Study on Optimizing Inventory by Application of ABC Analysis, Forecasting and Economic Order Quantity at Sankara Eye Hospital, Coimbatore

By

Smit Shah

Dissertation submitted in partial fulfillment of the requirements of the degree

MBA Hospital and Health Management

Academic year, 2018-2020

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TO WHOMSOEVER MAY CONCERN

This is to certify that Smit Dilip Shah, a student of MBA Hospital and Health Management from The IIHMR University, Jaipur has undergone Internship training at Sankara Eye Hospital, Coimbatore from 03.02.2020 to 03.05.2020.

The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.
The Internship is in fulfilment of the course requirements.

I wish him all success in all his future endeavours.

Dr P R Sodani
Dean, Academics and Student Affairs
The IIHMR University, Jaipur

Dr Anoop Khanna
Associate Professor
The IIHMR University, Jaipur

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled Study on optimizing inventory by application of ABC analysis, Forecasting and Economic order quantity and submitted by Smit Shah Enrollment No. 839 for award of MBA in Hospital and Health/ Pharmaceutical / Rural Management in Health and Hospitals of the University carried out during the period from to

……. embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.

Signature

Abstract

Title

A study on optimizing inventory by the application of ABC analysis, Forecasting and Economic order quantity at Sankara Eye Hospital, Coimbatore.

Objectives

- To identify drugs, medical consumables and surgical instruments for applying economic order quantity
- To forecast the demand for the identified items
- To calculate the economic order quantity for identified items

Research Question

- What is the current inventory control model utilized at Sankara Eye Hospital, Coimbatore?
- How will the application of economic order quantity inventory control model affect the current status of inventory?

Study Design

- Quantitative descriptive study conducted on a retrospective basis

Study Setting

- The study took place at Sankara Eye Hospital, Coimbatore from 3rd February 2020 to 3rd May 2020.

Sample size calculation

- Total items in hospital stores: 560

  Item Category A = 3/560

  Item Category B = 4/560

  Item Category C = 553/560

- Sample for analysis: 8 medicines

  5 medical consumables

Sampling method

- Non-probability convenience sampling

Data collection method

- Secondary consumption data for last 2 years was collected from Management Information System of Sankara Eye Hospital, Coimbatore.

Statistical methods employed

- Seasonal Index method
- Linear Regression

Inclusion criteria

- In patient medicines and consumables

Exclusion criteria

- Intraocular lens

Limitations

- Ordering cost (S) was not available, hence it was calculated on unit cost

Conclusion

The current model of forecasting utilised at Sankara Eye Hospital; Coimbatore considers simple average consumption. It does not capture trends and seasonal variation in consumption pattern. This might lead to stock outs or over-stocking which may result in loss of sales or increased carrying costs. The proposed model of seasonal index forecasting will capture trend and seasonal variation in demand and enable the organization to forecast demand efficiently.

Economic order quantity would help the organization to take decisions on optimum quantity to be ordered for a commodity. This would further contribute towards minimizing associated costs.

The results have shown a more comprehensive method of forecasting. However, quantification of associated ordering costs would yield a more accurate economic order quantity.

Acknowledgement

This project report is the outcome of a lot of hard work and guidance given by a lot of people. I would like to express my heartfelt gratitude to all the people who have been a part of this journey.

I would first like to thank Mr. Bharath Balasubramanian, President – Operations, Sankara Eye Hospital, Coimbatore for giving me the opportunity to undertake Dissertation program in this esteemed organization.

I am highly grateful to Mr. Santosh R, Head - Procurement for being a mentor, sharing his knowledgeable experiences and helping me throughout this journey.

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Furthermore, I would like to thank my mentor at The IIHMR University, Dr. Anoop Khanna for his guidance and support in successful completion of this report.

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A study on optimizing inventory by the application of ABC analysis, Forecasting and Economic order quantity at Sankara Eye Hospital, Coimbatore.

1. Introduction

Inventory management and control is one of the most important aspect in an effective organization. It is vital for any organization to control the flow of goods and materials. The primary goal of inventory management is to avoid holding too much stock and avoid stock outs. An effective inventory management facilitates holding optimum stock which can make a significant contribution to a company's profit.

The primary goal of hospitals is to provide excellent patient care at a reasonable cost. Hence, there is an increased, pressing need to cut costs. The hospitals are now adopting modern techniques such as six sigma, lean operations and radio frequency identification (RFID). On the cost-cutting front, hospitals have started maximizing resource utilization and optimizing inventory control. Economic order quantity (EOQ) is a proven model to optimize stock quantities and minimize associated costs.

The purpose of this study is to implement an effective forecasting model to facilitate optimum inventory control using ABC analysis and Economic order quantity. In-patient medical items, surgical items and consumables from past two years will be analysed.

Objectives

- To identify drugs, medical consumables and surgical instruments for applying economic order quantity
- To forecast the demand for the identified items
- To calculate the economic order quantity for identified items

Rationale

At Sankara Eye Hospital, Coimbatore a 'minimum-maximum' inventory control model is used which highlights the range of quantities to be maintained at a given point of time. The range is currently forecasted using simple average method. The seasonal index method of forecasting along with economic order quantity will take into consideration trends and seasonal variation in demand and enable the organisation to maintain optimum level of inventory.

2. Literature Review

No.	Author	Study design	Sample plan	Objectives	Key finding
1	M Devnani, AK Gupta And R. Nigah	Observational study	Drug formulary consisting of 421 items	• To examine the yearly utilization of pharma items and associated costs for the year 2007-08 • To develop a priority system based on ABC-VED analysis • To identify high priority pharma items based on ABC-VED analysis	• 13.78% (58) items were categorised as A-grade items, 21.58% (92) items were categorised as B-grade items, 64.37% items were categorised as C-grade items
2	Sukhbir Singh, Mahesh Devnani, Anil Kumar Gupta, Latika	Observational study	Drug formulary consisting of 416 drugs	• To apply ABC-VED analysis in the hospital pharmacy of a tertiary care institute • To identify drugs requiring strict management control	• Total annual expenditure of hospital pharmacy was 6.04 crore for the year 2008-09 • Therefore, a need for strict inventory management control was identified with priority to inventory optimization
3	Dr. Babu Krishmaraj, Meenakshi PK	Observational study	Drug inventory of hospital with 132 items	• To guarantee that there is a need of satisfactory load of required things	• ABC analysis was used to identify high priority items • 30.3% (40) items were categorised as A-grade items, 25% (33) items were categorised as B-grade items and 44.7% (59) items were C-grade

