

## Management of Leftover Vegetable and Fruit Products on Company X Profits



Ardhi Nata Kusumah<sup>1</sup>, Teguh Soedarto<sup>2</sup>, Dona Wahyuning Laily<sup>3</sup>

<sup>1,2,3</sup> Master of Agribusiness, Faculty of Agriculture, Universitas Pembangunan Nasional "Veteran" Jawa Timur

**ABSTRACT:** This study aims to investigate the management of leftover vegetable and fruit products and their impact on the profitability of a specific agribusiness company, Company X. The research objectives include understanding the quantity and characteristics of the leftover vegetables and fruits, and analyzing the factors influencing the amount of waste. The population of this study consists of employees of Company X, with a sample size of 100 individuals selected through a purposive sampling method. The research methodology includes data collection through interviews, observations, and questionnaires, followed by multiple linear regression analysis, data quality tests, and descriptive analysis. The operational definitions and variables of the study are clearly defined, and the collected data is analyzed using various methods. The results of the study reveal significant factors influencing the amount of waste product at Company X. The study also provides a comprehensive description of the company's procurement, storage, and sales processes, highlighting the challenges faced in these areas. The discussion includes an analysis of the cost and revenue associated with the leftover vegetables and fruits, providing valuable insights into the company's waste management practices and their impact on profitability. This research contributes to the existing literature on food waste management and offers practical benefits for Company X and similar agribusiness companies.

**KEYWORDS:** Management, Leftover of vegetable and fruit products, Advantages

### I. INTRODUCTION

Indonesia is one of the largest food waste producing countries in the world after Saudi Arabia in the first rank and third rank is the United States (The Economics Intelligence Unit). In addition, according to the environment director of Bappenas, it was conveyed that Indonesia experienced economic losses of 4-5 percent of the national Gross Domestic Product equivalent to Rp 213-551 trillion caused by food waste.

The amount of Indonesian food waste has dominated up to 44 percent of all types of waste waste. The amount is around 23 - 48 million tons per year. So, each person makes 115 - 185 kg of food waste per year (Bappenas, 2021) The accumulation of food waste in Indonesia is dominated by types of rice - grains such as rice, corn, wheat, and similar products. As for other types of food such as vegetables whose loss reaches 62 percent of the entire domestic supply of vegetables in Indonesia.

FAO notes food wastage occurs in all countries in the world. This world food institution also reminds that the availability of natural resources is limited so that to increase food supply will be more effective by reducing food waste rather than just focusing on efforts to increase food production by exploiting natural resources. About 25% of all food wasted globally is enough to feed the approximately 800 million hungry people worldwide each year (Food and Agriculture Organization of the United Nations, 2019).

PT. X is an agrotechnology start-up company that provides distribution services for fresh vegetables, fruits, dry goods, fish, meat, chicken and eggs. This start-up, which has been established since 2017, is a startup supplier of fresh fruits and vegetables directly from farmers to B2B (Business to Business) and B2C (Business to Customer) consumers throughout JABODETABEK, Bandung and Surabaya. Based on data obtained from analyst data PT. X, it is explained that until March 2021 PT. X has 35,097 active merchants, 39,193 active branches. Seeing the increasing number of services provided by PT. X and the increasing number of branch offices and warehouses spread across several cities, then PT. X must have good operational management.

The remaining vegetable and fruit products that cannot be sold regularly or products that have experienced deterioration will be partially discarded and some that are still suitable for consumption will be sold to customers. We can see in the table that the total remaining vegetable and fruit products at PT. X from October to December as much as 146,892 Kg consisting of

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vegetables and fruit. In my opinion, this figure is not small if we convert the total quantity into rupiah of Rp. 1,154,868,280. Of course, with such a large amount of money, it should be used for other operational activities so that it is not wasted in vain. The main problem with horticultural agricultural products is their relatively short shelf life and perishable properties. Horticultural plant products can undergo changes due to physical, physiological, chemical, or microbiological influences. So that if it is not controlled, it is related to the emergence of damage and rot which will ultimately reduce the quality of the harvest.

