with normal distribution.

Normal Distribution	
Product Bands (SKU)	$Q = q = (\mu) + (\sigma Z^{-1})\left(\frac{p-c}{p}\right)$
GATB103	18
GATB105	20
GATB118	28
GATB36	20
GATB46	20
GATB48	29
GATB52	21
GATB54	23
GATB56	31
GATB57	22
GATB68	23
GATB70	19
GATB74	22
GATB75	27
GATB80	20
GATB86	26
GATB90	35
GATB92	18

3 Results

Table 13 presents the comparison of the News Boy Model (uniform distribution) and News Boy Model (normal distribution) inventory methods.

Table 13. Comparative results for Q* with uncertain demand.

Model	News boy model uniform distribution	News boy model normal distribution	Actual uncertain demand
Product Bands SKU	$Q = q = (D_{min}) + (D_{max} - D_{min})\left(\frac{p-c}{p}\right)$	$Q = q = (\mu) + (\sigma Z^{-1})\left(\frac{p-c}{p}\right)$	
GATB103	570	540	443
GATB105	690	600	488
GATB118	2010	840	907
GATB36	750	600	453
GATB46	720	600	437
GATB48	1020	870	618
GATB52	690	630	440
GATB54	810	690	490
GATB56	960	930	632
GATB57	900	660	499
GATB68	900	690	485
GATB70	690	570	413
GATB74	630	660	439
GATB75	900	810	553
GATB80	780	600	436

GATB86	1050	780	552
GATB90	1590	1050	709
GATB92	660	540	471

After the analysis and calculations, we proceed to multiply the Q* values of both methods by the value of 30 days to obtain the value of the order on a monthly basis, since these values would be similar to the calculation of the Q of real uncertain demand. Table XIV shows that the smallest difference is obtained through the *News Boy Model inventory method with normal distribution*, which will allow improving the levels through a probabilistic method with greater certainty, taking into consideration the variables involved in inventory management, since it was previously carried out empirically.

4 Conclusions

Due to the high level of competitiveness that exists today, companies have the obligation to establish strategies that allow them to increase their customer service levels without incurring excessive costs. Adequate inventory management will allow: *a)* the effective and efficient supply of raw materials and materials for production activities; *b)* a balance between demand, inventory, and cash flow; *c)* an adequate level of service for each type of customer; *d)* avoidance of excess inventory; *e)* adequate investment in facilities; and *f)* reduction of pollutants that damage the environment, to mention a few.

This study addresses the problems of a commercial company located in the state of Puebla, Mexico, which is in a period of restructuring, establishing strategies to reduce the losses generated from the empirical method of managing their inventories. For this purpose, the research determines the optimal lot quantity by means of the EOQ method of inventories in two of its models: Single purchase model with standard deviation (News Boy Model) Normal distribution and Single purchase model with standard deviation (News Boy Model) Uniform distribution, eliminating the risk of shortage. The results show that *the News Boy Model with normal distribution* is the most appropriate method for the specialized automotive belt trading company.
A social benefit of establishing proper inventory levels is the efficient handling of both reused and recycled material by making use of reverse logistics and green logistics for the supply chain of the specialized trading company.

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