

# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 General Description of Research Object**

#### **1.1.1 Company Profile**

The history of the company started in 1999 when the drinking water business unit was operated by PT. XXX which was one of the subsidiaries of PT. YYY, under the supervision from Division III. At this time the company was building a strategic alliance with one of the most well-known Indonesian university, Institut Teknologi Bandung (ITB), to distribute Air Ganesha. However, the partnership had to be ended in 2001. Some issues started to occur alongside the time of partnering with ITB, causing the partnership to end. Nonetheless, the company was still trying to build another strategic alliance with CV. Angkindo to expand its operational scope and alternative to vertical integration (Quest & Competitive, n.d.). CV. Angkindo was located in Lembang, the business was producing drinking water products. The products made were gallon with capacity 19 liter, 600 ml bottled water, and cup-sized 240 ml.

Partnering with CV. Angkindo has given benefits to the company, it has increased the capability of the company to expand the business by establishing its drinking water factory. It did not happen instantly, PT.XXX was working together with PT.ZZZ, which is also founded by PT.YYY group leader built a drinking water factory with a new company name PT.XYZ on January 2<sup>nd</sup>, 2004. The factory was built in Kec. Cileunyi Kabupaten Bandung. The first products were launched in size varies 19 liter, 600ml, and 240 ml on October 26<sup>th</sup>, 2003.

#### **1.1.2 Products and Quality Control**

The competition is very fierce in the market, especially with the pricing strategy. To survive PT. XYZ added more varieties to its list of products. The new varieties of sizes are 1500 ml and 330 ml. Besides adding more varieties of sizes, PT. XYZ also works with Universitas Islam Negeri Sunan Gunung Djati to produce the university's drinking water brand. The product is produced based on the university's order.

PT. XYZ has not stopped to enlarge the business. The company is launching another brand and adding one more product size in 150 ml the second brand. In 2019 the cup product size is changed from 240 ml to 210 ml for efficiency.

The variety of brands and products are shown in the tables below:

**Table 1. 1** Type of packaging and size of products

Type of Packaging	Size
Cup	210 ml
Bottle	330 ml
	600 ml
	1500 ml
Gallon	19 l

Source: Production unit of PT.XYZ, 2019

Quality control is also one of the main focuses of the company. It could be proven from SNI ISO 9001: 2008: *Sistem Manajemen Mutu* (SMM) or quality management system certificate given in 2013. In October 2018 the quality management system is upgraded to SNI ISO 9001: 2015 through *Lembaga Sertifikat Produk* (LSPro) *Balai Besar Pulp dan Kertas* (BBPK).

### 1.1.3 Company's Vision and Mission

As a company PT.XYZ has to know where they are heading in the future. The company has to have a purpose and the reason for its existence in the market. The vision and mission of PT.XYZ is written below:

- a. Company Vision: *"Selalu Berusaha Menjadi yang Terbaik"*
- b. Company Mission: *"Bekerja untuk Mendapatkan Ridho Allah"*
- c. Philosophy: To work professionally based on Islamic rules that could bring *Ummat* into living with an entrepreneur spirit around the company's area. The employees are also considered as a part of the big family of the company, under principles of togetherness and *ukhuah Islamiyah*.

For those reasons, managements and employees of PT. PT.XYZ is determined to set the company's quality standard that is arranged by the company's director.

“To produce innovative high-quality products, that is supported by professionalism based on Islamic rules to achieve service standard and customers’ satisfaction”. (Quality Management System Policy, SNI ISO 9001: 2015).

Furthermore, PT.XYZ applies Halal policy as follows:

“To produce high-quality drinking water based on Indonesia national standard (SNI) and to guarantee the halal process of the production until finished products to produce Halal products to achieve service standard and customers’ satisfaction”.

#### **1.1.4 Corporate Culture**

The word Masoem itself has meaning. M stands for *Maslahat* means beneficial, A for *Amanah* means trust, S for *Siddiq*, *Sabanda-Sariksa* means honest and togetherness, O for Organization that has a goal to make the organization more professional, E for Effective and Efficient, and M for *Manfaat* means advantage.