Based on the description above, we can see that the remaining products produced by PT X must be considered considering the very large amount, as for this, this study looks for factors affecting the amount of remaining vegetable and fruit products in PT X. Then, looking at the mechanism of product procurement activities, product sorting and product storage whether it is in accordance with standard operational procedures owned by the company.

## II. GRAND THEORY

### Characteristics of Agricultural Products

The distribution and marketing of agricultural products present unique challenges due to their perishable, seasonal, and diverse nature (Tooy et al., 2023). The distribution chain for these products is often long, leading to challenges for both farmers and end-users (Apriadi & Saputra, 2017). Additionally, differences in product types require specific distribution methods, including cold chain logistics for food and agricultural products, which necessitate cold storage during distribution (Astuti & Normasari, 2022). Furthermore, geographical constraints, such as limited transportation access and high transportation costs, particularly in remote areas, hinder the marketing of agricultural products (Susandi et al., 2022). To address these challenges, various strategies have been proposed, including the use of digital marketing to reach millennial farmers and improve market access for agricultural products (Setiawan, 2022; Ningtyas et al., 2022). Moreover, the development of e-commerce platforms and marketplace-based information systems has been suggested to facilitate the marketing of agricultural products (Is et al., 2022). Additionally, the implementation of marketing strategies such as product differentiation, functionalization, value addition, and resonance has been recommended to enhance the marketing performance of agricultural products (Fadila et al., 2022). Furthermore, the utilization of digital platforms and applications has been proposed to expand the market for local agricultural products (Yulida et al., 2022). The unique characteristics of agricultural by-products, such as corn cobs, have been explored for industrial value, demonstrating the potential for creating marketable industrial products from agricultural waste (Septianto & Hasim, 2022). Moreover, the impact of agricultural production on the regional gross domestic product has been highlighted, emphasizing the significant contribution of the agricultural sector to the regional economy (Wicaksana, 2022). It is essential to consider the perishable nature and voluminous storage requirements of agricultural products, which can lead to spoilage and occupy significant storage space (Marita et al., 2021). To address these challenges, the development of e-commerce applications and content management systems has been suggested to improve the efficiency and effectiveness of agricultural product marketing (Sajiah et al., 2021). Furthermore, predictive models and information systems have been proposed to forecast agricultural product prices and facilitate marketing decisions (Pertiwi et al., 2022). The complexity of agricultural product supply chains has been acknowledged, necessitating sustainable supply chain management practices to ensure the efficient distribution of agricultural products (Jaya et al., 2020). Additionally, the potential of solar-powered drying systems for agricultural products has been recognized, offering a sustainable solution for product preservation and value addition (Tarigan, 2020). The unique challenges associated with the distribution and marketing of agricultural products require comprehensive strategies and technological innovations to ensure efficient and sustainable market access for farmers and end-users.

### Food Loss and Food Waste

Food loss and waste is a major global issue with significant environmental, economic, and social impacts (Griffin et al., 2008; Kör et al., 2021; Cattaneo et al., 2021; Gorter et al., 2021; Fatimah & Baliwati, 2022; Agarwal et al., 2021). Reducing food loss and waste has been identified as an important strategy to improve food security and sustainability (Griffin et al., 2008; Kör et al., 2021; Fatimah & Baliwati, 2022). Food loss refers to food that is unfit for human consumption before reaching the consumer, while food waste refers to food that is fit for consumption but ends up being discarded (Breewood, 2019). Several factors contribute to food loss and waste at different stages of the food supply chain (Cattaneo et al., 2021). In developed countries, post-consumer food waste accounts for the largest share of losses, while in developing countries losses occur mainly during production, storage, and transportation (Parfitt et al., 2010). Improper harvesting techniques, lack of infrastructure and technology, and inadequate supply chain management also lead to significant food losses (Xue et al., 2020; Gorter et al., 2021). Reducing food loss and waste requires action from multiple stakeholders across the supply chain as well as policy interventions (Cattaneo et al., 2021). Economic incentives and disincentives, improved infrastructure, education campaigns, and

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standardization of definitions and measurements have been proposed as potential strategies (Cattaneo et al., 2021; Swamilaksita, 2022). Reducing even a small portion of the one-third of global food that is lost or wasted each year could help increase food availability and nutrient supply while reducing environmental impacts (Griffin et al., 2008; Agarwal et al., 2021).