4	Pittayachaichoopara, Ittrarukukanpanich	Analytical study	Hospital inventory consisting of 862 items	• To improve stock administration for clinical supplies in the medical procedure branch of an emergency clinic	• The outcomes show that variety, turnover rate and superfluous expense were improved by 21.97%, 5% and 50.34% • Further investigation should be possible by invigorating stock with gauge request to locate a suitable stock model
5	Yunilla Dwi Putri Ariyanti, Oky Dwi Nurhayati	Observational study	Food consumption pattern for 212 days divided into 3 servings	• To build a forecasting system and determine the number of serving required for next period	• Forecasting values utilizing alpha parameter 0.3 and 0.7 with a base estimating blunder count utilizing MAPE for alpha 0.7 Estimating result not exclusively can be utilized to distribute food supplies but to control load of crude materials
6	Sushanta Sengupta, Ruma Dutta	Quantitative research		• To analyse demand forecast using linear regression function	• It was implied that a good forecasting depends upon forecasting technique used along with

					identification of demand function
7	Mahatme MS, Dakhale GN, Salve AM, Shinde AT	Observational study	Drug formulary of a hospital consisting of 210 items	• To apply ABC-VED analysis with economic order quantity (EOQ) • To compare the index costs with actual costs • To assess the expenditure for forthcoming years	• ABC-VED analysis along with EOQ and integrated economics optimizes cost of medical services. It also ensures materials are readily available to patients thereby, improving quality of healthcare services provided.
8	P.O Agada, E.H. Ogwuche	Quantitative study	Hospital inventory consisting of 786 medical consumables	• To implement a probabilistic EOQ model for inventory management	• The economic order quantity was found to be 864, 810 and 786 units when ordering cost was taken as 2.5%, 12.5% and 25% of unit cost. • This model would assist the hospital to undertake guided decision on quantities to be ordered according to various ordering costs

3. Methodology

Research Question

- What is the current inventory control model utilized at Sankara Eye Hospital, Coimbatore?
- How will the application of economic order quantity inventory control model affect the current status of inventory?

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Statistical methods employed

Seasonal Index method

Linear Regression

Inclusion criteria: In patient medicines and consumables

Exclusion criteria: Intraocular lens

Limitations: Ordering cost (S) was not available, hence it was calculated on unit cost

Seasonal Index

A seasonal index is a measure of how a season through some cycle compares with the average season of that cycle. By de-seasonalizing data, we're removing seasonal fluctuations, or patterns in the data, to predict or approximate future data values.

The seasonal index of each value is calculated by dividing the period amount by the average of all periods. This creates a relationship between the period amount and the average that reflects how much a period is higher or lower than the average.

For this study each quarter consumption average was divided by yearly consumption average to obtain seasonal index. Least square regression was then applied to forecast the value for next quarters.

Economic Order Quantity

Economic order quantity (EOQ) is the ideal order quantity an organisation should purchase to minimize inventory costs such as holding costs and ordering costs.

It is calculated by using the following formula:

$$Q = \frac{\sqrt{2DS}}{H}$$

Where,

Q = economic order quantity

D = demand

S = ordering cost

H = holding cost

Demand (D) was calculated by using seasonal index method of forecasting. Whereas, ordering cost (S) and holding cost (H) was provided by the organization.

4. Results

Seasonal Index and Forecasting Actamid

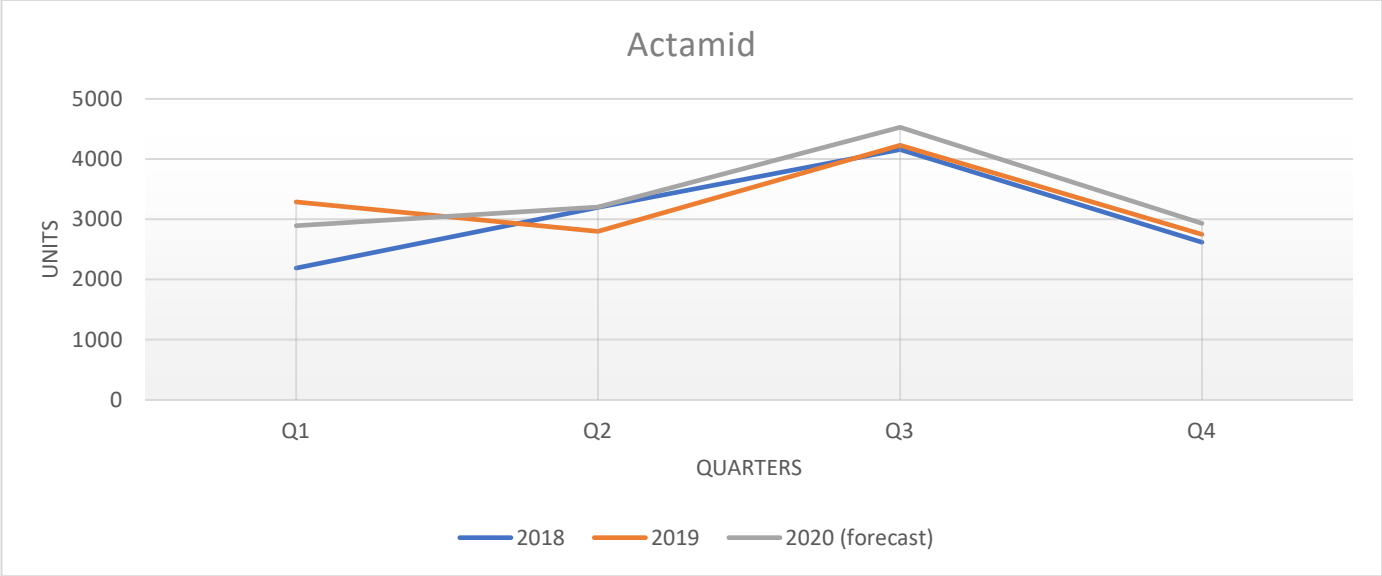

Fig 1 : Seasonal index graph for Actamid

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	2190	3290	2894	0.87
2	3200	2800	3205	0.95
3	4159	4230	4529	1.33
4	2620	2750	2931	0.85

Table 1: Seasonal index and forecasting for Actamid

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Actamid** for each quarter for the year 2020 was 2894, 3205, 4529 and 2931 respectively.

There has been an increase in demand for Actamid for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting Tropicacyl Plus

