Analysis of Material Requirement Planning with Exponential Smoothing,Arima Forecasting and Fixed Order Quantity Methods in Optimizing the Inventory in Garment Industry

D. Venu[1], P. Naga Ganesh[2], K.N.S. Prashanth[3], M. Pavan Kumar[4], Ch. Lokesh[5], Ch. Srilatha[6]
[1,2,3,4,5] *UG students, Department of Mechanical Engineering, NRI Institute of Technology, Pothavarappadu, Eluru (Dist), AP, India - 521212*
[6] *Associate Professor, Department of Mechanical Engineering, NRI Institute of Technology, Pothavarappadu, Eluru (Dist), AP, India – 521212*

Abstract **- Developing a Material Requirement Planning (MRP) system specifically for a GARNMENT INDUSTRY. So far, difficulties in controlling raw material inventories which causes problems for the production process. If there is a shortage of raw materials, the production process cannot be carried out, on the contrary if the raw material ordered is too excessive it will cause excess and the high cost of raw material inventory. This analysis develops an information system that can plan the needs of raw materials needed for production. In this system MRP method is used to develop raw material ordering planning systems, case studies at garment companies, Using Auto Regressive Integrated Moving Average (ARIMA) forecasting and fixed order quantity methods (FOQ). This analysis discusses the MRP method with the lot sizing FOQ technique and obtains optimum costs in the supply of raw materials.**

Keywords**— MRP, FOQ, ARIMA, Exponential Smoothing, Demand forecast**

I.INTRODUCTION

1.1 EXPONENTIAL SMOOTHING: The best forecasting techniques use exponential smoothing. Forecasts made with the Aid of exponential smoothing techniques are weighted averages of earlier observations, with the weights degrading exponentially with time. In other words, the associated weight is higher when the observation is more recent. This framework quickly and accurately creates projections for a variety of time series, which is a significant benefit for applications in industry. We outline the statistical framework for exponential smoothing techniques. These models produce prediction intervals in addition to the same point forecasts as the techniques outlined in the chapter's opening section. The practice of predicting future demand based on historical demand information gathered from the past is known as demand prediction. Demand prediction is the technique of predicting future demand based on historical demand information gathered from the industry. Predicting client demand is an art and science that helps corporate supply chains and business management execute it holistically. Both informal methods, such informed estimates, and quantitative methods, like the utilization of historical sales data and statistical tools or current data fromtest markets, are used in demand forecast.

1.2 ECONOMIC ORDER QUANTITY: In order to reduce overall inventory costs, including holding costs, shortfall costs, and order costs, a corporation should add a certain number of units to inventory with each transaction. This is known as the economic order quantity (EOQ) model. The number of units a business should add to inventory with each order to reduce overall expenses is known as the economic order quantity. Quantity of Economic Order.

1.3 FIXED ORDER QUANTITY: A maximum and fixed amount of inventory can be replenished at a time when the inventory levelhits the auto-set reorder point or the minimum stock level under the Fixed Order Quantity (FOQ) inventory control system, which fixes

the maximum and minimum inventory levels. In other words, an auto-reorders point is connected to the system's pre-fixed amount of inventory, and as soon as the inventory level reaches the minimum set-point, the point immediately places an order with the supplier for the maximum stock capacity.

1.4 ARIMA: Based on its own prior values, the ARIMA model makes predictions for a given time series. Any non-seasonal sequence of numbers that displays patterns and is not a collection of random occurrences can use it. For instance, because it was gathered over time, sales data from a clothes business would be a time series. A technique called ARIMA is used to anticipate or predict future events using a previous time series. It is based on the statistical idea of serial correlation, which holds that previous data points have an impact on subsequent data points. A particular method of analysing a set of data points gathered over a period of time is called a "time series analysis." Data points are gathered by analysts during time series analysis at regularintervals over a set rather than just intermittently or randomly capturing the data points. A time series is a group of observations of certain data points gathered over time by repeated measurements. This chapter describes about the literature review of ARIMA forecasting, exponential smoothing, economic order quantity, fixed order quantity, demand forecast.

