

DEMAND ANALYSIS OF AROMATIC COCONUTS FOR PROCESSING OF ABC CO., LTD

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ABSTRACT

Abstract— This research assessed the market for aromatic coconuts that ABC Company Limited will process. The objective of this research is to plan the preparation of merchandise to satisfy consumer demands utilizing the findings of an analysis of data. This research is quantitative in nature. An in-depth interview with an entrepreneur from ABC Company Limited, who operated a company buying aromatic coconuts from farmers and transporting them to Asiatic Agro-Industry Company Limited for subsequent processing, served as the primary data collection instrument. The data were analyzed using the Time Series Method of demand forecasting with the Exponential Smoothing method and the accuracy of the forecasting was measured using the mean absolute deviation MAD (Mean Absolute Deviation), Mean Squared Error, and Mean Absolute Percent Error (MAPE). Even though it has higher reliability and is the most accurate forecasting technique, Exponential Smoothing with $\alpha=0.1$ is implemented in demand forecasting and strategic sourcing, according to the research. 419,00 aromatic coconuts being consumed in January 2022.

Keywords— Demand, Forecasting, Aromatic Coconuts

INTRODUCTION

The coconut plant has been a part of Thai culture for a very long time. Coconuts can be used in a variety of ways throughout daily life and can help farmers make money. The fruit coconut is particularly well-liked. One of the best things about coconuts is how many different sections may be combined to create beneficial products, such as savory recipes that can be used to treat various ailments or symptoms. A total of 990 million coconuts, or about 65% of the output, will be used in the manufacturing of sugar, coconut milk, coconut oil, and different inventions, which currently employ around 55 million people in Thailand. The remaining 489 million fruits, or roughly 35% of the overall output, are used for both internal and international trade in a variety of businesses, including food and beverage production. (Chumphon Horticultural Research Centre, 2022)

ABC Co., Ltd., based in Mueang Nakhon Pathom District, was established in 2014. The province of Nakhon Pathom does business as a supplier of aromatic coconuts to Asiatic Agro-Industry Co., Ltd., an enterprise that processes aromatic coconuts into a range of products. Selling products both domestically and internationally The business will buy aromatic coconuts from growers in the provinces of Nakhon Pathom and Ratchaburi. Aromatic coconuts are agricultural goods having a shelf life of roughly 15 days; if kept for longer than that, they would deteriorate. Some aromatic coconuts will go rotten and be unable to be sold to the buyer company. The challenges discovered will have an impact on the cost incurred when buying extra coconuts from purchasers and replacing decaying aromatic coconuts. When supplying items, the opportunity cost of sales is less than what the customer wants. Additionally, the buyer's company's demand for aromatic coconuts varies from month to month. The study

team is therefore interested in examining the company's desire for aromatic coconuts. Asiatic Agro-Industry Co., Ltd. to be able to prepare aromatic coconuts as needed, minimizing cost losses and missing sales chances. Profit from future business operations.

Objective

1. To study ABC Co., Ltd.'s needs for aromatic coconuts.
2. To analyze the purchasers' companies' need for aromatic coconuts.
3. To prepare products by the needs of the purchasing organization.

METHODS

The secondary data of ABC Co., Ltd., which contains details regarding the purchasing company's need for aromatic coconuts, was utilized in the research. The managing director, the head of the marketing department, and the head of the purchasing department all serve as direct informants. An interview was performed as the data collection tool, and historical sales data from January to December of 2021 were used to analyze demand by projecting demand for aromatic coconuts. Using forecasting methods such as Exponential Smoothing, one can calculate the forecasting error and then compare it to the mean deviation method of calculation. Deviation from the absolute mean (MAD) The Mean Squared Error (MSE) method of measuring forecast error and the Mean Absolute Percent Error method of verifying forecast error (MAPE).