### Factors Affecting Food Waste

Food waste is a complex issue influenced by many factors. Based on the relevant and high-quality references provided, the main factors that can affect food waste at the household level are:

1. Consumer behavior and lifestyle (Chaerul & Zatadini, 2020; Farliana et al., 2021). Consumers' food purchasing, storage, and preparation habits can directly impact the amount of food that is wasted. Factors like impulsive buying, overstocking, and improper storage can lead to spoilage and waste;
2. Socioeconomic status (Farliana et al., 2021; Wuryanti et al., 2021). Households with higher incomes tend to waste more food due to a greater ability and willingness to purchase excess food. However, socioeconomic status is not the only factor that influences consumer behavior;
3. Psychological factors (Medawati et al., 2020; Rosli & Salamuddin, 2021; Pedhu, 2022). Attitudes, values, and motivations related to food and waste can impact food waste generation. For example, a lack of concern about wasting food or a lack of planning and organization in the kitchen;
4. Food-related knowledge and skills (Hebrok & Boks, 2017). Limited knowledge about food storage, preparation, and recipe planning can contribute to food being thrown away;
5. Cultural and social norms (Qi & Roe, 2016). Social norms around food, eating, and hospitality can shape consumers' food-related decisions and behaviors.

In summary, both external situational factors and internal psychological factors interact to drive household food waste. A holistic approach that addresses consumers' knowledge, attitudes, motivations, and behaviors is needed for effective food waste prevention strategies.

### Impact of Food Waste

The impact of food waste:

1. Heller et al. (2018) discusses the environmental impacts of food waste in terms of greenhouse gas emissions and energy demand. It finds that reducing food waste can lower these impacts;
2. Massow et al. (2019) mentions both environmental and economic impacts of household food waste;
3. Li et al. (2021) specifically examines the environmental and economic costs of food waste from a university canteen. It finds that food waste leads to greenhouse gas emissions and economic losses;
4. Garcia-Garcia et al. (2015) reviews the environmental impact of food waste in food supply chains, finding that it generates significant waste;
5. Goossens et al. (2020) evaluates measures to reduce food waste in the food service sector and calculates the avoided environmental impacts and economic costs;
6. Robbins & Sharvelle (2013) analyzes the economic feasibility of a food waste diversion program and finds that it would result in losses, making it currently unfeasible;
7. Ohlsson (2006) argues that assessing the environmental impact of the entire food chain is needed to avoid sub-optimization in food waste management.

## III. RESEARCH METHODOLOGY

### Types of Research

This study is a descriptive research that aims to provide a detailed and accurate picture of the factors influencing the amount of leftover vegetable and fruit products at Company X. The research uses a mixed-methods approach, combining qualitative and quantitative methods to collect and analyze data. The qualitative data is collected through interviews and observations, while the quantitative data is collected through surveys. The data is then analyzed using descriptive analysis, data quality testing, and multiple linear regression analysis. This research methodology allows for a comprehensive understanding of the research problem and provides robust and reliable results (Sugiyono, 2016).

### Location Determination

The location of this research was carried out at the head office and branches of PT. X located in Jakarta, Bandung and Sidoarjo. The selection of research sites is carried out purposively in accordance with the research objectives and based on the consideration that PT. X is one of the Start-Ups engaged in the sale of agricultural products and household needs where in the

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sale of agricultural products, of course, the company will be vulnerable to perishable products and cannot be stored for a long time. The location of PT X is in Sidoarjo.

### Object of Research

The object of research is the topic of the problem that is the target of research. The object of this research is the remaining vegetable and fruit products from PT. X in the sense of a product that has been degraded or damaged and cannot be sold at regular sales (does not meet predefined specifications). The subject of research is an informant or party who is the source of research data. The subjects of this study consisted of PT. X and employees at PT. X.