II.LITERATURE REVIEW

Rahul Hencha et.al [1] Since materials are the primary prerequisite for every finished product, material requirements planning (MRP) systems are widely employed across all industries. An essential component of production planning and control is determining lot sizes, lead times, scheduling in production locations, and the quantity of parts and their types that are available. Safety stock boosts overall company profit by decreasing inventory costs, shipping costs, packaging costs, and other expenses. By reviewing the appropriate shortage plan and determining the quantity of items that should be included in the next day collection plan in order to reduce the amount of material not included in the plan. Jozef Trojan et.al [2**]** "Demand Driven Material Requirements planning. Some Methodical and Practical Comments" Supply chain network complexity will change as a result of Industry 4.0. It will become increasingly vital to adjust to the needs of the consumer and respond in a timely manner that accepts the product waiting. These factors indicate that the supply chain needs to be managed differently. It is insufficient to see the supply chain traditionally as a linear system that can have its separate subsystems optimized to create an optimal supply chain. The article's major goal was to demonstrate the potential that may be attained by applying the DDMRP to the supply chain. Given that DDMRP is a new technology. Chairul Furqon et.al [3] The organization places a strategic emphasis on inventory management. Inventory is one of the most expensive assets for many businesses, accounting for close to 50% of total capital invested. The purpose of this study was to evaluate the company's execution of Material Requirement Planning (MRP), in particular. The lot sizing techniques employed in this analysis of material requirement planning (MRP) include lot for lot (LFL), economic order quantity (EOQ), and periodic order quantity (POQ). The method of lot sizing that yields the POQ is the base price for all raw commodities. Erry Rimawan et.al [4] It is important to maintain effective inventory control and act in compliance with the regulations while providing inventory to produce different types of paper. Production demand. However, these businesses frequently face inventory control issues, such excess stock. The LFL, EOQ, FOQ, and POQ MRP methodology is employed. Lot-For-Lot (LFL), Quantity Order (EOQ), Fixed Order Quantity (FOQ), and Period Order Quantity are used in planning utilizing the Material Requirement Planning (MRP) method (POQ). The Quant Order (POQ) method, which generates or fills the message and maintains the minimum, can be identified from the comparison of all sizing measure methods. Nidaul Hasanati1 et.al [5] Many actors, including the apparel industry, have been prompted by the increasingly competitive economic climate to employ information and communication technology as a competitive advantage. There have been issues thus far with managing raw material stockpiles, which affects how things are made. The production process cannot be completed if there is a scarcity of raw materials; nevertheless, if too much raw materials are ordered, this will result in surplus and high inventory costs. MPS are the end product of the Production Scheduling Information System and are produced from thedemand

forecasting outcomes of sales transaction history data in OTP. When this system is built, ordering errors for raw materials—including the quantity of orders and order time—can be reduced by up to 80%. Errors may happen if the market's demand differs from what was anticipated or if supplier time limitations are present. This technology offers users the ability to order raw foods conveniently and with solutions. If the expected market demand differs from reality or if a supplier's scheduling restrictions prevent them from delivering items on schedule, errors may happen. Dinesh E. D et.al [6] Systems for managing material requirements planning (MRP) are widely used to control the flow of materials and parts on the production floor. Exploding bills of material, determining net material requirements, and production planning are all done using the MRP approach. Order scheduling, cycle time production, and supplier lead times are all aspects that together decide when orders should be placed. The master production schedule and bill of materials identify the materials tobe needed. It is a time-phased priority-planning method used to optimize inventory that figures out the amount of material needed and plans supply to satisfy demand across all products and parts in one or more facilities. The benefit of Material Requirement Planning (MRP), which guarantees that materials are available in time for service and delivery to customers. Demand projections serve as the MRP's input for the subsequent material procurement. By maintaining the required amount in the sector, it regulates both excessive and low inventories of materials. Karen Santin et.al [7] the adoption of a technology for materials planning in the Brazil furniture business. The MRP method was employed (Material Requirements Planning). The work was created based on the process improvement identification, which includes: lower inventory costs, improved production efficiency, and more accurate informationThe following outcomes were assessed following a five-month MRP run: In addition to these quantifiable benefits, client feedback revealed improvements in customer service. As supply agreements were reached and the gap between the company and its suppliers was closed, suppliers' delivery times also improved. Obubu M et.al [8] The study proposes crime modelling and forecasting using Autoregressive Integrated Moving Average Models. The best model was selected based on the minimum Akaike information criterion (AIC), Bayesian information criterion (BIC), and Hannan-Quinn criterion (HQC) values and was used to make forecasts. We used a twenty-nine-year crime data in Nigeria pertaining to Armed RobberyIt was discovered that armed robberies were increasing over the anticipated period. Therefore, government should establish mechanisms in all of the federation's states to actively occupy the populace, especially our youth. The Nigerian government needs to clean up the Nigeria Police Force and other security services and reassess its anti-crime policies. In order to create industries that would serve to gainfully employ her population, the government and its agencies should collaborate with the private sector. D Hebsiba Beula et.al [9] The insurance sector is directly impacted by climate change risks, which include transitional risks, liability risks, and physical risks. The insurance industry is significantly being impacted by climate change, which includes things like summer heat waves and heavy rainfall (Flood). It has an impact on the reinsurance and insurance industries. When working with a little amount of land, farmers use hybrid variety plants, seeds, and other products to boost agricultural productivity. Konstantin Kostic et.al [10] This article demonstrates how to describe the fundamental problem of optimum control of the discrete system, which is to determine the ideal number of replenishments in the fixed-order quantity system. The time horizon is finite, and the decision environment is deterministic. The law of dynamics, the control domain, and the performance criterion make up a discrete system. Although it is primarily a simulation model of inventory dynamics, the performance criterion allows for a comparison of different order schemes. The influx and outflow rates have an impact on the dynamics of state variables. SZEENSIM et.al [11] Method in Forecasting is the process of making future value predictions using data from the past. It can be carried out in a variety of ways, including statistical or machine learning approaches. Modern life is not possible without electricity. The results indicate that the Box-Jenkins approach and SPSS's Expert Modeler are suitable for predicting electricity usage for the coming year. But Expert Modeler is more sophisticated than the Box-Jenkins approach since it can complete the forecast in a matter of clicks rather than having to manually sort through many models to find the one that works best. Fitri Maya Puspita et.al [12] Forecasting and Fixed Order Quantity Method in