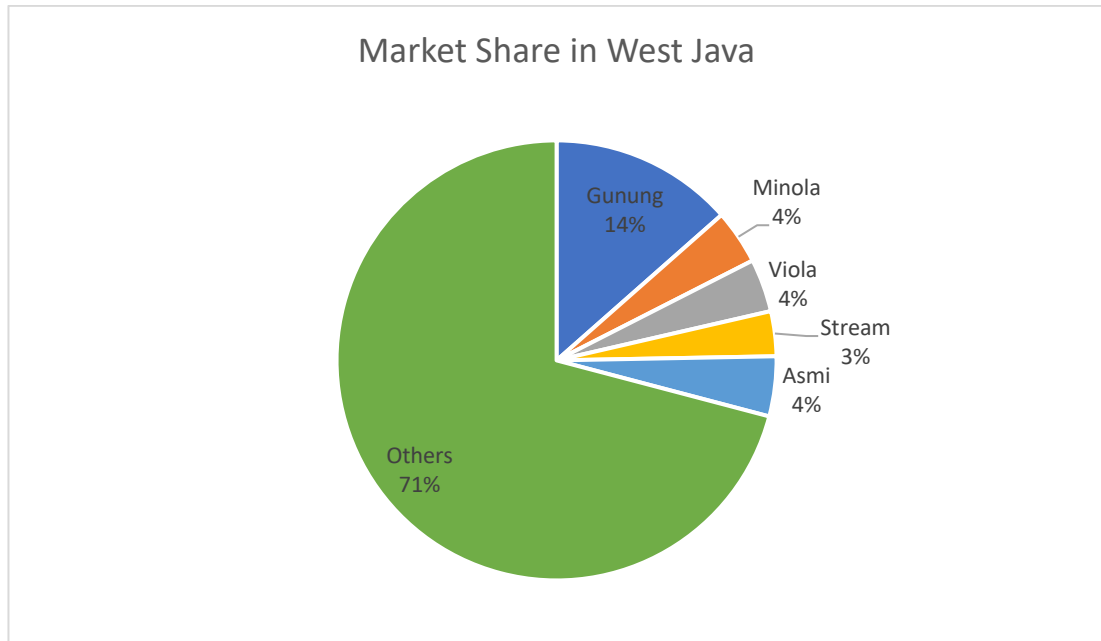
The Group realizes that Allah’s permission is life goals. That every work and effort is in the name of Allah. Therefore, the company pledge to:

- a. Increase the capability and work commitment, therefore every activity could be done is good and beneficial for all parties.
- b. Consider every duty and responsibility that is given to the member of the company as trust that has to be done with full of responsibility.
- c. Uphold the honesty (*sidiq*) with the spirit of “*sabanda-sariksa*”.
- d. Uphold the organizational culture professionally.
- e. Have financial awareness to achieve efficiency and work effectiveness to support the growth of PT.ZZZ Group.
- f. Keep the mindset that the existence and activity of PT.ZZZ Group always gives big advantages for every stakeholder, including for the public as general.

#### **1.2 Background**

The industry of drinking water is getting more competitive. It is proven by the large number of the players in the market. According to ASPADIN (*Asosiasi perusahaan Air Minum Dalam Kemasan Indonesia*) there are 700 players in bottled water industry in 2017. West java contributes 14.5% of the bottled water industry. The number puts West Java as number 2 highest contributor after Jakarta (Nurudin, 2017). PT XYZ is located in West Java, it means that the company is in the market where it is more

competitive than other region besides Jakarta. There are 5 local players in West Java that are dominating the market namely, Gunung, Minola, Viola, Stream, and Asmi (Nurudin, 2017). The percentage of market share is shown in the pie chart below.



**Figure 1. 1** Bottled water market share in West Java

Source: Nurudin (2017)

In order to compete in the more competitive market the business has to implement strategic planning. As stated by Steiner (2014), to raise the effectiveness of an organization, it is essential for the organization to forecast its environment, figure on the problems, establish plans to overcome the problems. One of the mandatory abilities that can support the existence of the business is manufacturing the right amount of products to avoid loss on sales or extra cost. By producing the number of goods that could cover the needs of the market, the company could get a maximum profit. Unable to fulfill the demand is equal to skipping the opportunity to get more profit. Accurate forecast can decrease the risk of producing excessively or inadequately that may cause economic waste or lack of property (Rajakovic & Shiljkut, 2017).

