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Demand Forecasting to Reduce Dead Stock and Loss Sales : A Case Study of the Wholesale Electric Equipment and Part Company

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Abstract

The purpose of this study is to forecast product demands and develop appropriate and adequate procurement plans to meet customer needs and reduce costs. When the product exceeds customer demands that the company supports insufficient storage spaces. Moreover, some items are stored for a long period, causing the deterioration of dead stock. Which that uncertain customer demands, are considered. The actual purchasing orders of customers aren't equal to the forecast provided by the customers. In some cases, customers have higher product demands, resulting in the product being insufficient to meet the customer's needs. However, some customers have lower demands for products than estimates, causing insufficient storage spaces and dead stock. This study aims to reduce the loss of sales opportunities and the number of remaining goods in the warehouse, citing 5 product samples of the company's most popular products. The data were collected during the duration of the study from January to December 2022. The methods used to forecast are simple moving averages, weighted moving averages, and exponential smoothing methods. The economic ordering quantity and reorder point are used to calculate to meet customer needs and track results. The research results are very beneficial to the company. The company can reduce the loss of sales opportunities by 10%, so that the company has enough products to meet customer needs, and can reduce unused products up to 10% dead stock. This enables the company to order products more accurately, increasing profits and storage space.

Keywords
Demand Forecast; Reorder Point; Lost Sale; Dead Stock; Purchasing.

1. Introduction
Enterprise competition is fierce and changing, and consumer demand is increasing or decreasing. This makes it difficult to predict the number of products on the market. Therefore, many organizations want to develop their business potential to effectively promote and move forward. By looking for principles or methods to reduce costs, but still regard profits and consumer satisfaction as priorities. Forecasting technology is a method that applies scientific and statistical principles to short-term planning and decision-making. And long-term.

Since 1972, Thailand's electronic industry has been developing continuously. The government has formulated a policy to promote investment by providing tax and non-tax benefits through the Investment Committee. The Board of Investment (BOI) aims to attract foreign investors. In 1972-1992, the government promoted investment in export production. Foreign investors have gradually invested in electronic production bases such as integrated circuits (IC) and printed circuit board: (PCB) hard disk drive (HDD) floppy disk motor wire and cable with the relatively low labor cost of Thailand at that time and the Plaza Agreement of 1987, the yen strengthened. Therefore, Japanese companies will move their production bases abroad. Thailand is one of the important production bases because it is a market with high growth potential. ASEAN Free Trade Area (AFTA) In 2004, multinational companies from Japan, Taiwan and the United States established more production bases in Thailand.

The electronics industry is undergoing rapid technological change. Only foreign companies that invest in Thailand and joint ventures with foreign countries are the entrepreneurs with competitiveness in the global market. Most Thai entrepreneurs carry out business in the form of contracts and often operate subcontractors from major foreign

entrepreneurs. It leads to the lack of skill development of workers, and the added value of electronic products is not very high, especially IC, PCB, diode and Transistor. In addition, in the era of rapid development of digital technology in the world Thailand's current electronic products may be inconsistent with the categories of electronic products with good growth in the global production chain (global) Supply chain, such as solid-state drives (SSDs) and some types of ICS and PCBs, which are used as key components in the production of notebook smartphones. And other small electronic equipment (electronic equipment). In addition, Thailand's electronics industry is developing slowly in supporting industries, and the wages of Thai workers are also high. Therefore, the production cost of electronic products in Thailand has increased, resulting in Thailand losing its potential to compete with neighboring countries, such as: China, Vietnam and Malaysia.

Compared with other industries, the electronic component's industry is an industry with continuous growth and high value. In today's world, more production and exports have been transferred to East Asia, and the export value of ASEAN countries continues to increase. In Thailand, the electronic component industry is one of the industries developed in the past decades Its important role in technology transfer, production and marketing has made Thailand. The main export of the industry. Electronic products have created the largest revenue for Thailand for many years in a row, accounting for 30 of the total export value, employing more than 700,000 workers.

Based on the above requirements, researchers are interested in studying the product demand forecast to reduce the loss of sales opportunities. Case study, A company that wholesales equipment and electronic components to reduce ordering costs.