Optimizing the Inventory Policy of Raw Materials of Seder Hana Restaurant in Palembang" Originating in Mining, Restaurant Seder Hana is a cuisine renowned for its attributes throughout Indonesia. Therefore, Material Requirement Planning (MRP) was used in conjunction with ARIMA forecasting and the Fixed Order Quantity (FOQ) method to predict the minimum inventory costs at Sudirman and Polygon branches. The Seder Hana Restaurant in Polygon has cheaper inventory expenses than the one in Sudirman, according to the calculation's findings. In Indonesia, Restaurant Seder Hana is known for its distinctive flavours, which have led to an optimal cost inventory for rendang and fried chicken ingredients found in Polygon branch restaurants. Vineet Parate et.al [13] A company keeps a small amount of stock in order to use it properly when needed in the future while maintaining a steady flow of activities. In most situations, keeping the cost of storing raw materials or completed goods in stock will be the optimal inventory plan. The type of industry will determine which of these two models—a probabilistic or deterministic model of inventory control—to use. Choosing a model for an organisation to adopt can be very challenging in practise. Taufik Djatna et.al [14] Utilizing inventory control modelling, warehouse costs, product and raw material availability, and customer satisfaction levels are all optimized. The accuracy is between 98% and 99%. Regardless of the pattern or volume of data, this forecasting's accuracy tends to remain constant. Gabriella Regina et.al [15] Clothing manufacturers frequently employ aggregate planning to maximize profits by determining the best balance between increasing sales and lowering production costs. This technique, however, is unable to adjust to the variable demand without a reliable demand forecast and careful production planning, leading to frequent product stockouts that raise the number of unfulfilled customer needs. Implementing Material Requirement Planning (MRP) is the suggested improvement strategy to address this issue. Jamal Fattah et.al [16] The study described in this article contributes to time series-based modelling and demand forecasting in the food industry. Our research shows how historical demand data may be used to estimate future demand and how supply chain effects these forecasts. Several autoregressive integrated moving average (ARIMA) models were created using historical demand data and the Box-Jenkins time series procedure. Sourabh Shastri et.al [17] One of the most crucial processes in the knowledge discovery process, data mining is needed to draw out fascinating patterns from huge amounts of data. The percentage of live births that received the anti- tuberculosis vaccine Bacillus Calmette Guerin (BCG) is used in this paper to forecast the BCG coverage percentage for the following five years based on historical yearly data for Coverage in India. We did this by using the exponential smoothing technique. A popular forecasting method known as exponential smoothing employs weighted values of past series observations to estimate the near future for time series data. Sachin Agarwal et.al [18] The most crucial element in industries is inventory. In order to reduce the costs of varying production rates, overtime, subcontracting, unnecessary cost of sales, and backorder penalties during periods of high and dynamic demand, inventory management is crucial. Economic Order Quantity (EOQ) models have long been used successfully in the marketing, automobile, pharmaceutical, and retail industries. I Nyoman Didi Gunawan et.al [19] Inventory management is a task that a business performs to help with decision- making so that material requirements for business activities such as manufacturing and sales can be met ideally and with the least amount of risk. Overstocking is wasteful since it increases the workloads required for maintenance and storage in the warehouse. With the help of the EOQ (Economic Order Quantity). Hairul Rizad Md Sapry et.al [20**]** The deployment of MRP systems is essential to today's production process since it gives the business, as well as the marketing and manufacturing teams, useful information. However, the MRP system is not fully capable of doing all tasks. Regarding flexibility and adaptation to changes in the external environment, the MRP system has a few restrictions. The goal of the study is to determine whether the MRP system can accurately anticipate the amount of inventory needed. By the all journals the exponential smoothing is generally used to make short-term forecasts, but longer-term forecasts using this technique can be quite unreliable.