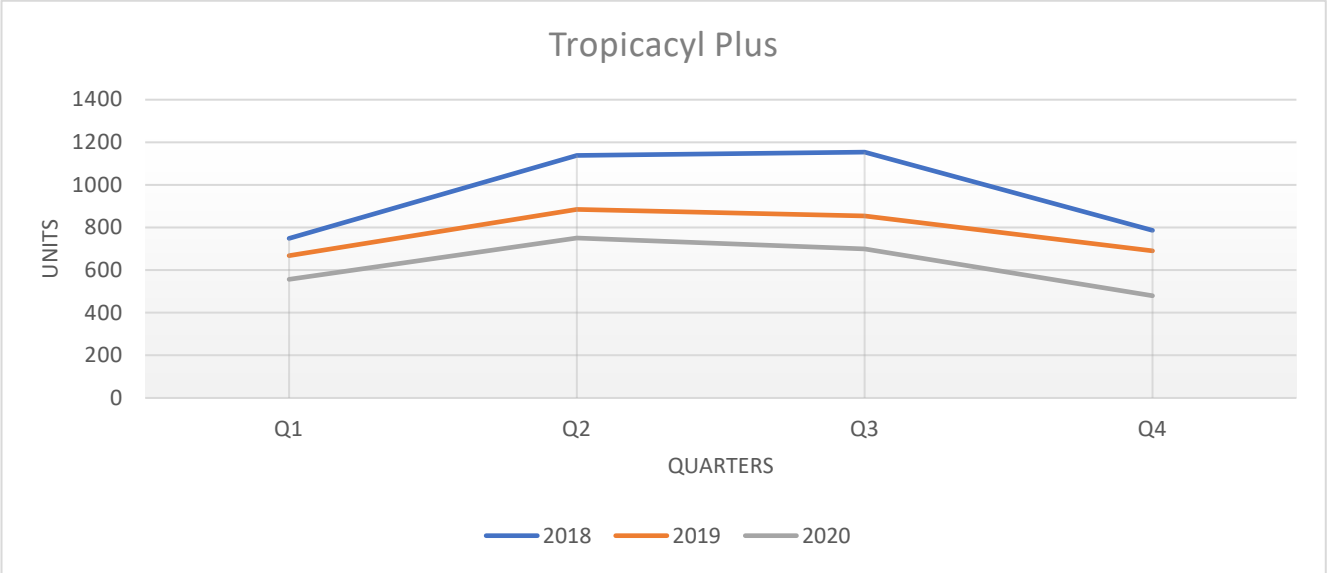

Fig 2: Seasonal index graph for Tropicacyl Plus

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	749	668	557	0.82
2	1139	885	751	1.17
3	1154	855	700	1.16
4	786	691	480	0.85

Table 2: Seasonal index and forecasting for Tropicacyl Plus

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Tropicacyl Plus** for each quarter for the year 2020 was 557, 751, 700 and 480 respectively.

There has been a decrease in demand for Tropicacyl Plus for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting Exocin 5ML

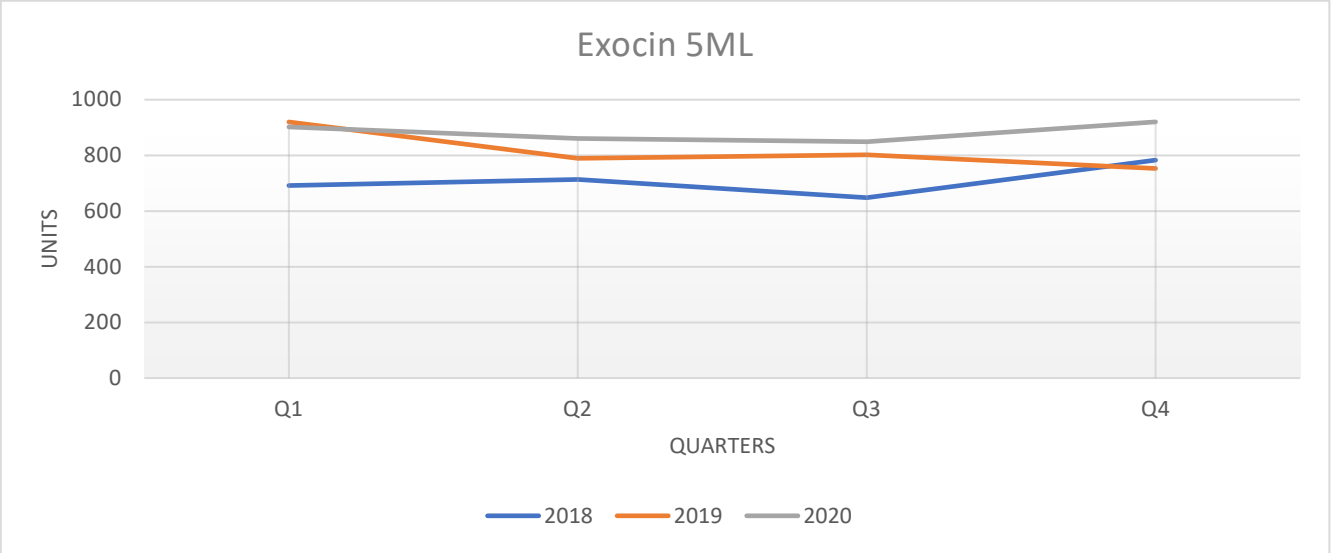

Fig 3: Seasonal index graph for Exocin 5ML

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	692	920	902	1.06
2	714	789	861	0.99
3	648	802	849	0.95
4	783	753	920	1.01

Table 3: Seasonal index and forecasting for Exocin 5ML

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Exocin 5ML** for each quarter for the year 2020 was 902, 861, 849 and 920 respectively.

There has been an increase in demand for Exocin 5ML for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting Chymoral Forte Tab

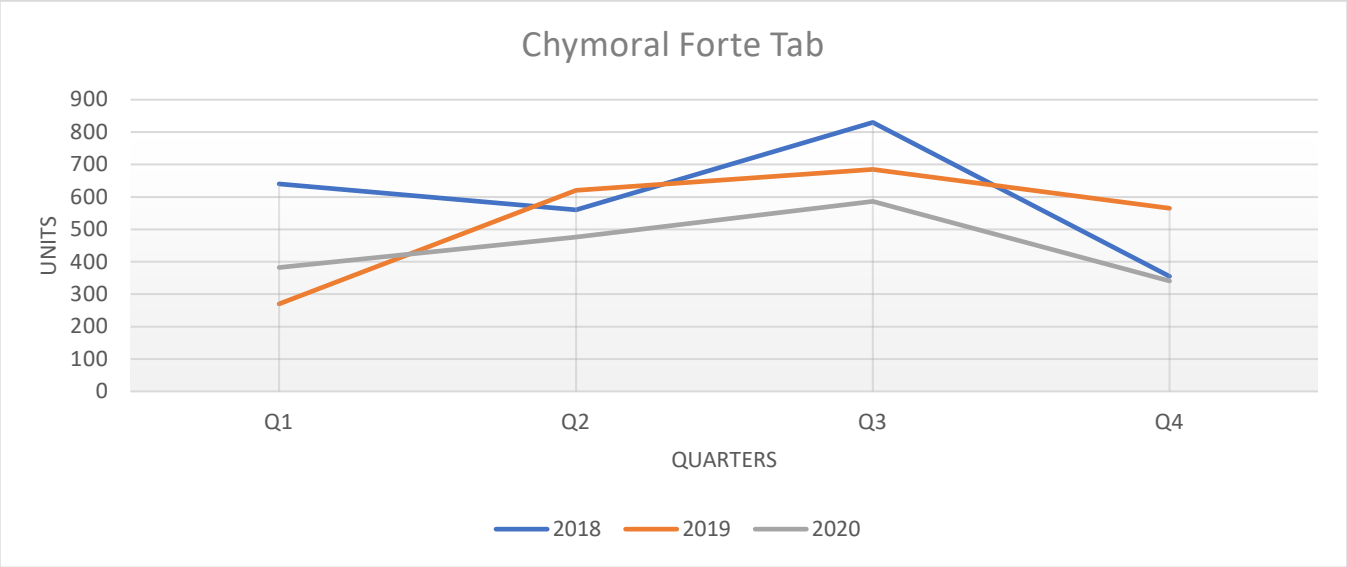

Fig 4: Seasonal index graph for Chymoral Forte Tab

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	640	270	383	0.80
2	560	620	477	1.04
3	830	685	586	1.34
4	355	565	341	0.81

Table 4: Seasonal index and forecasting for Chymoral Forte Tab

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Chymoral Forte Tab** for each quarter for the year 2020 was 383, 477, 586 and 341 respectively.