1.1 Objectives
1. Research how to correctly predict product demand.
2. Plan appropriate and sufficient procurement volume to meet the demand.
3. Reduce order costs.

2. Literature Review
Research product demand forecast to reduce sales opportunity loss Case study of electronic equipment and parts wholesale companies The theories related to the subject of the study, as the guidelines for the study of financial management, are as follows:
1. Forecasting
2. Inventory management
3. Economic order quantity: EOQ

Forecasting
what will happen in the future, such as forecasting the demand in the next three years. Forecasting plays an important role in all aspects. Government agencies and the private sector, the government must estimate or forecast next year's income and expenditure for planning, and the private sector must forecast demand. Planning production, inventory, labor, etc.

Forecasting steps
Patimaporn (2013) said that the prediction process can be divided into 9 steps.
1. Determine objectives
2. Define Forecast
3. Collect information
4. Inspection information
5. Select prediction technology
6. Prediction test
7. Check the accuracy of the model.
8. Application prediction
9. Check the accuracy regularly as the data increases.

It can be seen that all 9 prediction processes must be repeated, and the prediction results should be checked regularly to obtain the most accurate prediction. Therefore, the prediction cannot be made only once and then considered as completed.

There are three types of forecasts:
Short-term forecast refers to the forecast of events not exceeding 1 year, usually not exceeding 3 months, such as procurement plan forecast. Scheduling, task allocation, demand forecast and production level forecast.
Medium-term forecast is the forecast of events in 3 months to 3 years. It is used to forecast sales plans and production plans. Cash budget planning and operation planning analysis.

Long-term prediction is the prediction of events over 3 years. It is usually used for new product planning, investment costs, and location expansion. And research and development.

Quantitative Methods
Quantitative prediction technology is a technology that uses historical data to create prediction models in the form of mathematical equations. Therefore, the accuracy of prediction depends on the accuracy of available data and the method of mathematical equation form. 1. Auxiliary model and 2. Time series model, including Navigation method, moving average, Exposure smoothing, Classical decomposition and Trend projection.

Time series
Chatfield (2006) said Time series technology is a technology that uses historical quantitative data that changes with the occurrence of time series to predict the future based on assumptions. The movement pattern of the future time series follows the movement pattern of the past, and the time series model predicts. This is a method to predict future demand based on historical figures of various variables. Use statistical data in chronological order of past occurrence to predict the future, and collect the past data daily and weekly. It is used continuously every month or every year. Therefore, it is recommended to use charts to determine the nature of data movement. This will meet the goals and needs of searching patterns in historical data to predict future needs using this pattern. Time series method is a method to predict future demand, and its characteristics are expected to be the same as current or future demand. There are many ways to use time series. The sequence types used are as follows:

Moving averages
This is a prediction method. It is a time series. Each change point of the average value is a mathematical value or many averages. The continuous value is the frequency used to sell various products in a short time, such as 12 months. Therefore, the data often moves in a short time, so the calculation result will be Equation 1.1.

$$F_t = \frac{A_{t-1}+A_{t-2}+A_{t-3}+\cdots+A_{t-n}}{n} \quad \text{..... (1.1)}$$

Weighted Moving Average
This is a moving average, weighted to make it more accurate, because in practice, the prediction technology will change greatly. Some ranges may be heavier than others. There is no specific formula to determine the weighting method. Therefore, using counterweight requires some experience, for example, if it was heavy last month. The prediction may reflect the abnormal change of the calculated data, such as equation 1.2.

$$F_t = w_1 A_t + w_2 A_{t-2} + w_3 A_{t-3} + \cdots + w_n A_{t-n} \quad \text{..... (1.2)}$$

Exponential Smoothing
It is based on the same criteria as the moving average method, that is, smoothing the value to eliminate random variance. But it will be improved to solve the limitation. The weight will decrease with the time of observation. The number of observations is far lower than the moving average, and the exponential smoothness can be expressed as equation 1.3.

$$F_{t+1} = \alpha d_t + (1-\propto)F_t \quad \text{.....(1.3)}$$

Combination forecasting

Ekkajit (2017) said that due to the use of single variable forecasting, the purpose of combined forecasting is to improve the accuracy of forecasting. The principles and important information of other models are ignored, such as Granger et al (2004). It shows that combination forecasting can improve the accuracy of the model, and explains why combination forecasting will improve the prediction. In terms of the average value of the square error, in order to combine the prediction results of multiple models, the technology of determining the weight using the product regression model is introduced. This method is led by Charles Nelson, who has a principle to determine the weight of each model to minimize the prediction error. The model used to combine the forecast results should be selected from the models with different bases, without bias. The result value of the best forecast combination provides the best weight for each model.