III.METHODOLOGY

By collecting data from the company now, using this method we can predict the usage of raw material of cotton, IP cloth, Fibers &hardware using past years

data. Using this exponential smoothing method, we will find the demand forecast from demand we will find economic order quantity and fixed order quantity for IP cloth, fibers & Hardware, Cotton. In EOQ and FOQ we will find demand. EXPONENTAIL SMOOTHING IN THIS METHOD HAD BEEN FORECAST. We may predict this by using data from the clothing industry and forecasted methodologies from the prediction of the data using this computing demand forecast of the EOQ, FOQ of this method.

ARIMA METHOD:

In method using IBM SPSS Statistics version 29.0.0.0(241) software. We will find the demand forecast we will insert past yearsvalue in the software we will receive demand forecast values.

IV.EXPERIMENTATION

EXPONENTIAL SMOOTHING FOR IP CLOTH:

TABLE I: Exponential Smoothing for Ip Cloth

MONTH	QUANTITY (Q)	FORE CASTED QUANTITY	ABSLOUTE FORECAT ERROR	ERROR	SQ. FORE CAST ERROR	% ERROR	ABSOLUTE PERCENTAGE ERROR
JAN	5000						
FEB	7000	5000	5000.00	2000.00	4000000.00	28.57	28.57
MAR	6000	5400.00	5400.00	600.00	360000.00	10.00	10.00
APR	7000	5520.00	5520.00	1480.00	2190400.00	21.14	21.14
MAY	8000	5816.00	5816.00	2184.00	4769856.00	27.30	27.30
JUN	7000	6252.80	6252.80	747.20	558307.84	10.67	10.67
JUL	8000	6402.24	6402.24	1597.76	2552837.02	19.97	19.97
AUG	8000	6721.79	6721.79	1278.21	1633815.69	15.98	15.98
SEP	8000	6977.43	6977.43	1022.57	1045642.04	12.78	12.78
OCT	8000	7181.95	7181.95	818.05	669210.91	10.23	10.23
NOV	9000	7345.56	7345.56	1654.44	2737179.97	18.38	18.38
DEC	9000	7676.45	7676.45	1323.55	1751795.18	14.71	14.71
	90000	70294.22	70294.22	14705.78	22.27	189.73	189.73

MEAN FORECAST ERROR	6390.383272
MEAN ABSLOUTE ERROR	6390.383272
MEAN SQUARED ERROR	2.024545455
MAPE	17.24861503
23-Jan	7941.156803

The demand forecasting for cotton raw materials is determined using the exponential smoothing method, which isdiscussed in the TABLE II above

TABLE II: EOQ & FOQ for IP cloth

Demand	90000	Demand	90000
Ordering cost	9	Purchase cost	300
Carrying cost	36	Ordering cost	9
EOQ	212.1320344	Holding cost	36
		FOQ	345

EXPONENTIAL SMOOTHING FOR COTTON:

TABLE III: Exponential smoothing of cotton

MONTH	QUANTITY (Q)	FORE CASTED DEMAND	ABSLOUTE FORECAT ERROR	ERROR	SQ. FORE CAST ERROR	% ERROR	ABSOLUTE PERCENTAGE ERROR
JAN	3000						
FEB	4000	3000	3000.00	1000.00	1000000.00	25.00	25.00
MAR	4000	3200.00	3200.00	800.00	640000.00	20.00	20.00
APR	5000	3360.00	3360.00	1640.00	2689600.00	32.80	32.80
MAY	4000	3688.00	3688.00	312.00	97344.00	7.80	7.80
JUN	5000	3750.40	3750.40	1249.60	1561500.16	24.99	24.99
JUL	5000	4000.32	4000.32	999.68	999360.10	19.99	19.99
AUG	5000	4200.26	4200.26	799.74	639590.47	15.99	15.99
SEP	7000	4360.20	4360.20	2639.80	6968518.70	37.71	37.71
OCT	8000	4888.16	4888.16	3111.84	9683524.29	38.90	38.90
NOV	8000	5510.53	5510.53	2489.47	6197455.54	31.12	31.12
DEC	7000	6008.42	6008.42	991.58	983221.26	14.17	14.17
	65000	45966.30	45966.30	16033.70	22.27	268.47	268.47