The interview is semi-structured and is divided into two sections:

Part 1 General information of Tannapat Import Limited Partnership

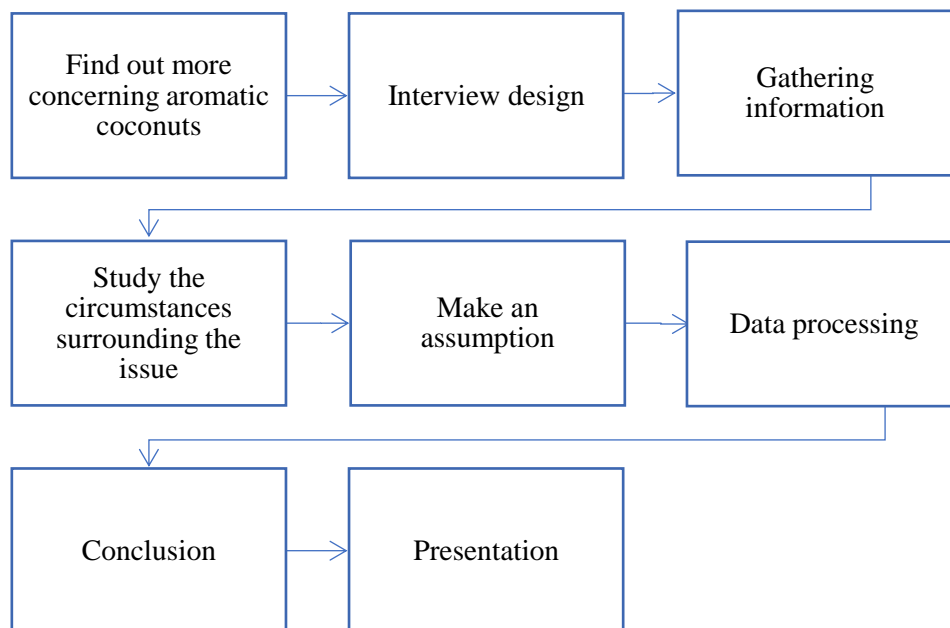
Part 2 Information about past orders

Presenting interview forms to professionals to test validity. Take the expert interview form to determine the Index of Item-Objective Congruence (IOC), which has the following formula, to examine content validity:

$$IOC = \sum R / N$$

IOC	Consistency between the objectives and the substance
$\sum R$	The aggregate of all expert evaluations
N	Number of experts

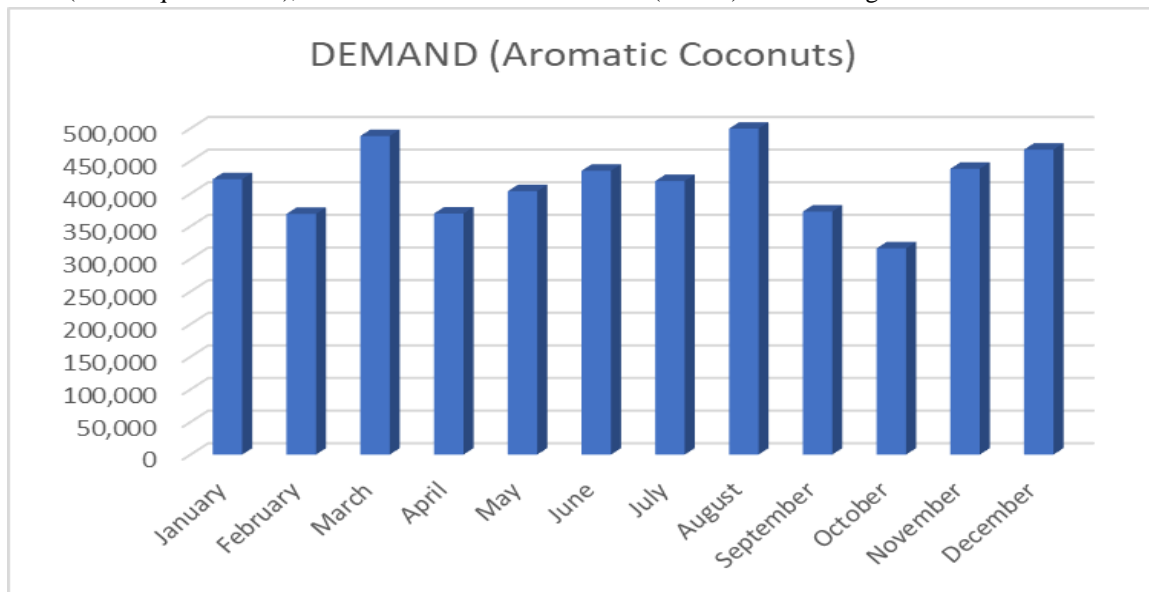
With scores of +1 for content conformance, -1 for content inconsistency, and 0 for uncertainty, the grading standards are on a three-level scale. It was discovered that every item on the questionnaire has an IOC value larger than 0.5, indicating that the questionnaire has a good level of content validity that can be measured and must have an IOC value greater than 0.5 forward.