Mean Absolute Deviation (MAD)
Mean Absolute Deviation can be expressed as equation 1.4.

$$\mathrm{MAD} = \sum_{t=1}^{n} \frac{|e_t|}{n} \qquad \text{..... (1.4)}$$

MAD = *Dema*nd - Forecast

Mean Squared Error (MSE)
Mean Squared Error can be expressed as equation 1.5.

$$\mathrm{MSE} = \sum_{t=1}^{n} \frac{(e_t)^2}{n} \qquad \text{..... (1.5)}$$

$\mathrm{MSE} = \mathrm{MAD}^2$

Mean Absolute Percentage Error (MAPE)
Mean Absolute Percentage Error can be expressed as equation 1.6.

$$\mathrm{MAPE} = \left(\frac{100}{n}\right) \sum_{y=1}^{n} \left|\frac{A_t - F_t}{A_t}\right| \qquad \text{..... (1.6)}$$

$$\mathrm{MAPE} = \frac{\mathrm{Demand} - Forecast}{\mathrm{Demand}} \times 100$$

2.1 Inventory Management
In business operation, inventory management is an important factor that managers must pay attention to, and there must be appropriate management principles. According to the research on the concept of inventory management, many scholars have discussed different issues. The main conclusions are as follows Wattana Chiang-Kool (2003) said that package has a broad meaning, including goods, tools, electrical appliances, equipment, spare parts, machinery, Engines, raw materials and building materials. Even finished products can be called packages. Suchart Supamongkol (2010) said: In package management, the cost of spare parts packages accounts for a high proportion of the total maintenance cost. In industrial countries, the average storage of spare parts is about 3-5% of the machine price, and the storage cost is about 20-40% of the value of spare parts in stock to ensure the production capacity of the organization. In short, in this study, inventory It refers to the materials used to maintain the engine machinery used in the factory and covers the general materials used in daily operation. Such as general hardware, office supplies, fixed equipment and security equipment. Balance management needs to forecast demand. Calculate the quantity of each order point and additional orders to maintain the inventory level matching the regular withdrawal amount.

Inventory management principles
In order to effectively manage inventory, according to further research, the inventory management principles are as follows Principles for controlling new orders Khamnai Apichayasakul, (1994) said that purchase time is a very important factor in purchasing inventory products. Especially when the enterprise's inventory control system is continuous, it can be determined. When the inventory is found to be reduced to a certain level, it will be reordered

with the same fixed quantity as the order quantity. Suchart Supamongkol, (2010) added that the principle of controlling new orders has two aspects: 1. When to order? 2. How many materials need to be ordered each time? Wattana (2008) added that spare part's management is effective. When the factory produces for a period of time at an appropriate time, about for three years, the machine has been working in the combustion stage. After some maintenance, spare parts and general materials are used. Statistical data are available for calculation. During this period, statistical variables should be improved, such as changing the engineering basis, changing the utilization rate and changing the determinants.

Applicability of performance indicators to measure inventory reserves

Suchart Supamongkol, (2010) Refer to the applicability of reserve packages commonly used in business as follows:

1. Inventory turnover rate refers to the remaining turnover rate (when the product is inventory turnover rate).

Inventory turnover rate can be expressed as equation 1.7.

$$\text{Inventory Turnover} = \frac{Annual\ Sale}{Average\ Inventory} \quad \ldots\ldots\ldots (1.7)$$

2. Month or Days Inventory refers to Month or Days Inventory Measured from the Month or Days Inventory average days of inventory sales, this Inventory Turnover Ratio is further calculated to find the month (or day) of inventory turnover.