MEAN FORECAST ERROR	4178.754597
MEAN ABSLOUTE ERROR	4178.754597
MEAN SQUARED ERROR	2.024545455
MAPE	24.40668298
23-Jan	6206.739886

The table discuss about demand forecasting using the exponential smoothing method, which is used to determinedemand forecasting for cotton raw materials in the above TABLE III.

TABLE IV: EOQ & FOQ for cotton

Demand	65000	Demand	65000
Ordering cost	12	Purchase cost	234
Carrying cost	37.5	Ordering cost	12
EOQ	204	Holding cost	37.5
		FOQ	283.5

The EOQ and FOQ values discussed above represent their ideal order sizes, enabling them to meet demand withoutgoing over budget in the above TABLE IV.

EXPONENTIAL SMOOTHING FOR FIBER & HARDWARE:

TABLE V: Exponential smoothing for Fiber & hardware

MONTH	QUANTITY (Q)	FORE CASTED DEMAND	ABSLOUTE FORECAT ERROR	ERROR	SQ. FORE CAST ERROR	% ERROR	ABSOLUTE PERCENTAGE ERROR
JAN	2000						
FEB	3000	2000	2000.00	1000.00	1000000.00	33.333333	33.33
MAR	3000	2200.00	2200.00	800.00	640000.00	26.666667	26.67
APR	4000	2360.00	2360.00	1640.00	2689600.00	41.000000	41.00
MAY	3000	2688.00	2688.00	312.00	97344.00	10.400000	10.40
JUN	5000	2750.40	2750.40	2249.60	5060700.16	44.992000	44.99
JUL	4000	3200.32	3200.32	799.68	639488.10	19.992000	19.99
AUG	4000	3360.26	3360.26	639.74	409272.39	15.993600	15.99
SEP	5000	3488.20	3488.20	1511.80	2285524.73	30.235904	30.24
OCT	4000	3790.56	3790.56	209.44	43863.51	5.235904	5.24
NOV	4000	3832.45	3832.45	167.55	28072.64	4.188723	4.19
DEC	4000	3865.96	3865.96	134.04	17966.49	3.350979	3.35

	45000	33536.16	33536.16	9463.84	22.27	235.389110	235.39

MEAN FORECAST ERROR	3048.741506
MEAN ABSLOUTE ERROR	3048.741506
MEAN SQUARED ERROR	2.024545455
MAPE	21.39900998
23-Jan	3892.768686

The demand forecasting for cotton raw materials is determined using the exponential smoothing method in the aboveTABLE V, which is discussed in the table above.

TABLE VI: EOQ & FOQ for Fiber and Hardware

Demand	45000	Demand	45000
Ordering cost	10.5	Purchase cost	127
Carrying cost	20	Ordering cost	10.5
EOQ	217.3707	Holding cost	20
		FOQ	157.5

Their ideal order sizes, which allow them to meet demand without going over budget, are represented in the above TABLE VIby the EOQ and FOQ values discussed above TABLE VI.

ARIMA FORECASTING:

In this method, we will use the past two years' dates to find the demand forecast, and we will insert the past two years' values into the software, and we will receive the demand forecast values as output.

IP CLOTH:

TABLE VII: Modal fit of IP cloth

Fit Statistic	Mean	SE	Minimum	Maximum	5	10	25	50	75	90	95
Stationary R-squared	.828	.	.828	.828	.828	.828	.828	.828	.828	.828	.828
R-squared	.828	.	.828	.828	.828	.828	.828	.828	.828	.828	.828
RMSE	768.875	.	768.875	768.875	768.875	768.875	768.875	768.875	768.875	768.875	768.875
MAPE	10.604	.	10.604	10.604	10.604	10.604	10.604	10.604	10.604	10.604	10.604
MaxAPE	21.026	.	21.026	21.026	21.026	21.026	21.026	21.026	21.026	21.026	21.026
MAE	583.333	.	583.333	583.333	583.333	583.333	583.333	583.333	583.333	583.333	583.333
MaxAE	1102.564	.	1102.564	1102.564	1102.564	1102.564	1102.564	1102.564	1102.564	1102.564	1102.564
Normalized BIC	13.911	.	13.911	13.911	13.911	13.911	13.911	13.911	13.911	13.911	13.911

The above modal fit TABLE VII provides a concise summary of how well the modals, with re-estimated parameters, fitdata. For each statistic, the table provides the mean, standard error, minimum and maximum value across all models.