### Population

Population is a generalized area consisting of objects or subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions. The population in this study is employees of PT. X from purchasing, inventory, quality control, helper and waste center officer. These five parts play an important role in providing information and related data in this study which was carried out by filling out questionnaires and interviews (Sugiyono, 2016).

### Samples and Sampling Techniques

The sample is part of the population that has certain characteristics or conditions. The sampling technique used in this study uses purposive sampling technique Purposive sampling is a sampling technique with certain considerations in. The reason for using this purposive sampling technique is because it is suitable for quantitative research, or studies that do not generalize according to. The sample in this study was employees of PT. X in purchasing, inventory, quality control, helper and waste center officer. Where employees in that section know information about the remaining products at PT. X so that more complete information data is obtained to answer the research objectives (Sugiyono, 2016).

### Data Collection

The data collection method in this study involves the use of primary data and secondary data.

1. Primary data was collected through various means, including interviews with key informants such as PT Supervisors. X in the Waste Center, Inventory, Purchasing, helper, Quality Control and Staff sections of each of these sections. In addition, filling out questionnaires is also used as a primary data collection method, with questionnaires distributed to employees of PT. X.
2. Secondary data are obtained from literature studies, and recording data related to the amount of remaining vegetable and fruit products, the amount of product procurement, the amount of sales and the amount of income.

In addition, observation is also used as a data collection technique, by making direct observations on human activities at PT. X. This data collection is carried out over a certain period of time, with the data used being time series data for the last 1 year 2022.

### Data Analysis

Data analysis is the process of systematically searching and compiling data obtained from interviews, field notes, and other materials so that it can be easily understood and the results of research can be informed to others. Descriptive analysis is research conducted with the aim of providing an accurate picture of certain conditions or symptoms to determine the relationship between one symptom and other symptoms. The quantitative approach is a scientific approach that views a reality that can be clarified, concrete, observed and measurable, the variable relationship is causal where the research data is in the form of numbers and analysis using statistics (Sugiyono, 2016).

The analysis used to answer the purpose of the second study was to see the phenomenon of waste products from the remaining vegetable and fruit products at PT. X. The analysis used is multiple linear regression analysis to analyze the factors that affect the amount of residual vegetable and fruit products in PT. X. Factors that can affect the remaining vegetable and fruit products include the procurement of vegetables and fruits, sorting of vegetables and fruits, overstock, quality of vegetables and fruits, quality of labor and sales of vegetables and fruits. Tabulated data processing will be processed using SPSS Statistics 23.0.

### Descriptive Data Analysis

At this stage the data is worked and processed in such a way that it succeeds in showing truths that can be understood to answer the problems posed in the research. Qualitative research is more concerned with the process than these results because the relationship between the parts being studied will be much clearer when observed in the research process.

The work procedure for data analysis in qualitative research can be divided into two major stages, namely: (1) research is carried out while in the field to collect data or after the researcher leaves the research setting; (2) data processing and categorization. Descriptive analysis methods lead to research procedures that produce qualitative data. With this descriptive

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analysis technique, researchers try to describe an event by describing and observing directly or indirectly the working mechanism of PT. X from procurement to sales.

This type of research using descriptive analysis methods is intended for exploration and clarification of a social reality, thus this descriptive analysis does not question the relationship between existing variables, with no intention of drawing generalizing conclusions that cause a symptom or social reality. Therefore, this descriptive analysis does not use and does not test hypotheses and also does not build and develop a theoretical treasury.

### Validity Test

The validity test is used to measure the validity or invalidity of a questionnaire. A questionnaire can be said to be valid if the questions and questionnaires are able to reveal something that will be measured by the questionnaire (Ghozali; 2012). The validity test uses person correlation analysis by looking at decisions to determine whether or not instrument items are valid. If at a significant level of 5%, the value of  $r$  is calculated  $> r$  table then it can be concluded that the item of the instrument is valid and vice versa.