Month or Days Inventory can be expressed as equation 1.8.

$$\text{MOS (Month of Supply)} = \frac{\text{Average Inventory}}{\text{Cost of Goods Sold}} \text{ x Period Length} \quad \ldots\ldots\ldots\ldots (1.8)$$

Articles 1. and 2. can be used to measure the turnover rate of factory materials, only applicable to general packages and quick-rotating shoulders. They cannot be used to measure slow-rotating parts.

2.2 Economic order quantity: EOQ

Kiatsak Chandaeng (2006) As mentioned earlier, the economic ordering quantity is the point where the storage cost and ordering cost are equal and all the remaining material costs exist. The lowest value is the fixed quantity of the quantity in the order. It belongs to the order point policy and is the most commonly used technology. However, because it is easy to understand and use, the application must be based on the following assumptions:

1. Customer demand is accurate, consistent, and independent.
2. The time between the delivery date and the order issuance until the goods are received.
3. The delivery period is fixed.
4. The order quantity is fixed.
5. Variable and fixed costs are fixed.
6. The Seller's goods are not in shortage.

Thitima Chaiyakul (2012) explained that: Economic order quantity analysis is the best production quantity of an organization. According to the order quantity, the organization will generate the sum of values. The annual storage cost and order cost are the lowest. Because storing a small amount of inventory will increase the frequency and cost of orders, while storing a large amount of inventory will increase the cost. In inventory.

Economic order quantity can be expressed as equation 1.9.

$$\text{EOQ} = \sqrt{\frac{2\text{DS}}{\text{H}}} \quad \ldots\ldots\ldots\ldots\ldots (1.9)$$

3. Methods

Through the literature review of prediction theory, select the correct prediction model and use the time series analysis method. The main purpose of this study is to study the most accurate prediction model. Through quantitative prediction and order planning. In this study, researchers will use customer data prediction and PO data from this month. From January to December 2022, it is used to analyze customer demand as product unit data and forecast data in order planning. The operation process is as follows:

1. Collect customer data forecast and PO data from January to December 2022 to analyze customer needs.
2. Take five best-selling products, for example.

3. Use data to send orders to manufacturers, because the company is not a manufacturer. We import products from abroad. Therefore, the production and transportation time is very long lead time to support customer.
The problem is that when the customer provides the forecast plan every month, but when the customer actually opens the purchase order, the demand for products is greater. The purchase orders provided by the forecast or for some projects are less than the forecast, resulting in insufficient products to meet the needs of customers. This study aims to reduce the loss of sales opportunities. And reduce the inventory quantity in the warehouse.The data analysis method researchers analyzed the data obtained from the data collection, as follows:
1. Prediction and analysis: predict future events based on the company's experience and sales. The forecast is based on the production cycle, namely short-term forecast and time series forecast.
2. Analyze the company's inventory by using historical data and inventory management by measuring methods. Inventory turnover rate and average inventory day measurement MOS (supply month).
3. New order points with variable inventory demand rate and fixed cycle.

4. Data Collection

Citing 5 product samples of the company's most popular products. The data were collected during the duration of the study from January to December 2022.

Table 1. 5 best-selling product samples.

No.	Code	Cost (฿)/Piece	Qty for selling	Annual Cost (฿)
1	134PH	2.715	1,620,000	4,398,300
2	12A06	5.056	445,000	2,249,920
3	127M2	2.727	815,650	2,224,278
4	122D1	3.125	370,000	1,156,250
5	1340C	2.238	440,000	984,720

5. Results and Discussion

5.1 Forecasting

According to the company's past work experience and sales situation, forecast and analyze by predicting future events. The forecast is based on the sales cycle. This is a short-term forecast. The researchers will bring information about the demand for screw products. 5 Ranking of the most common sales demands from January 2022 to December 2022, use moving averages, weighted moving averages, and exponential smoothing methods for forecasting. In order to improve the demand for products that meet the product demand, the case study is as follows:

Table 2. Forecasting of 134PH. Period 3 Month.