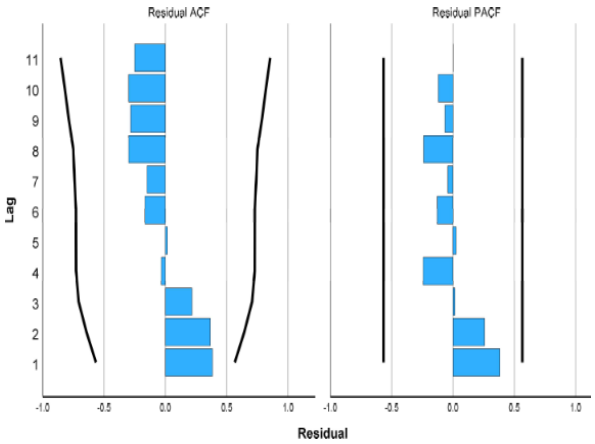

Fig.1: Residual ACF & PACF

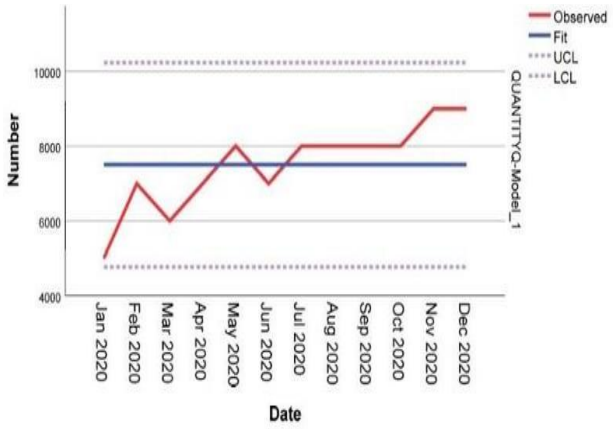

Fig.2: Observed, Fit, UCL&LCL

The analysis involves looking at the Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF)plots as shown in above Fig. 1. This Fig.2 shows the results of the forecasting of raw materials on month-by-month data that can be obtained by the prediction from January to December observed from the data fix that is in lower control limit and upper control limit using rawmaterial of IP cloth we can forecast from the from the data to analyses the feature of the forecast.

COTTON:

TABLEVIII: Modal Fit for Cotton

Fit Statistic	Mean	SE	Minimum	Maximum	5	10	25	50	75	90	95
Stationary R-squared	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000
R-squared	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000
RMSE	1224.745	.	1224.745	1224.745	1224.745	1224.745	1224.745	1224.745	1224.745	1224.745	1224.745
MAPE	13.418	.	13.418	13.418	13.418	13.418	13.418	13.418	13.418	13.418	13.418
MaxAPE	50.000	.	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000
MAE	916.667	.	916.667	916.667	916.667	916.667	916.667	916.667	916.667	916.667	916.667
MaxAE	2500.000	.	2500.000	2500.000	2500.000	2500.000	2500.000	2500.000	2500.000	2500.000	2500.000
Normalized BIC	14.635	.	14.635	14.635	14.635	14.635	14.635	14.635	14.635	14.635	14.635

It can be determined usingthe percentile method, which is based on the data and takes into account the summary's range of maximum and minimum modalities in the autocorrelation function which are shown in above TABLE VIII.