### Reliability Test

Reliability is a tool for measuring a questionnaire which is an indicator of a variable. A questionnaire is said to be reliable or reliable if the answers to the questions are consistent or stable over time (Ghozali, 2012). Reliability measurements in this study were carried out by means of one shot or measurement once. Here the measurement is only once and then the results are compared with other questions or measuring reliability with the Cronbach Alpha statistical test ( $\alpha$ ). A variable is said to be reliable if the value of Cronbach alpha ( $\alpha$ )  $> 0.6$  and vice versa.

### Classical Assumption Test

This test is intended to measure the level of variable values in multiple linear regression analysis or detect the presence or absence of multicollinearity, heteroscedasticity, normality, and autocorrelation in the estimation results because if there is a deviation from these classical assumptions, the F test and t test conducted previously become invalid and statistically can confuse the conclusions obtained, for that the assumption test is carried out.

### Analysis Regresi Linear Berganda

Regression analysis is basically the study of the dependence of the dependent variable (bound) with one or more independent variables (explanatory or independent variables), with the aim of estimating and or predicting the population average or values of the dependent variable based on the value of the known independent variable (Ghozali, 2012). For regression where the independent variable consists of two or more, regression is also called multiple regression. Because the independent variable above has a variable consisting of two variables, the regression in this study is called multiple regression. Multiple linear regression analysis is a common statistical method used to examine the relationship between a dependent variable and several independent variables. To measure the presence or absence of correlation between variables. The multiple linear regression analysis aims to determine the factors that affect the amount of waste product or waste at PT. X.

### Hypothesis Testing

The steps of multiple linear regression analysis to analyze the factors that affect the amount of waste products at PT. X is:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e$$

Information:

Y : Remaining vegetable and fruit products (dependent variable)

a : Constanta

e : Standar errorr

### Cost and Revenue Analysis

#### 1. Cost

To calculate the total cost of trading business can be calculated using the formula:

$$TC = TFC + TVC \dots \dots \dots \text{(Source: Sukirno, 2013)}$$

Information:

TC = Total business cost (Rp)

TFC = Fixed cost of business (Rp)

TVC = Business variable costs (Rp)

#### 2. Income

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Revenue is calculated through the subtraction between receipts and total costs for one production process calculated using the formula:

$$\pi = TR - TC \dots\dots\dots \text{(Source: Sukirno, 2013)}$$

Information:

$\pi$ : total revenue (Rp)

TR: total receipt (Rp)

TC: total cost (Rp)

### IV. RESULTS AND DISCUSSION

#### Description of Respondent Statistics

The characteristics of respondents are a general description of employees from PT X who work and relate to the rest of vegetable and fruit products. The characteristics of PT X employees can be seen based on the results of research obtained from the results of filling out questionnaires conducted by employees. The sample in this study is 100 respondents who will describe the perception of PT. X what factors affect the amount of residual vegetable and fruit products. The results of the study are described in the form of percentages and in the form of tabulations of data on the total answers of all respondents. The following is a tabulation containing data information obtained from consumers after conducting interviews and filling out questionnaires which include: name, gender, age, position and location of work of respondents. Statistical descriptive analysis was used to see the characteristics of each respondent in this study consisting of gender, age, educational background, work location, and occupation.

**Table 1. Characteristics of Respondents by Gender**

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	69	69.0	69.0	69.0
	Female	31	31.0	31.0	31.0
	Total	100	100.0	100.0	

Source: Processed Primary Data, 2023

From Table 1. The gender of the respondents above, it can be seen that respondents with male gender there are 69 people and women there are 31 people. So it is assumed that the majority of respondents in this study are male with a percentage of 69%. The difference in the number of genders in PT X employees is quite a lot because the work is quite heavy and requires considerable energy and there are working hours at night.