There has been an increase in demand for Chymoral Forte Tab for Q2 and Q4 and decrease in demand for Q1 and Q3 for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting Glucometer Strips

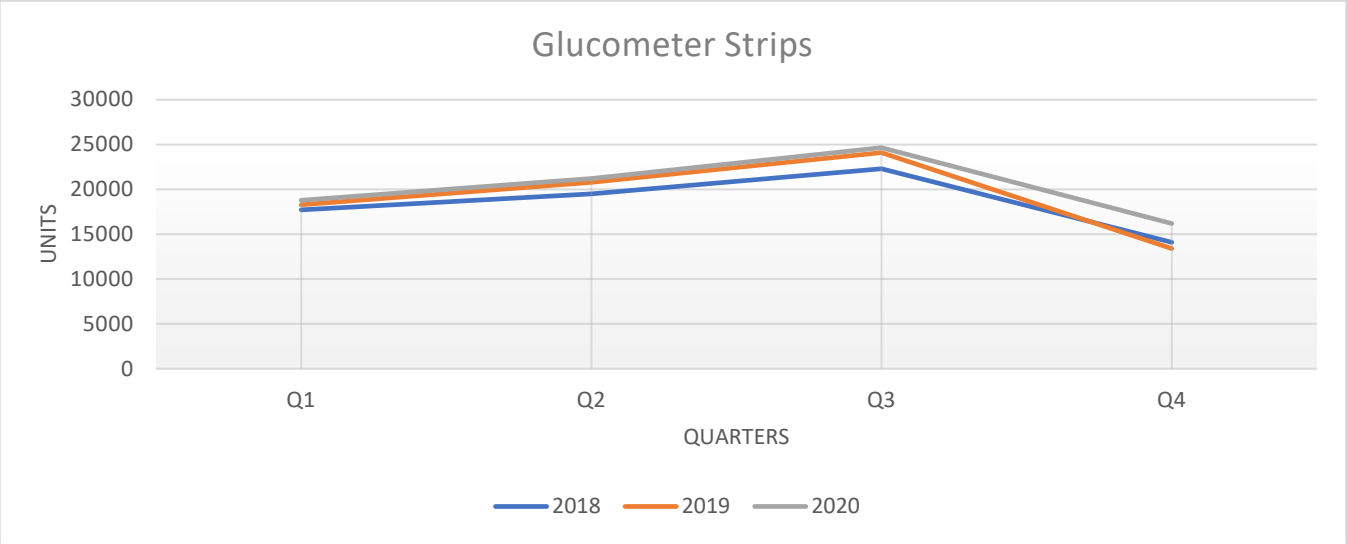

Fig 5: Seasonal index graph for Glucometer strips

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	17700	18300	18797	0.96
2	19500	20800	21230	1.07
3	22300	24100	24653	1.24
4	14099	13400	16193	0.73

Table 5: Seasonal index and forecasting for Glucometer strips

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Glucometer strips** for each quarter for the year 2020 was 18797, 21230, 24653 and 16193 respectively.

There has been an increase in demand for Glucometer strips for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting Cohevisc

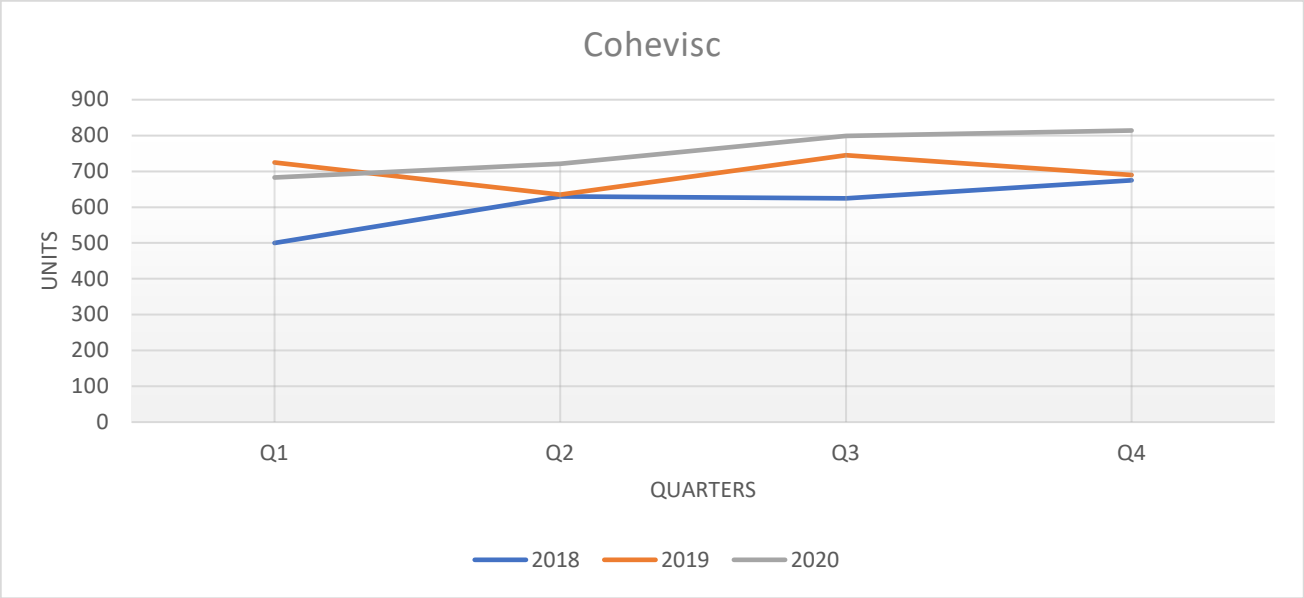

Figure 6: Seasonal index graph for Cohevisc

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	500	725	683	0.94
2	630	635	721	0.97
3	625	745	799	1.05
4	675	690	814	1.04

Table 6: Seasonal index and forecasting for Cohevisc

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Cohevisc** for each quarter for the year 2020 was 683, 721, 799 and 814 respectively.