Picture 1 Research methodology

RESULTS

Focused on in-depth discussions with sources about the demand for aromatic coconuts to be delivered to the business. According to Asiatic Agro-Industry Co., Ltd., the issue is in the past, buyers' demand for aromatic coconuts has outpaced supply, necessitating the return of excess coconuts for sale to the general public at par or below cost. There will be months when the supply of delivered coconuts falls short of the demand, which lowers the opportunity cost of selling the good than the level of demand from the buyer. The research team has therefore taken the issue under consideration and has a plan to examine consumer needs by gathering information on previous customer demands for the previous year as a database to predict demand for fragrant coconuts. Finding the value that is most closely related to actual sales requires finding the exponential smoothing. The least amount of forecasting error can be obtained for use in analysis prophesy by measuring forecasting error using MAD (Mean Absolute Deviation), MSE (Mean Squared Error), and Mean Absolute Percent Error (MAPE) as following

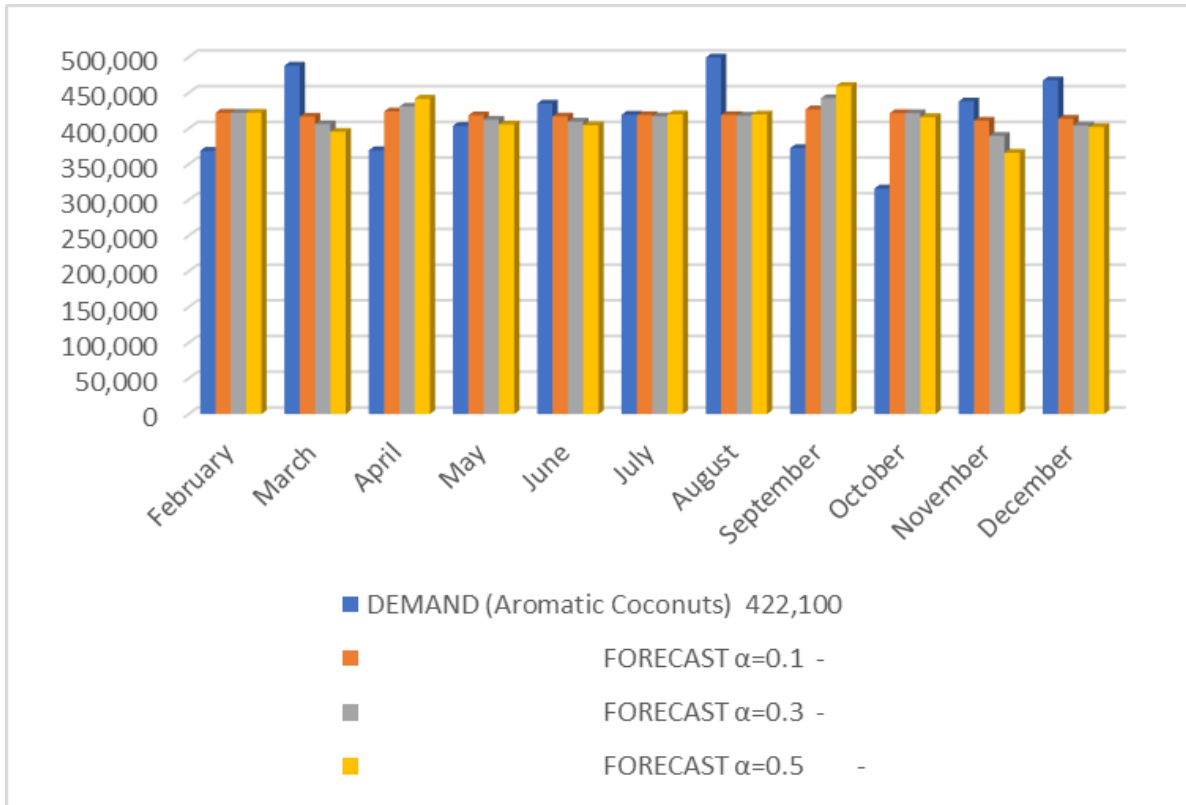


Picture 2 Chart displaying the expected demand for aromatic coconuts in 2021

Table 1

Forecasting demand for aromatic coconuts using the value technique Exponential Smoothing