**Table 2. Characteristics of Respondents by Age**

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-25	21	21.0	21.0	21.0
	26-30	59	59.0	59.0	59.0
	31-35	18	18.0	18.0	18.0
	36-40	2	2.0	2.0	2.0
	Total	100	100.0	100.0	

Source: Processed Primary Data, 2023

From Table 3 of respondents' ages above, it can be seen that respondents aged 21-25 years there are 21 people, ages 26-30 years there are 59 people, ages 31-35 years there are 18 people, and ages 36-40 years there are 2 people. From the results of the age frequency of respondents, it is assumed that the majority of respondents to this study are aged between 26-30 years with a percentage of 59%. Companies often prefer workers between the ages of 26 to 30 because this age group is often considered to have a number of advantages that can contribute positively to company performance and productivity.

**Table 3. Characteristics of Respondents by Educational Background**

Educational Background		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	High School	23	23.0	23.0	23.0
	Bachelor	77	77.0	77.0	77.0
	Total	100	100.0	100.0	

Source: Processed Primary Data, 2023

From Table 3 of the respondents' educational background above, it can be seen that respondents graduated from high school there were 23 people and there were 77 S1 graduates. So it is assumed that the majority of respondents in the study were Bachelor graduates with a percentage of 77%. Many companies prefer employees who have an S1 education background rather than high school because higher education tends to bring a number of relevant advantages for various job roles. A Bachelor degree (S1) usually reflects a deeper level of knowledge, a broader understanding, and more specific skills in a particular field. S1 graduates often have better analytical, problem-solving, and communication skills, which are important for many jobs that require complex decision-making and interaction with various parties. Nonetheless, it is important to note that there are jobs and positions where higher education may not be required, and high school degree holders with appropriate skills can also be successful in those roles. In many cases, the decision to choose an undergraduate or high school education also depends on the specific requirements of the job, work experience, and other factors related to the role being applied for.

### Validity Test Results

Table 4. Validity Test Results

Variable	Question	R Table	R Calculate	Sig.	Information
Procurement of vegetables and fruits (X1)	X1.1	0.1966	0.832	0.000	Valid
	X1.2	0.1966	0.809	0.000	Valid
	X1.3	0.1966	0.693	0.000	Valid
	X1.4	0.1966	0.726	0.000	Valid
Sorting vegetables and fruits (X2)	X2.1	0.1966	0.719	0.000	Valid
	X2.2	0.1966	0.738	0.000	Valid
	X2.3	0.1966	0.745	0.000	Valid
	X2.4	0.1966	0.747	0.000	Valid
Overstock (X3)	X3.1	0.1966	0.766	0.000	Valid
	X3.2	0.1966	0.767	0.000	Valid
	X3.3	0.1966	0.780	0.000	Valid
	X3.4	0.1966	0.763	0.000	Valid
Quality of vegetables and fruits (X4)	X4.1	0.1966	0.612	0.000	Valid
	X4.2	0.1966	0.682	0.000	Valid
	X4.3	0.1966	0.811	0.000	Valid
	X4.4	0.1966	0.803	0.000	Valid
Labor quality (X5)	X5.1	0.1966	0.827	0.000	Valid
	X5.2	0.1966	0.753	0.000	Valid
	X5.3	0.1966	0.792	0.000	Valid
	X5.4	0.1966	0.686	0.000	Valid
Vegetable and fruit sales (X6)	X6.1	0.1966	0.784	0.000	Valid
	X6.2	0.1966	0.838	0.000	Valid
	X6.3	0.1966	0.777	0.000	Valid
	X6.4	0.1966	0.759	0.000	Valid
Amount of Residual Vegetable and Fruit Products (Y)	Y1	0.1966	0.582	0.000	Valid
	Y2	0.1966	0.796	0.000	Valid
	Y3	0.1966	0.794	0.000	Valid
	Y4	0.1966	0.817	0.000	Valid
	Y5	0.1966	0.795	0.000	Valid
	Y6	0.1966	0.612	0.000	Valid

Source: SPSS Data Analysis, 2023

Testing the validity of this research with the value of pearson correlation as r count and then compared with r count. Determine the validity test decision, namely when r calculate the table  $\geq$  r and sig value.  $< 0.05$  means the question is used in the questionnaire is valid, on the other hand, when r is calculated  $\leq$  r table and the sig value is  $> 0.05$  it means that the question

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used in the questionnaire is invalid and needs to be discarded or replaced. From the results of the validity test for variables X1, X2, X3, X4, X5, X6, and Y above, it can be seen that all question items used in the questionnaire are valid because they have r values calculated  $\geq r$  tables and sig values.  $< 0.05$ . After the points above are declared valid, then the reliability of each variable can be tested.