In connection with this, to lessen the risk of loss, careful planning is needed, related to how many goods must be produced that can meet the level of consumer demand. One of the tactics in matching supply to demand is to forecast accurately. According to Diebold (2007:9), forecasting not only assumes what will happen in the future but also becomes a guide in making the decision, good forecast equals to good decisions. The

current issue faced by PT.XYZ is forecasting how much goods must be produced is sometimes still unable to cope with the level of consumer demand for these goods.

PT.XYZ is currently using traditional judgement method and not using any theoretical quantitative forecasting method as a model to generate the number. From a research on demand of lubricant product conducted by Sudarman (2016), the accuracy of forecast is very low when the company not using any theoretical method, after linear regression method is applied the accuracy significantly increases. PT.XYZ sets the number of products that will be manufactured in a year by adding about 10-30% from the previous year's number of demand and adjusting the monthly forecast every 3 months. The table 1.2 shows the percentage of increase in manufactured products number.

**Table1. 2** Increase in 2019 production from the number of 2018 demand

Product	Demand 2018	Forecasting 2019	Increase	Percentage of Increase
Cup	1,927,306	2,254,891	327,585	14.5%
330 ml Bottle	93,205	132,209	39,004	29.5%
600 ml Bottle	840,088	1,117,596	277,508	25%
1500 ml Bottle	173,169	247,143	73,974	30%
Gallon	942,406	1,384,466	442,060	32%

Source: Production unit of PT.XYZ (2019)

In adjusting the monthly forecast, PT.XYZ assesses some aspects, such as the season, culture, and government policy. The first aspect is the seasonal aspect that gives impact to the demand, in the dry season people tend to buy bottled water more than a gallon. On the other hand, the gallon is selling more in the rainy season because people need hot water to brew coffee or make tea by using a water dispenser which requires gallon. The cultural aspect is all about the traditions of customers. For instance, in the month of Ramadhan, 'Eid al-Fitr, and other religious celebration days, water in the cup is more demanded. However, the dates of those celebration days are changing each year, it urges the company to adjust every 3 months.

By using the current method the company is mostly able to match the demand, most of the products have little error in their forecasting. However, one type of product has

a higher number of forecasting error than other products. The product that has more errors in forecasting is 330 ml bottle. As shown in the table 1.3 the number of Mean Absolute Percentage Error (MAPE) for 330 ml bottle is 14%.

**Table1. 3** Number of MAPE for every product

Product Type	MAPE
Cup	10%
330ml	14%
600ml	5%
1500ml	6%
Gallon	1%

Source: Data Processing (2020)

The table 1.4 breaks down the 14% MAPE. Although few months have little error with 1-3%, there are more months with a bigger number of MAPE. January 2019 has the biggest number of errors, with 48% of MAPE or 3,926 gaps. The number of error is gotten from calculating historical data of sales and production in PT.XYZ from January 2018 to December 2019.

**Table1. 4** Detailed data of gap and error

Time	Sales	Production	Gap	MAD	MSE	MAPE
Jan-18	8,218	8,087	(130)	130	16,939.02	2%
Feb-18	6,448	5,600	(847)	847	718,086.76	13%
March-18	10,699	10,915	216	216	46,504.92	2%
April-18	7,283	7,888	605	605	366,206.52	8%
May-18	10,259	13,699	3,440	3,440	11,833,256.00	34%
June-18	5,544	5,843	299	299	89,550.56	5%
July-18	8,163	6,436	(1,727)	1,727	2,982,874.41	21%
Aug-18	7,001	5,558	(1,443)	1,443	2,082,393.30	21%
Sep-18	6,923	6,856	(67)	67	4,422.25	1%
Oct-18	8,784	8,531	(253)	253	63,857.29	3%
Nov-18	6,953	7,152	199	199	39,422.10	3%
Dec-18	6,932	7,635	703	703	494,209.00	10%
Jan-19	8,157	12,083	3,926	3,926	15,413,476.00	48%
Feb-19	7,625	10,032	2,407	2,407	5,793,649.00	32%
March-19	8,486	10,011	1,525	1,525	2,325,625.00	18%
April-19	8,375	10,112	1,737	1,737	3,017,169.00	21%
May-19	9,151	10,212	1,061	1,061	1,125,721.00	12%
June-19	6,858	8,193	1,335	1,335	1,782,225.00	19%