There has been an increase in demand for Cohevisc for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting Lancet (OR) Medipoint

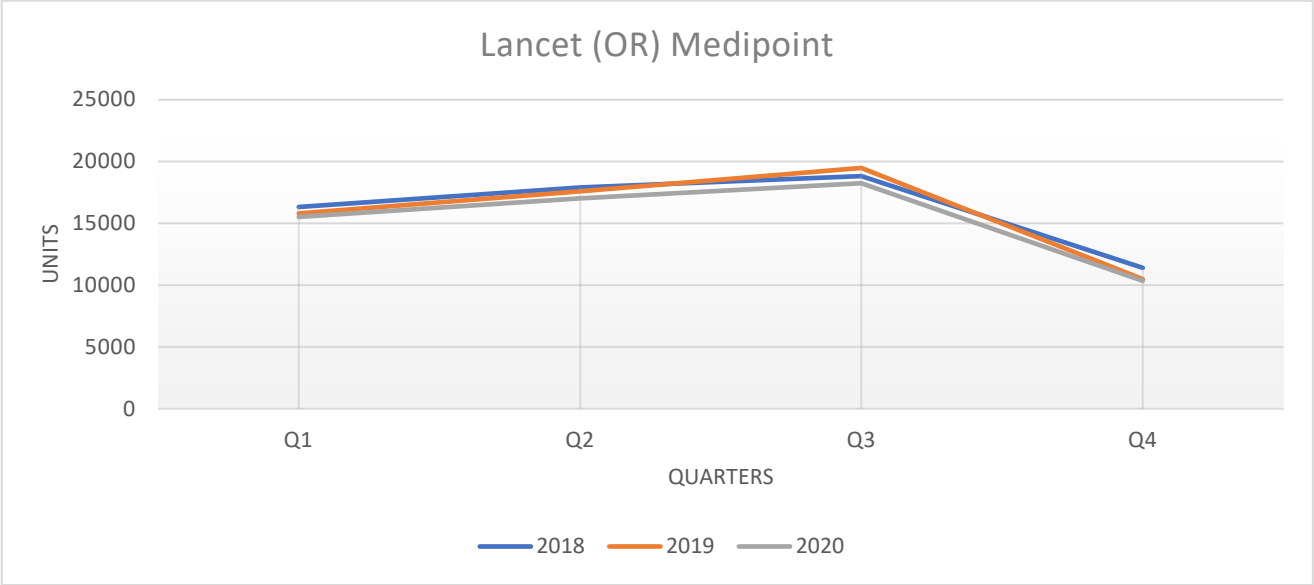

Figure 7: Seasonal index graph for Lancet (OR) Medipoint

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	**16317**	**15800**	**15515**	**1.01**
2	**17900**	**17600**	**17032**	**1.11**
3	**18820**	**19480**	**18244**	**1.20**
4	**11400**	**10487**	**10346**	**0.68**

Table 7: Seasonal index and forecasting for Lancet (OR) Medipoint

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Lancet (OR) Medipoint** for each quarter for the year 2020 was 15515, 17032, 18244 and 10346 respectively.

There has been an increase in demand for Lancet (OR) Medipoint in Q3 and a decrease in demand in Q1, Q2 AND Q4 for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting Vigamox 5ML

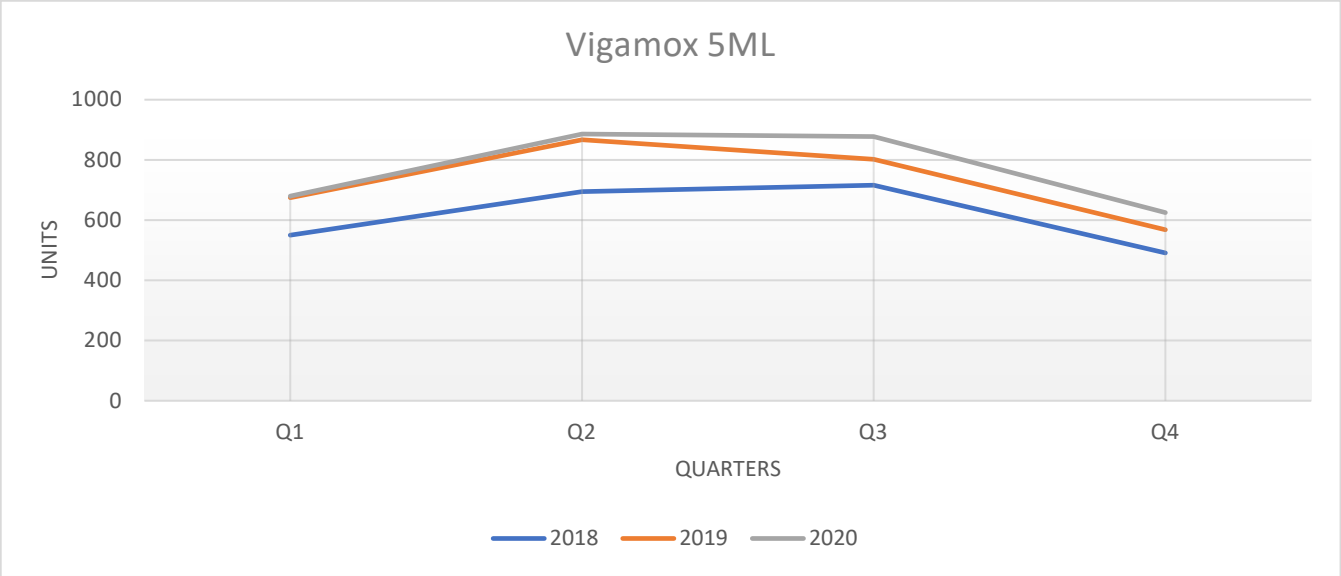

Figure 8: Seasonal index graph for Vigamox 5ML

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	550	674	680	0.91
2	695	867	886	1.17
3	716	802	878	1.13
4	491	568	625	0.79

Table 8: Seasonal index and forecasting for Vigamox 5ML

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Vigamox 5ML** for each quarter for the year 2020 was 680, 886, 878 and 625 respectively.

There has been an increase in demand for Vigamox 5ML for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting 2CC Syringe

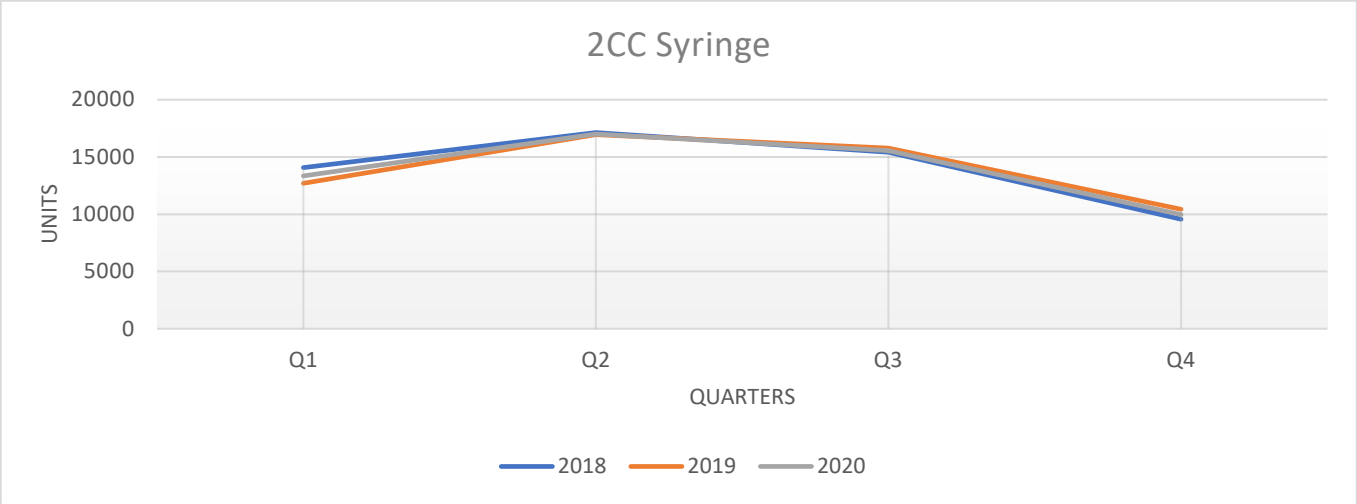

Figure 9: Seasonal index graph for 2CC Syringe

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	14066	12694	13356	0.96
2	17130	16948	17002	1.22
3	15403	15779	15551	1.11
4	9562	10431	9967	0.71