### Reliability Test Results

**Table 5. Reliability Test Results**

Variable	Cronbach Alfa	Information
Procurement of vegetables and fruits (X1)	0.768	Reliabel
Sortasi sayuran dan buah (X2)	0.742	Reliabel
Overstock (X3)	0.775	Reliabel
Quality of vegetables and fruits (X4)	0.752	Reliabel
Sorting vegetables and fruits (X2)	0.760	Reliabel
Vegetable and fruit sales (X6)	0.812	Reliabel
Amount of Residual Vegetable and Fruit Products (Y)	0.824	Reliabel

Source: SPSS Data Analysis, 2023

Reliability tests are needed to determine to what extent measurement results using the same questions, will produce the same data. Determining the reliability test decision when the Conbarch Alpha value  $> 0.60$ , it is stated that the variable used is reliable. Seen in the SPSS output above, the Conbarch Alpha value of each variable is greater than 0.60 meaning that all questions used in each variable are reliable.

### Normality Test Results

**Table 6. Reliability Test Results**

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		100
Normal Parameters <sup>a,b</sup>	Mean	.0000000
	Std. Deviation	2.57967896
Most Extreme Differences	Absolute	.042
	Positive	.042
	Negative	-.036
Test Statistic		.042
Asymp. Sig. (2-tailed)		.200 <sup>c,d</sup>
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		
d. This is a lower bound of the true significance.		

Source: SPSS Data Analysis, 2023

The normality test is useful to find out whether the data used is normally distributed or not. Testing the normality of data in this study by means of statistical and graphic tests. Statistical tests using the Kolmogrov Sminov Test Method. In the Kolmogrov Sminov Test Method if the value of asymp sig. (2-tailed)  $> 0.05$  then the data is normally distributed. Seen from the table above, the value of asymp.sig. (2-tailed) of 0.200, this value is  $> 0.05$  so it means that the data used in this study is already normally distributed we can see in Table 12 in the Asymp section. Sig. (2-tailed) of 0.200.

### Heteroscedacity Test Results

**Table 7. Heteroscedacity Test Results**

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.142	1.370		1.564	.121
	Procurement of vegetables and fruits (X1)	-.038	.064	-.065	-.603	.548



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Sortasi sayuran dan buah (X2)	-.094	.074	-.146	-1.265	.209
Overstock (X3)	.069	.077	.104	.902	.369
Quality of vegetables and fruits (X4)	-.018	.071	-.030	-.259	.796
Sorting vegetables and fruits (X2)	-.046	.077	-.070	-.598	.551
Vegetable and fruit sales (X6)	.067	.067	.114	1.002	.319
a. Dependent Variable: ABS_Res					

Source: SPSS Data Analysis, 2023

In this research, the heteroscedasticity test was tested through the Glejser Test by progressing the absolute residue. When the significance (sig.) of the variable is free with absolute residual  $> 0.05$ , it means that there is no heteroscedasticity problem. In accordance with Table 7 of the SPSS results above, it can be seen that the values of sig X1 to X6 have a significance value of  $> 0.05$ , so it is concluded that there are no symptoms of heteroscedasticity in each independent variable.

### Multicollinearity Test Results

Table 8. Multicollinearity Test Results

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Procurement of vegetables and fruits (X1)	.895	1.118
	Sortasi sayuran dan buah (X2)	.766	1.305
	Overstock (X3)	.768	1.302
	Quality of vegetables and fruits (X4)	.741	1.350
	Sorting vegetables and fruits (X2)	.760	1.317
	Vegetable and fruit sales (X6)	.789	1.267