MONTH	DEMAND (Aromatic Coconuts)	$\alpha = 0.1$	$\alpha = 0.3$	$\alpha = 0.5$
January	422,100	-	-	-
February	368,900	422,100	422,100	422,100
March	488,200	416,780	406,140	395,500
April	369,500	423,922	430,758	441,850
May	403,700	418,480	412,381	405,675
June	435,000	417,002	409,776	404,688
July	419,300	418,802	417,343	419,844
August	499,600	418,851	417,930	419,572
September	372,500	426,926	442,431	459,586
October	316,000	421,484	421,454	416,043
November	438,000	410,935	389,816	366,021
December	467,500	413,642	404,271	402,011
January-2022	?	419,028	423,240	434,755



Picture 3 The forecast is displayed on the graph using the exponential smoothing technique

Generate demand projections for coconuts using the valuation technique In terms of Exponential Smoothing, 0.1 = 419,028 coconuts, 0.3 = 423,240 coconuts, and 0.5 = 434,755 coconuts. The demand forecast data for aromatic coconuts was utilized to test the forecast's accuracy by calculating the forecasting error using the following 3 approaches.

Table 2
Use of the Mean Absolute Deviation (MAD) approach to calculate forecast error

MONTH	DEMAND (Aromatic Coconuts)	FORECAST $\alpha=0.1$	MAD $\alpha=0.1$	FORECAST $\alpha=0.3$	MAD $\alpha=0.3$	FORECAST $\alpha=0.5$	MAD $\alpha=0.5$
January	422,100	-	-	-	-	-	-
February	368,900	422,100	53,200	422,100	53,200	422,100	53,200
March	488,200	416,780	71,420	406,140	82,060	395,500	92,700
April	369,500	423,922	54,422	430,758	61,258	441,850	72,350
May	403,700	418,480	14,780	412,381	8,681	405,675	1,975
June	435,000	417,002	17,998	409,776	25,224	404,688	30,312
July	419,300	418,802	498	417,343	1,957	419,844	544
August	499,600	418,851	80,749	417,930	81,670	419,572	80,028
September	372,500	426,926	54,426	442,431	69,981	459,586	87,086
October	316,000	421,484	105,848	421,454	105,452	416,043	100,043
November	438,000	410,935	27,065	389,816	48,184	366,021	71,979
December	467,500	413,642	53,858	404,271		402,011	65,489
Total			533,900				655,706
MAD			48,556		54,622		59,610

The data table's measurement of forecasting error using the Mean Absolute Deviation (MAD) method reveals that the exponential smoothing forecast's $\alpha=0.1$, $\alpha=0.3$, and $\alpha=0.5$ values are 48,520, 54,622, and 66,835, respectively. Forecasting with exponential smoothing with a value of $\alpha=0.1$ hence has the anticipated value with the lowest inaccuracy.

Table 3
Measurement of forecast error using the method Mean Squared Error (MSE)

MONTH	DEMAND (Aromatic Coconuts)	FORECAST $\alpha=0.1$	MSE $\alpha=0.1$	FORECAST $\alpha=0.3$	MSE $\alpha=0.3$	FORECAST $\alpha=0.5$	MSE $\alpha=0.5$
January	422,100	-	-	-	-	-	-
February	368,900	422,100	2,830,240,000	422,100	2,830,240,000	422,100	2,830,240,000
March	488,200	416,780	5,100,816,400	406,140	6,733,843,600	395,500	8,593,290,000
April	369,500	423,922	2,961,754,084	430,758	3,752,542,564	441,850	5,234,522,500
May	403,700	418,480	218,448,400	412,381	75,359,761	405,675	3,900,625
June	435,000	417,002	323,928,004	409,776	636,250,176	404,688	918,817,344
July	419,300	418,802	248,004	417,343	3,829,849	419,844	295,936
August	499,600	418,851	6,520,401,001	417,930	6,669,988,900	419,572	6,404,480,784
September	372,500	426,926	2,962,189,476	442,431	4,890,344,761	459,586	7,583,971,396
October	316,000	421,484	11,126,874,256	421,454	11,120,124,304	416,043	10,008,601,849
November	438,000	410,935	732,514,225	389,816	2,321,697,856	366,021	5,180,976,441
December	467,500	413,642	2,900,684,164	404,271	3,997,906,441	402,011	4,288,809,121
Total			35,678,098,014		43,032,128,212		51,047,905,996
MSE			3,243,463,456		3,912,011,656		4,640,718,727