Month	Moving Average (MA)		Weighted Moving Average (WMA)		Exponential Smoothing Method	
	Total Demand (Piece)	Forecast (Piece)	Total Demand (Piece)	Forecast (Piece)	Total Demand (Piece)	Forecast (Piece)
JAN	120,000		120,000		120,000	
FEB	140,000		140,000		140,000	
MAR	130,000		130,000		130,000	140,000
APR	120,000	130,000	120,000	131,667	120,000	135,000
MAY	110,000	130,000	110,000	126,667	110,000	127,500
JUN	140,000	120,000	140,000	116,667	140,000	118,750
JUL	130,000	123,333	130,000	126,667	130,000	129,375
AUG	150,000	126,667	150,000	130,000	150,000	129,688
SEP	90,000	140,000	90,000	141,667	90,000	139,844
OCT	160,000	123,333	160,000	116,667	160,000	114,922

NOV	180,000	133,333	180,000	135,000	180,000	137,461
DEC	150,000	143,333	150,000	158,333	150,000	158,730
Jan'23	?	163,333	?	161,667	?	154,365

Table 3. Forecasting of 12A06. Period 3 Month.

Month	Moving Average		Weighted Moving Average (WMA)		Exponential Smoothing Method	
	Total Demand (Piece)	Forecast (Piece)	Total Demand (Piece)	Forecast (Piece)	Total Demand (Piece)	Forecast (Piece)
JAN	20,000		20,000		20,000	
FEB	44,000		44,000		44,000	
MAR	21,000		21,000		21,000	44,000
APR	40,000	28,333	40,000	28,500	40,000	32,500
MAY	30,000	35,000	30,000	34,333	30,000	36,250
JUN	30,000	30,333	30,000	31,833	30,000	33,125
JUL	30,000	33,333	30,000	31,667	30,000	31,563
AUG	40,000	30,000	40,000	30,000	40,000	30,781
SEP	90,000	33,333	90,000	35,000	90,000	35,391
OCT	50,000	53,333	50,000	63,333	50,000	62,695
NOV	50,000	60,000	50,000	61,667	50,000	56,348
DEC	40,000	63,333	40,000	56,667	40,000	53,174
Jan'23	?	46,667	?	45,000	?	46,587

Table 4. Forecasting of 127M2. Period 3 Month.

Month	Moving Average		Weighted Moving Average (WMA)		Exponential Smoothing Method	
	Total Demand (Piece)	Forecast (Piece)	Total Demand (Piece)	Forecast (Piece)	Total Demand (Piece)	Forecast (Piece)
JAN	70,000		70,000		70,000	
FEB	70,000		70,000		70,000	
MAR	60,000		60,000		60,000	70,000
APR	64,880	66,667	64,880	65,000	64,880	65,000
MAY	70,000	64,960	70,000	64,107	70,000	64,940
JUN	70,000	64,960	70,000	66,627	70,000	67,470
JUL	63,000	68,293	63,000	69,147	63,000	68,735
AUG	92,770	67,667	92,770	66,500	92,770	65,868
SEP	30,000	75,257	30,000	79,052	30,000	79,319
OCT	72,000	61,923	72,000	56,423	72,000	54,659
NOV	83,000	64,923	83,000	61,462	83,000	63,330
DEC	70,000	61,667	70,000	70,500	70,000	73,165
Jan'23	?	75,000	?	74,667	?	71,582

Table 5. Forecasting of 122D1. Period 3 Month.

Month	Moving Average		Weighted Moving Average (WMA)		Exponential Smoothing Method	
	Total Demand (Piece)	Forecast (Piece)	Total Demand (Piece)	Forecast (Piece)	Total Demand (Piece)	Forecast (Piece)

JAN	40,000		40,000		40,000	
FEB	50,000		50,000		50,000	
MAR	30,000		30,000		30,000	50,000
APR	30,000	40,000	30,000	38,333	30,000	40,000
MAY	30,000	36,667	30,000	33,333	30,000	35,000
JUN	40,000	30,000	40,000	30,000	40,000	32,500
JUL	40,000	33,333	40,000	35,000	40,000	36,250
AUG	30,000	36,667	30,000	38,333	30,000	38,125
SEP	30,000	36,667	30,000	35,000	30,000	34,063
OCT	10,000	33,333	10,000	31,667	10,000	32,031
NOV	20,000	23,333	20,000	20,000	20,000	21,016
DEC	20,000	20,000	20,000	18,333	20,000	20,508
Jan'23	?	16,667	?	18,333	?	20,254

Table 6. Forecasting of 1340C.Period 3 Month.