Table 9: Seasonal index and forecasting for 2CC Syringe

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **2CC Syringe** for each quarter for the year 2020 was 13356, 17002, 15551 and 9967 respectively.

There has been a decrease in overall demand for 2CC Syringe for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting 5CC Syringe

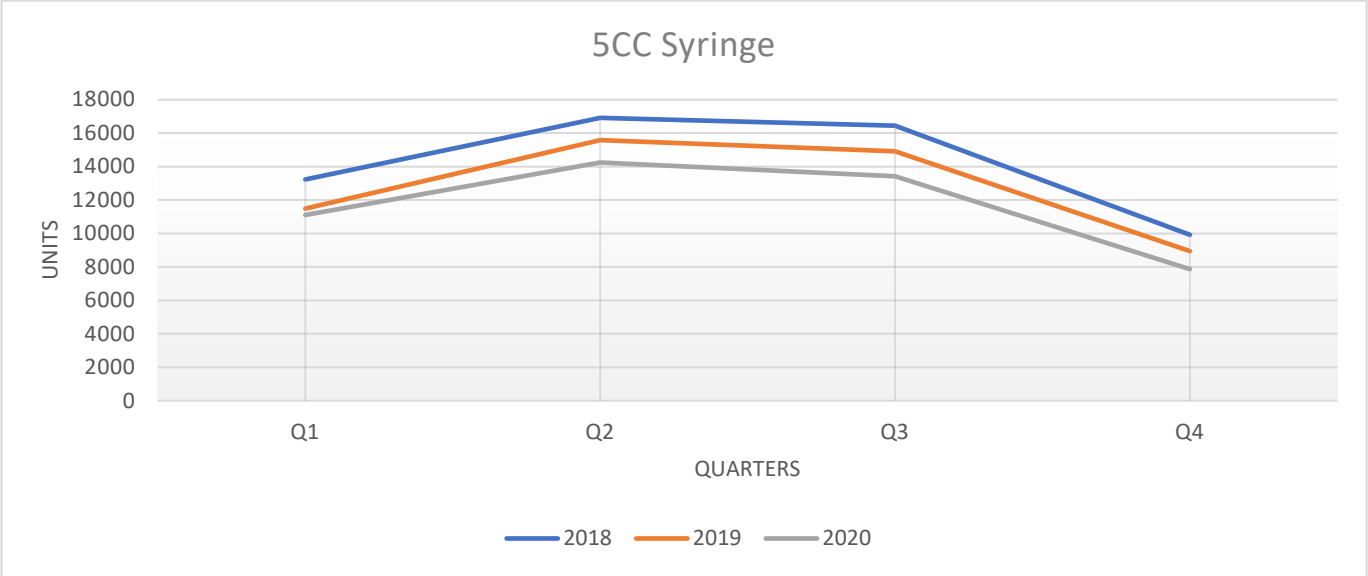

Figure 10: Seasonal Index graph for 5CC Syringe

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	13237	11481	11102	0.92
2	16915	15583	14246	1.21
3	16438	14922	13425	1.17
4	9921	8945	7866	0.70

Table 10: Seasonal index and forecasting for 5CC Syringe

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **5CC Syringe** for each quarter for the year 2020 was 11102, 14246, 13425 and 7866 respectively.

There has been a decrease in demand for 5CC Syringe for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting Appavisc PFS 3ML

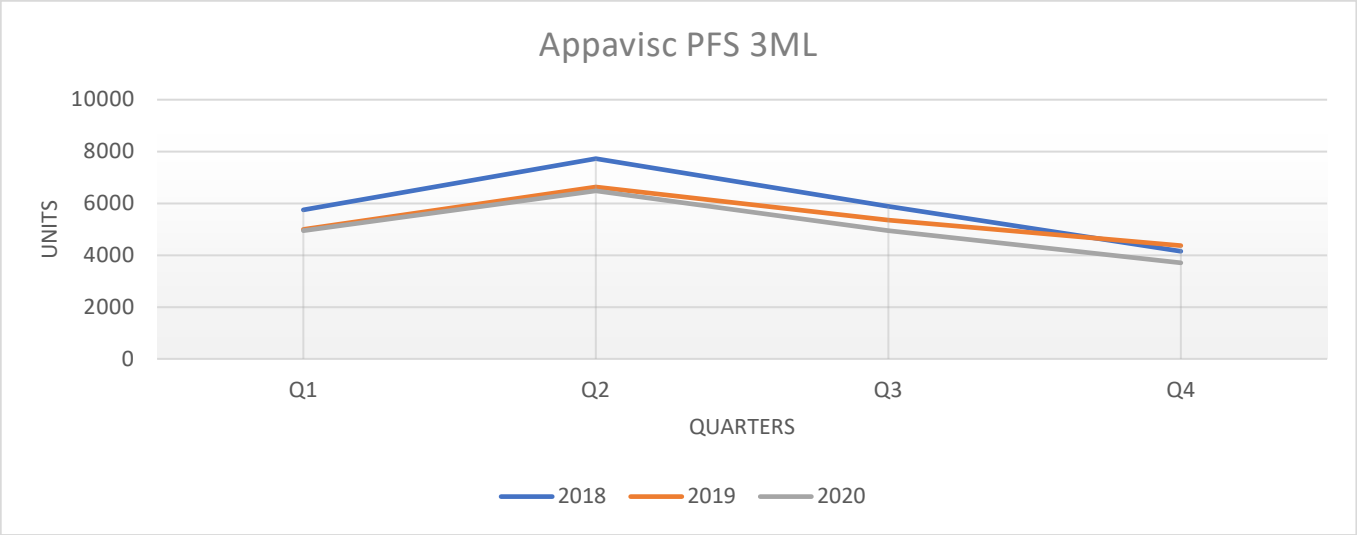

Figure 11: Seasonal index graph for Appavisc PFS 3ML

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	5753	5000	4949	0.93
2	7725	6632	6483	1.25
3	5886	5350	4952	1.10
4	4152	4370	3706	0.73

Table 11: Seasonal index and forecasting for Appavisc PFS 3ML

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Appavisc PFS 3ML** for each quarter for the year 2020 was 4949, 6483, 4952 and 3706 respectively.