From the data table, measure the error of forecasting using the method Mean Squared Error (MSE) found that Exponential Smoothing $\alpha=0.1$ equals 3,243,463,456 $\alpha=0.3$ equals 3,912,011,656 and $\alpha=0.5$ equals 4,640,718,727. Exponential Smoothing $\alpha=0.1$ has a predictive value with the smallest error.

Table 4
The measurement of the forecast error using the Mean Absolute Percent Error (MAPE) method.

MONTH	DEMAND (Aromatic Coconuts)	FORECAST $\alpha=0.1$	MAPE $\alpha=0.1$	FORECAST $\alpha=0.3$	MSE $\alpha=0.3$	FORECAST $\alpha=0.5$	MSE $\alpha=0.5$
January	422,100	-	-	-	-	-	-
February	368,900	422,100	0.14	422,100	0.14	422,100	0.14
March	488,200	416,780	0.15	406,140	0.17	395,500	0.19
April	369,500	423,922	0.15	430,758	0.17	441,850	0.20
May	403,700	418,480	0.04	412,381	0.02	405,675	0.00
June	435,000	417,002	0.04	409,776	0.06	404,688	0.07
July	419,300	418,802	0.00	417,343	0.00	419,844	0.00
August	499,600	418,851	0.16	417,930	0.16	419,572	0.16
September	372,500	426,926	0.15	442,431	0.19	459,586	0.23
October	316,000	421,484	0.33	421,454	0.33	416,043	0.32
November	438,000	410,935	0.06	389,816	0.11	366,021	0.16
December	467,500	413,642	0.12	404,271	0.14	402,011	0.14
Total			1.34		1.49		1.62
			0.12		0.14		0.15
MAPE			12%		14%		15%

From the data table Mean Absolute Percent Error (MAPE) found that the exponential smoothing $\alpha=0.1$ to be 12%, $\alpha=0.3$ to be 14%, $\alpha=0.5$ to be 15%, therefore showing that the exponential smoothing $\alpha=0.1$ has the predictive value with the smallest error.

After analyzing the error in the forecast, the research team discovered that the prediction with a value of $\alpha = 0.1$ had the smallest margin of error. They shared this forecasting principle with entrepreneurs to help them plan for the purchase of aromatic coconuts to be delivered to their factory in January 2022. The predicted value for the coconuts was 419,028, and the factory placed an order for 419,000 coconuts. This resulted in an error of 28 coconuts, which reduced the cost of purchasing excess coconuts.

RESULTS AND DISCUSSION

Based on projections of the market for fragrant coconuts to get the figure that is most closely related to actual sales, one can find exponential smoothing (Exponential Smoothing). To determine the accuracy of the forecast, which is the mean of the absolute deviation MAD, data on prior orders of fragrant coconuts will be gathered from January to December 2021, a period of 12 months (Mean Absolute deviation), The Mean Square Error (MSE) and the least Mean Absolute Percent Error (MAPE) are the basis for forecasting. And found that the exponential smoothing $\alpha=0.1$ has the least error, so it was used in the forecast in January 2022, equal to 419,028 coconuts, actual purchase of fragrant coconuts was 419,000.

Using the exponential smoothing method to predict the demand for aromatic coconuts for processing, findings were quite near to actual sales. In order to meet the needs of the buyer company, the company, a case study, was able to arrange the preparation of aromatic coconuts. This is consistent with the forecasting theory presented in the book Statistical Forecasting by Karin Kandananond using the Time Series Method. that technique is employed to predict upcoming sales. It is anticipated to match past, present, or projected sales.

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