Month	Moving Average		Weighted Moving Average (WMA)		Exponential Smoothing Method	
	Total Demand (Piece)	Forecast (Piece)	Total Demand (Piece)	Forecast (Piece)	Total Demand (Piece)	Forecast (Piece)
JAN	20,000		20,000		20,000	
FEB	40,000		40,000		40,000	
MAR	30,000		30,000		30,000	40,000
APR	40,000	30,000	40,000	31,667	40,000	35,000
MAY	30,000	36,667	30,000	36,667	30,000	37,500
JUN	40,000	33,333	40,000	33,333	40,000	33,750
JUL	50,000	36,667	50,000	36,667	50,000	36,875
AUG	40,000	40,000	40,000	43,333	40,000	43,438
SEP	30,000	43,333	30,000	43,333	30,000	41,719
OCT	60,000	40,000	60,000	36,667	60,000	35,859
NOV	30,000	43,333	30,000	46,667	30,000	47,930
DEC	30,000	40,000	30,000	40,000	30,000	38,965
Jan'23	?	40,000	?	35,000	?	34,482

Table 7. Comparison table of MAD, MSE and MAPE values.

Code	MAD			MAS			MAPE		
	Moving Average (MA)	Weighted Moving Average (WMA)	Expone-ntial Smoothing Method	Moving Average (MA)	Weighted Moving Average (WMA)	Expone-ntial Smoothing Method	Moving Average (MA)	Weighted Moving Average (WMA)	Expone-ntial Smoothing Method
134PH	24,444	24,815	24,542	839,506,173	890,123,457	866,447,830	19%	19%	19%
12A06	13,741	14,000	12,720	459,888,889	430,425,926	394,411,352	26%	26%	23%
127M2	13,779	14,274	14,427	362,011,946	431,874,213	435,403,049	28%	29%	30%
122D1	8,148	7,037	6,888	103,703,704	85,802,469	84,944,153	44%	38%	39%
1340C	10,370	11,296	10,896	135,802,469	160,802,469	158,481,725	27%	30%	29%
TOTAL	**14,096**	**14,285**	**13,895**	**380,182,636**	**399,805,707**	**387,937,622**	**29%**	**28%**	**28%**

From the comparison table of forecast summation of the top 5 products of companies from all 3 forecasting methods,

where the best sum of forecast results gives the best weight of each model, it can be concluded that MAD: Best Moving Average Forecasting Method Equal to 14,096. MSE: Best Moving Average Forecasting Method Equal to 380,182,636. MAPE: Best Weighted Moving Average Forecasting Method and Exponential Smoothing Method Equal to 28%.

5.2 Inventory management

At present, there is no economic order calculation and no purchase point is sought, including the storage capacity of some products exceeding the necessity. Therefore, the researchers calculated the order quantity and order point and calculated the goods that were stored more than necessary. The researchers brought the demand data of the five screw products, which encountered the most common problems in the sales demand from January 2022 to December 2022, we will use EOQ/ROP theory and inventory data analysis to find appropriate new order points. Annual turnover rate and average demand. In order to optimize the demand for screw products, the top 5 case study product codes. 134PH, 12A06, 127M2, 122D1 and 1340C.The fee for each transaction is 10,000 Baht. Warehouse storage fee: 6,000 per year. The transportation date of each order is 90 days.

Table 8. EOQ/ROP analysis.

No.	Code	Cost (฿) /Piece	Aunual Purchase Order (Piece)	Aunual Cost (฿)	Stock Balance (Piece)	Annual cost of stock balance (฿)	**EOQ** (Piece)	**ROP** (Piece)
1	134PH	2.715	1,620,000	4,398,300	250,000	678,750	2,324	399,452
2	12A06	5.056	445,000	2,249,920	35,000	176,960	1,218	109,726
3	127M2	2.727	815,650	2,224,278	70,000	190,890	1,649	201,119
4	122D1	3.125	370,000	1,156,250	40,000	125,000	1,111	91,233
5	1340C	2.238	440,000	984,720	80,000	179,040	1,211	108,493

According to the table 8, new order point calculation, variable inventory demand rate, and fixed cycle. The new order point of product code 134PH is 399,452 pieces per month, The new order point of product code 12A06 is 109,726 pieces per month, The new order point of product code 127M2 is 201,119 pieces per month, The new order point of product code 122D1 is 91,233 pieces per month, The new order point of product code 1340C is 1084,93 pieces per month.