There has been an overall decrease in demand for Appavisc PFS 3ML for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting Ribolink 1MG

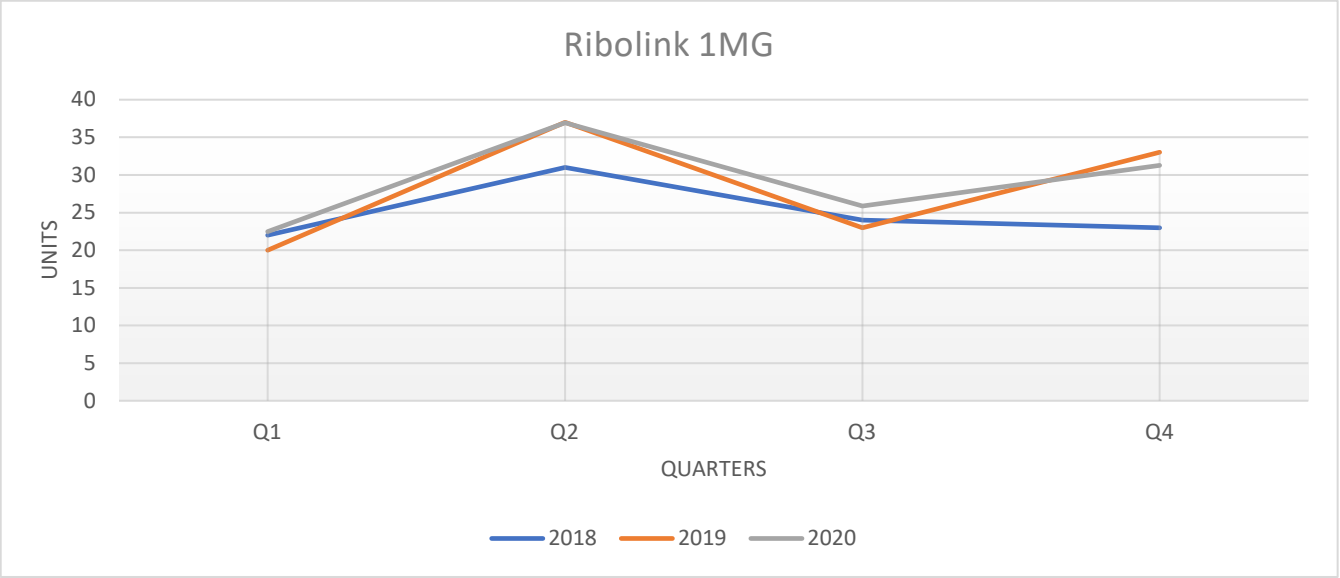

Figure 12: Seasonal index graph for Ribolink 1MG

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	22	20	22	0.79
2	31	37	37	1.28
3	24	23	26	0.88
4	23	33	31	1.05

Table 12: Seasonal index and forecasting for Ribolink 1MG

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Ribolink 1MG** for each quarter for the year 2020 was 22, 37, 26 and 31 respectively.

There has been an overall increase in demand for Ribolink 1MG for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Seasonal Index and Forecasting Patient Interface Cone

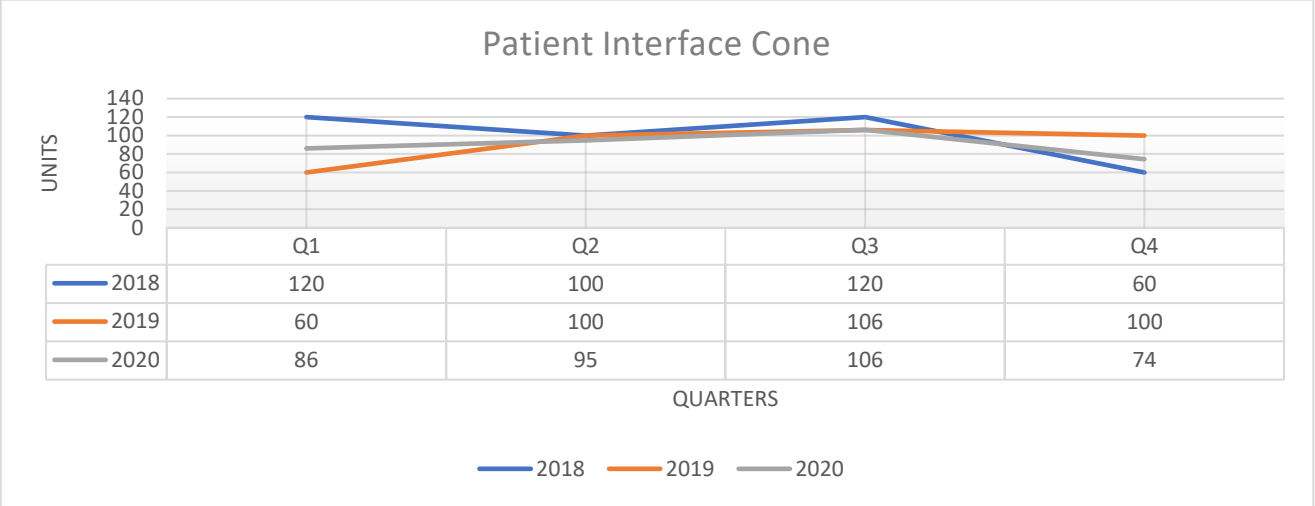

Figure 13: Seasonal index graph for Patient interface cone

Quarters	2018	2019	2020 (forecast)	Seasonal Index
1	120	60	86	0.94
2	100	100	95	1.04
3	120	106	106	1.18
4	60	100	74	0.84

Table 13: Seasonal index and forecasting for Patient interface cone

Interpretation: The values of each quarter for the year 2020 was forecasted by calculating seasonal index. Seasonal index indicates average consumption for that quarter compared to its annual average. Trend was then calculated by using **least square regression**, taking 2018 as the base year and multiplying it by respective seasonal index. The forecasted value for **Patient Interface Cone** for each quarter for the year 2020 was 86, 95, 106 and 74 respectively.

There has been an overall decrease in demand for Patient Interface Cone for the year 2019 when compared to 2018. This trend was captured and reflects in the forecasted value for the year 2020.