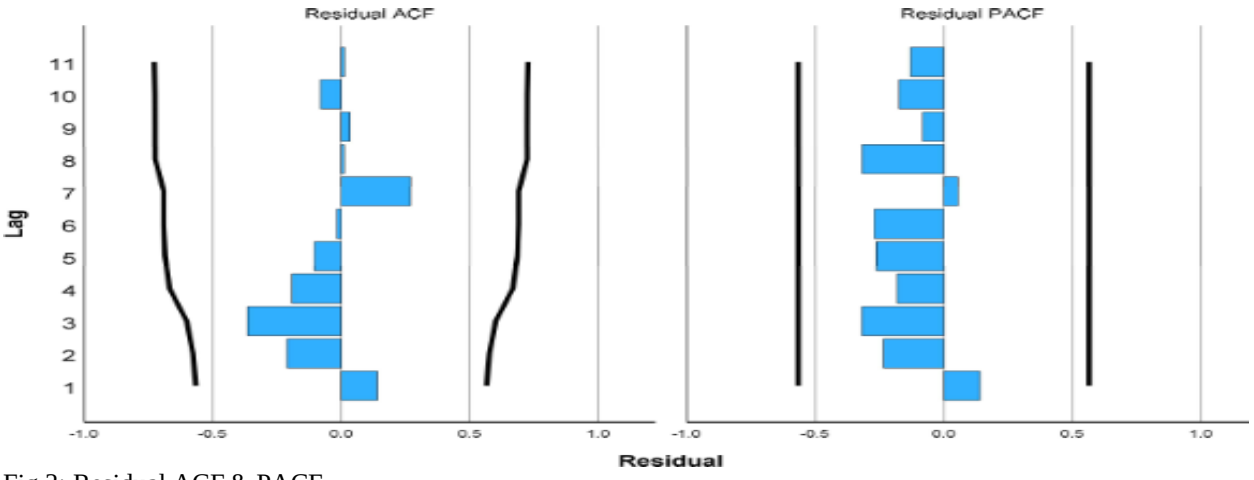

Fig.3: Residual ACF & PACF

Plots for the autocorrelation function (ACF) and partial autocorrelation function (PACF) are examined during theanalysis which is shown in above Fig.3.

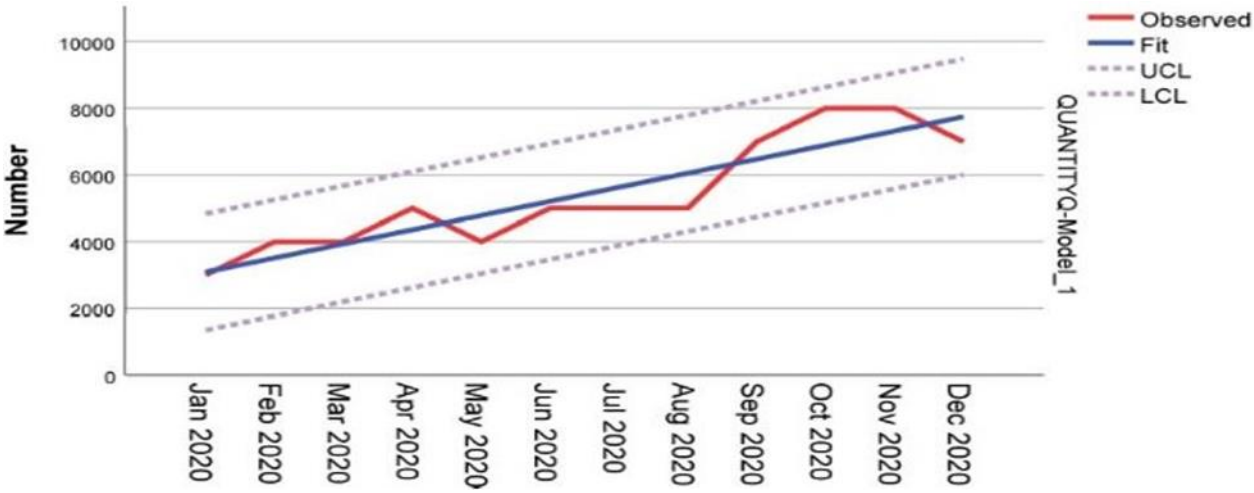

Fig.4: Observed, fits, UCL & LCL

This Fig.4 displays the results of the raw material forecasting on month-by-month data that can be obtained by the prediction from January to December observed from the data fix that is in lower control limit and upper control limit using raw material of cotton.

FIBER&HARDWARE:

TABLE IX: Modal fit for fiber and hardware

Fit Statistic	Mean	SE	Minimum	Maximum	5	10	25
Stationary R-squared	.230	.	.230	.230	.230	.230	.230
R-squared	.230	.	.230	.230	.230	.230	.230
RMSE	.332	.	.332	.332	.332	.332	.332
MAPE	.011	.	.011	.011	.011	.011	.011
MaxAPE	.034	.	.034	.034	.034	.034	.034
MAE	.231	.	.231	.231	.231	.231	.231
MaxAE	.683	.	.683	.683	.683	.683	.683
Normalized BIC	-1.830	.	-1.830	-1.830	-1.830	-1.830	-1.830

50	75	90	95
.230	.230	.230	.230
.230	.230	.230	.230
.332	.332	.332	.332
.011	.011	.011	.011
.034	.034	.034	.034
.231	.231	.231	.231
.683	.683	.683	.683
-1.830	-1.830	-1.830	-1.830

The summary range of maximum and minimum modalities in the autocorrelation function is taken into account by thepercentile method, which is based on the data which is mentioned in above TABLE IX.