Table 9. Analysis Table of Inventory Days, Investment Turnover and Annual Average Demand.

No.	Code	Cost (฿) /Piece	Annual Purchase Order (Piece)	Annual Cost (฿)	Stock Balance (Piece)	Annual cost of stock balance (฿)	Inventory turnover	Inventor Day
1	134PH	2.715	1,620,000	4,398,300	250,000	678,750	6	56
2	12A06	5.056	445,000	2,249,920	35,000	176,960	13	29
3	127M2	2.727	815,650	2,224,278	70,000	190,890	12	31
4	122D1	3.125	370,000	1,156,250	40,000	125,000	9	39
5	1340C	2.238	440,000	984,720	80,000	179,040	6	66

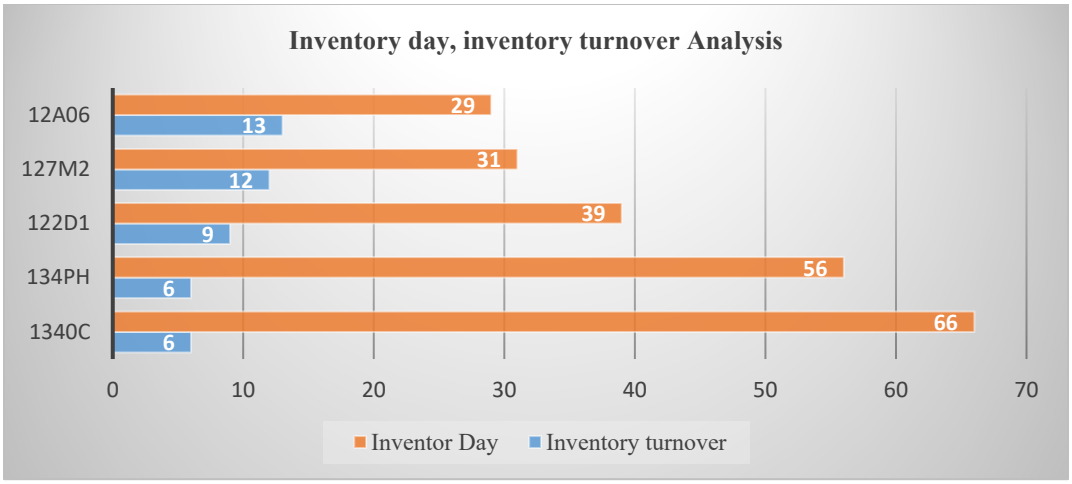

Figure 1. Chart Analysis of Inventory Days, Investment Turnover and Annual Average Demand.

Figure 1. The researchers ranked the product categories with the most holding days and the product categories with the least holding days and concluded that: Product code 1340C has the most days, and product code 12A06 has the least days.

6. Conclusion

The forecast analysis of an electronic equipment and parts wholesale company concluded that: Collect 12 months' sales data from January 2022 to December 2022 and analyze the demand forecast. Three prediction methods of moving average and weighted moving average Average), exponential smoothing method. By comparing the demand forecast results, find the given forecast value MAD: The best prediction method of moving average is 14,096.

MSE: The best prediction method of moving average is 38,0182,636. MAPE: Use best weighted moving average (WMA) and exponential smoothing methods Equal to 28%.It has the minimum tolerance, which is the closest value, and finds a new order point in the variable inventory demand rate and fixed time cycle Shortages may occur due to uneven utilization or inventory demand. Therefore, inventory must be retained to prevent shortages in order to find new order points. Through visual shift and experience prediction, there aren't enough raw materials to meet customer needs. As a result, the store lost sales opportunities. The study found that the prediction theory was used to predict the demand for appropriate products to meet the demand. Case study of customers who come to order products and reduce the loss of sales opportunities According to the product comparison results, the company reduced the loss of sales opportunities by predicting the demand for the top five screw products. The reduction of opportunity loss leads to an increase in the company's revenue. The prediction theory is used in this study as a guide for development, improvement, implementation, and planning management.

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Biography

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