Recommended method

Economic order quantity for Actamid

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**2894**	**2.83**	**6**	**20**	**139**
Q2	**3205**	**2.83**	**6**	**20**	**146**
Q3	**4529**	**2.83**	**6**	**20**	**174**
Q4	**2931**	**2.83**	**6**	**20**	**140**

Table 14: Economic order quantity for Actamid

Interpretation: The optimum quantity of Actamid to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 139, 146, 174 and 140 respectively

Economic order quantity for Tropicacyl Plus

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**557**	**34.54**	**6**	**20**	**61**
Q2	**751**	**34.54**	**6**	**20**	**71**
Q3	**700**	**34.54**	**6**	**20**	**68**
Q4	**480**	**34.54**	**6**	**20**	**57**

Table 15: Economic order quantity for Tropicacyl Plus

Interpretation: The optimum quantity of Tropicacyl Plus to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 61, 71, 68 and 57 respectively

Economic order quantity for Exocin 5ML

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**902**	**41.29**	**6**	**20**	**78**
Q2	**861**	**41.29**	**6**	**20**	**76**
Q3	**849**	**41.29**	**6**	**20**	**75**
Q4	**920**	**41.29**	**6**	**20**	**78**

Table 16: Economic order quantity for Exocin 5ML

Interpretation: The optimum quantity of Exocin 5ML to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 78, 76, 75 and 78 respectively

Economic order quantity for Chymoral Forte Tab

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**383**	**12.93**	**6**	**20**	**51**
Q2	**477**	**12.93**	**6**	**20**	**56**
Q3	**586**	**12.93**	**6**	**20**	**63**
Q4	**341**	**12.93**	**6**	**20**	**48**

Table 17: Economic order quantity for Chymoral Forte Tab

Interpretation: The optimum quantity of Chymoral Forte Tab to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 51, 56, 63 and 48 respectively

Economic order quantity for Glucometer Strips

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**18797**	**7.14**	**6**	**20**	**354**
Q2	**21230**	**7.14**	**6**	**20**	**376**
Q3	**24653**	**7.14**	**6**	**20**	**405**
Q4	**16193**	**7.14**	**6**	**20**	**329**

Table 18: Economic order quantity for Glucometer Strips

Interpretation: The optimum quantity of Glucometer strips to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 354, 376, 405 and 329 respectively

Economic order quantity for Cohevisc

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**683**	**290**	**6**	**20**	**67**
Q2	**721**	**290**	**6**	**20**	**69**
Q3	**799**	**290**	**6**	**20**	**73**
Q4	**814**	**290**	**6**	**20**	**74**

Table 19: Economic order quantity for Cohevisc

Interpretation: The optimum quantity of Cohevisc to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 67, 69, 73 and 74 respectively

Economic order quantity for Lancet (OR) Medipoint

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**15515**	**1.46**	**6**	**20**	**322**
Q2	**17032**	**1.46**	**6**	**20**	**337**
Q3	**18244**	**1.46**	**6**	**20**	**349**
Q4	**10346**	**1.46**	**6**	**20**	**263**

Table 20: Economic order quantity for Lancet (OR) Medipoint

Interpretation: The optimum quantity of Lancet (OR) Medipoint to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 332, 337, 349 and 263 respectively

Economic order quantity for Vigamox 5ML

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**680**	**188.62**	**6**	**20**	**67**
Q2	**886**	**188.62**	**6**	**20**	**77**
Q3	**878**	**188.62**	**6**	**20**	**77**
Q4	**625**	**188.62**	**6**	**20**	**65**

Table 21: Economic order quantity for Vigamox 5ML

Interpretation: The optimum quantity of Actamid to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 67, 77, 77 and 65 respectively

Economic order quantity for 2CC syringe

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**13356**	**1.86**	**6**	**20**	**298**
Q2	**17002**	**1.86**	**6**	**20**	**337**
Q3	**15551**	**1.86**	**6**	**20**	**332**
Q4	**9967**	**1.86**	**6**	**20**	**258**

Table 22: Economic order quantity for 2CC syringe

Interpretation: The optimum quantity of 2CC Syringe to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 298, 337, 332 and 258 respectively

Economic order quantity for 5CC syringe

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**11102**	**2.38**	**6**	**20**	**272**
Q2	**14246**	**2.38**	**6**	**20**	**308**
Q3	**13425**	**2.38**	**6**	**20**	**299**
Q4	**7866**	**2.38**	**6**	**20**	**229**

Table 23: Economic order quantity for 5CC syringe

Interpretation: The optimum quantity of 5CC Syringe to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 272, 308, 299 and 229 respectively

Economic order quantity for Appavisc PFS 3ML

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**4949**	**42.86**	**6**	**20**	**182**
Q2	**6483**	**42.86**	**6**	**20**	**208**
Q3	**4952**	**42.86**	**6**	**20**	**182**
Q4	**3706**	**42.86**	**6**	**20**	**157**

Table 24: Economic order quantity for Appavisc PFS 3ML

Interpretation: The optimum quantity of Appavisc PFS 3ML to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 182, 208, 182 and 157 respectively

Economic order quantity for Ribolink 1MG

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**22**	**3626.55**	**6**	**20**	**12**
Q2	**37**	**3626.55**	**6**	**20**	**16**
Q3	**26**	**3626.55**	**6**	**20**	**13**
Q4	**31**	**3626.55**	**6**	**20**	**14**

Table 25: Economic order quantity for Ribolink 1MG

Interpretation: The optimum quantity of Ribolink 1MG to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 12, 16, 13 and 14 respectively

Economic order quantity for Patient Interface Cone

Quarters	Forecasted demand	Unit cost (Rs)	Holding cost (% of unit cost)	Ordering cost (% of unit cost)	Economic order quantity
Q1	**120**	**7533.03**	**6**	**20**	**28**
Q2	**100**	**7533.03**	**6**	**20**	**26**
Q3	**120**	**7533.03**	**6**	**20**	**28**
Q4	**60**	**7533.03**	**6**	**20**	**20**

Table 26: Economic order quantity for Patient interface cone

Interpretation: The optimum quantity of Patient Interface Cone to be ordered for meeting forecasted demand requirements and to minimize associated cost when holding cost and ordering cost are taken as 6% and 20% of unit cost for each quarter is 28, 26, 28 and 20 respectively

Consolidated economic order quantity

Product name	Q1	Q2	Q3	Q4	Yearly average
Actamid	139	146	174	140	150
Tropicacyl Plus	61	71	68	57	64
Exocin 5ML	78	76	75	78	77
Chymoral Forte Tab	51	56	63	48	54
Glucometer Strips	354	376	405	329	366
Cohevisc	67	69	73	74	71
Lancet (OR) Medipoint	322	337	349	263	318
Vigamox 5ML	67	77	77	65	71
2CC Syringe	298	337	332	258	306
5CC Syringe	272	308	299	229	277
Appavisc PFS 3ML	182	208	182	157	182
Ribolink 1MG	12	16	13	14	14
Patient Interface Cone	28	26	28	20	25

Table 27: Consolidated economic order quantity

5. Conclusion

The current model of forecasting utilised at Sankara Eye Hospital; Coimbatore considers simple average consumption. It does not capture trends and seasonal variation in consumption pattern. This might lead to stock outs or over-stocking which may result in loss of sales or increased carrying costs. The proposed model of seasonal index forecasting will capture trend and seasonal variation in demand and enable the organization to forecast demand efficiently.

Economic order quantity would help the organization to take decisions on optimum quantity to be ordered for a commodity. This would further contribute towards minimizing associated costs.

The results have shown a more comprehensive method of forecasting. However, quantification of associated ordering costs would yield a more accurate economic order quantity.

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