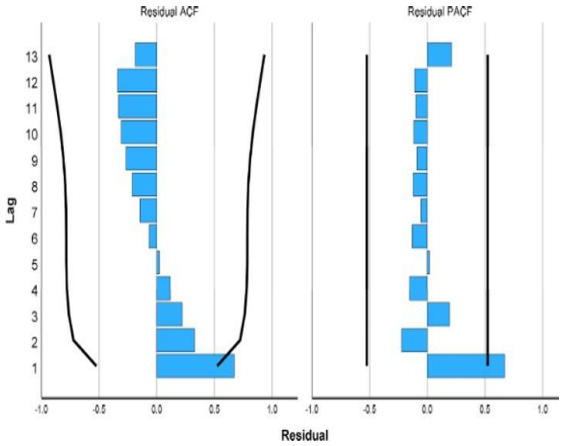

Fig.5: Residual ACF & PACF

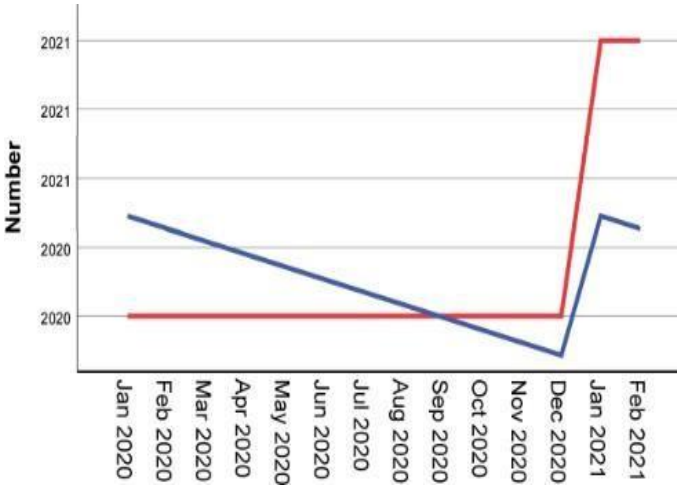

Fig.6: Observed & fit

Autocorrelation analysis is a critical step in the exploratory data analysis stage of time series forecasting. Pattern recognition and randomness testing are both aided by the autocorrelation analysis shown in Fig.5. This Fig.6 displays the results of the raw material forecasting on month-by-month data that can be obtained by the prediction from January to December observed from the data fix that is in lower control limit and upper control limit using raw material of fiber and hardware.

V.RESULT

The comparison between Autoregressive Moving Average (ARIMA) model and Exponential Smoothing Method in making a prediction. The comparison is focused on the ability of both methods in making the Forecasts with the different number of data sources and the different length of forecasting period. The ARIMA model can produce a better prediction for the long-term fore casting with limited data sources but cannot produce a better prediction for time series with a narrow range of one point to another as in the time series for Exchange Rates. On the contrary, Exponential Smoothing Method can produce a better forecasting for Exchange Rates that has a narrow range of one point to another for its time series, while it cannot produce a better prediction for a longer forecasting period.

VI.CONCLUSION

In this analysis we conclude that utilization of both the forecasting methods are useful for prediction of raw material by using this technique. We can reduce the wastage of raw material and reduce the cost of raw material and we can also have inventory control and we can also deliver the goods on time and satisfy the customer requirements and also improve the sales and profit ofthe company. We can also deliver the goods within the short periods. Compared to the other methods ARIMA forecasting and Exponential

smoothing methods are more useful for prediction of raw material. The comparison between Autoregressive Integrated Moving Average (ARIMA) model and Exponential Smoothing Method in making a prediction. The comparison is focused on the ability of both methods in making the Forecasts with the different number of data sources and the different length of forecasting period. The ARIMA model can produce a better prediction for the long-term forecasting with limited data sources but cannot produce a better prediction for time series with a narrow range of one point to another as in the time series for Exchange Rates. On the contrary, Exponential Smoothing Method can produce a better forecasting for Exchange Rates that has a narrow range of one point to another for its time series, while it cannot produce a better prediction for a longer forecasting period.

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