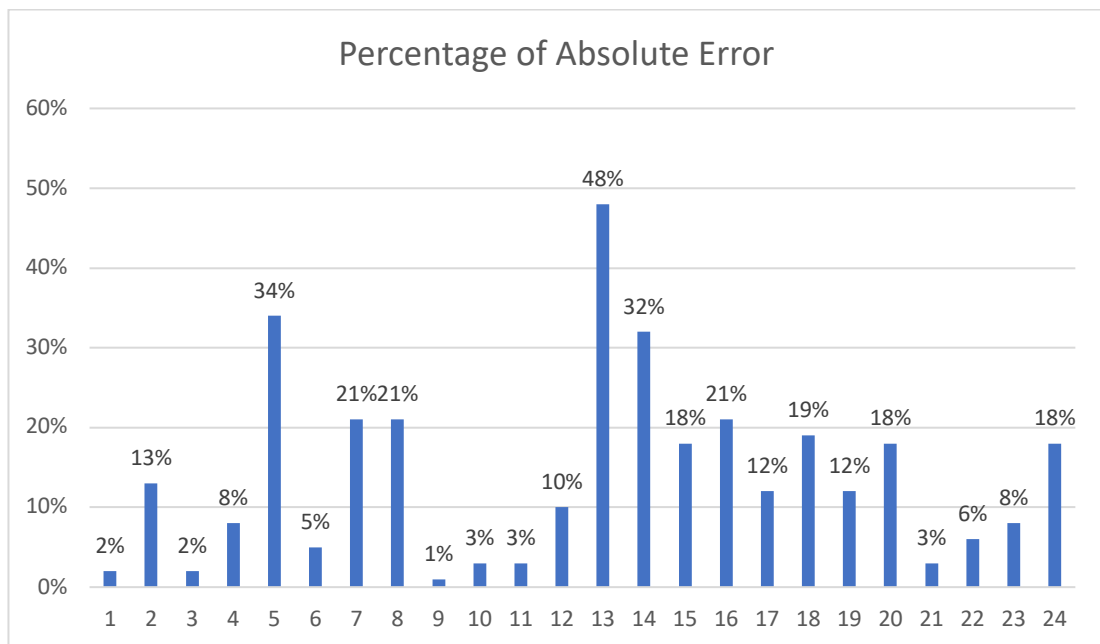
Continued

Continued

July-19	9,262	8,143	(1,119)	1,119	1,252,161.00	12%
Aug-19	8,542	6,972	(1,570)	1,570	2,464,900.00	18%
Sep-19	10,649	10,324	(325)	325	105,625.00	3%
Oct-19	8,090	8,577	487	487	237,169.00	6%
Nov-19	8,836	8,095	(741)	741	549,081.00	8%
Dec-19	11,531	9,440	(2,091)	2,091	4,372,281.00	18%
				<b>1,177</b>	<b>2,382,366.84</b>	<b>14.1%</b>

Source: Data processing (2020)

The bar chart visualizes the percentage of errors better. Three periods have the highest percentage of error, namely on May 2018, January 2019, and February 2019 with more than 30% of error. Three periods with the error of more than 20% are in July 2018, August 2018, and April 2019. The rest are varied from 1% to 19%.



**Figure 1. 2** Percentage of absolute error from 330 ml bottled water

Source: Data processing (2020)

Having too many products in the warehouse could decrease the capacity of the warehouse. The company does not apply fixed layout for the warehouse therefore the capacity for other product could be taken by the products that are produced too much. When the demand is higher than the produced goods, the company has to produce more. In the table 1.4 is written that there are some periods when the production is lacking than to produce more than what has been forecasted. 11 months out of 24 months have less production than demand. It is possible that the company would have

loss in sales. To cope with it the company is making more products. Produce more than what has been planned to urges the employee to work overtime.

**Table 1. 5** Work schedule in PT.XYZ

Monday – Saturday	
Shift 1	05.00-13.00
Shift 2	13.00-21.00
Shift 3	21.00-05.00

Source: Production unit of PT.XYZ (2019)

The table 1.5 shows the work schedule for the employees in the production department. The production is running 24 hours for 6 days. Thus the extra working hour must be done on Sunday. An extra working hour means that the employees have to be paid more than usual working hours. More wages for employees increase the cost of production.

The production that is not planned has more challenges than the ones that are planned well. When the company has to produce more to fulfill the demand, it has to consider many aspects such as the availability of raw materials, if the materials are not available the company has to order more and has to consider lead time. Therefore the company needs a more accurate method to forecast 330ml bottle water product.

Concerning the background, the title of this final project is “Analyzing the Suitability of Time Series and Regression Forecasting Method for Drinking Water Product of PT.XYZ”.

### **1.3 Problem Statement**

330 ml bottled water products have the most errors in forecasting compare to other products produced by PT.XYZ. The season and culture are also affecting the demand for this type of product. Therefore the problem statement that will be researched in this final project will be:

- a. What is the number of errors resulted by each method in the research?
- b. Which method does result the least number of error and is it the most suitable method to forecast the future demand of 330 ml bottled water product?
- c. How many units of 330 ml bottled water product would be demanded in the future by using chosen forecasting method?



## **1.4 Research Objectives**

From the problem statements can be concluded that the objectives of this research are:

- a. To see the number of errors resulted by each method in the research.
- b. To find out the method with least number of errors and the most suitable method to forecast the future demand of 330 ml bottled water product.
- c. To know the number of units of 330 ml bottled water products would be demanded in the future by using chosen forecasting method.

## **1.5 Significance of the Study**

This research is expected to be beneficial for parties of interest. The benefits of this research are:

### **1.5.1 Theoretical Use**

This research is conducted to enrich the knowledge in forecasting and operational management study field for the author. Furthermore, the findings in this final project hopefully could be continually studied in the next research.

### **1.5.2 Practical Use**

This research is written as an effort to hopefully advise on solving the company's problems in forecasting and operation management.

## **1.6 Research Limitation**

- a. Data used in this research is only demand, production and forecast from January 2018 until December 2019
- b. The research is done to find a better method to forecast the demand of 330 ml bottled water products only.
- c. The research is conducted for planning purposes.

## **1.8 Writing Systematics**

Writing systematic contained in this report is written to briefly explain about the conducted research. The writing systematic in this report is described as follows:

## **CHAPTER I INTRODUCTION**

This chapter describes the background of the research, which leads to the problem statement and research objectives.

Limitations, benefits, and writing systematics of the research are explained in this chapter as well.

## **CHAPTER II LITERATURE REVIEW**

This chapter explains about theories that are related to the problem statement. Theories are obtained from relevant books, journals, and previous research, which would be the guideline and tools in solving the problem.

## **CHAPTER III RESEARCH METHODOLOGY**

The chapter contains a collection of information needed in processing data to get results according to the research objectives. The stages of research are explained in this chapter including problem statement, data processing and collection, analyzing the problem in the company, and stage of concluding the research.

## **CHAPTER IV DATA COLLECTION AND PROCESSING**

The data that will be used for the research is collected in this chapter. The data could be secondary data, which the available information, could be gotten from the interview, and primary data that is gotten from the research. The data is then processed with the methodology that is described in the previous chapter.

## **CHAPTER V ANALYSIS**

The processed data that is obtained from chapter IV is analyzed in this chapter. Besides the processed data, the circumstances before and the research are analyzed to compare between both of the circumstances.

## **CHAPTER VI CONCLUSION AND SUGGESTIONS**

This chapter concludes the result of the study. Suggestions for the company and the next research are written in this chapter.