Source: SPSS Data Analysis, 2023

In the research conducted, there should be no high correlation between the independent variables because it makes the relationship between the independent variables to the dependent variables disturbed. There are no symptoms of multicollenierity when the tolerance value  $> 0.100$  and the VIF value  $< 10.00$ . According to the results of SPSS in Table 8 above, we can look sequentially at the tolerance and VIF values in the free variable of vegetable and fruit procurement (X1) of 0.895 and 1.118, the variable of sorting vegetables and fruits (X2) of 0.766 and 1.305, the variable overstock (X3) of 0.768 and 1.302, the variable quality of fruits and vegetables (X4) of 0.741 and 1.350, labor quality variables (X5) of 0.760 and 1.267 and vegetable and fruit sales variables (X6) of 0.789 and 1.267 have a torelance value of  $> 0.100$  and a VIF value of  $< 10.00$ , so it is concluded that there are no symptoms of multicollenierity in each independent variable.

### Auto Correlation Test Results

Table 9. Auto Correlation Test Results

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.838 <sup>a</sup>	.702	.683	2.05135	2.107
a. Predictors: (Constant), sales of vegetables and fruits, procurement of vegetables and fruits, quality of vegetables and fruits, sorting of vegetables and fruits, overstock, quality of labor					
b. Dependent Variable: the amount of residual vegetable &; fruit products					

Source: SPSS Data Analysis, 2023

Autocorrelation testing is carried out by looking at the results of Durbin Watson values and adjusting to the criteria. Durbin Watson (DW) decision making by comparing it with nilla Du in DW table. If the  $DU < DW$  values  $< (4-DU)$  then it is stated that the data used does not occur autocorrelation symptoms. In accordance with the SPSS output above, the DW value is 2.107, this value is greater than the DU value (1.8031) and smaller than 4-DU (2.1969) so it is concluded that in this study there are no symptoms of autocorrelation.

### Coefficient of Determination Test Results

Table 10. Coefficient of Determination Test Results

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.838 <sup>a</sup>	.702	.683	2.05135	2.107

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1	.838 <sup>a</sup>	.702	.683	2.05135	2.107
a. Predictors: (Constant), sales of vegetables and fruits, procurement of vegetables and fruits, quality of vegetables and fruit, sorting vegetables and fruits, overstock, labor quality					
b. Dependent Variable: the amount of residual vegetable & fruit products					

Source: SPSS Data Analysis, 2023

The value of the coefficient of determination is between 0 and 1. If the value is close to 1, it means that the independent variable provides almost all the information needed to predict the dependent variable. However, if the value of R<sup>2</sup> is getting smaller, it means that the ability of independent variables to explain the dependent variable is quite limited (Ghozali, 2016). The value of R square (R<sup>2</sup>) or the determination of the coefficient as a predictor of the magnitude of influence is given by the independent variable to the dependent variable. The results of SPSS in Table 16 above show an R Square value of 0.702 which means that the variables of vegetable and fruit procurement (X1), vegetable and fruit sorting (X2), overstock (X3), quality of vegetables and fruits (X4), labor quality (X5), sales of vegetables and fruits (X6) together affect the number of remaining vegetable and fruit products by 70.2% and the other 29.8% is influenced by other variables that are not in this study.

### Multiple Linear Regression Analysis Results

**Table 11. Multiple Linear Regression Analysis Results**

Coefficients <sup>a</sup>								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	5.930	1.971		3.009	.003		
	Procurement of vegetables and fruits (X1)	.513	.092	.335	5.597	.000	.895	1.118
	Sorting vegetables and fruits (X2)	.683	.106	.415	6.414	.000	.766	1.305
	Overstock (X3)	.645	.110	.378	5.856	.000	.768	1.302
	Quality of vegetables and fruits (X4)	.345	.102	.223	3.398	.001	.741	1.350
	Sorting vegetables and fruits (X2)	.280	.110	.164	2.533	.013	.760	1.317
	Vegetable and fruit sales (X6)	-.512	.097	-.337	-5.297	.000	.789	1.267

a. Dependent Variable: Amount of Residual Vegetable and Fruit Products (Y)

Source: SPSS Data Analysis, 2023

Based on Table 10 of the regression coefficients above, a multiple linear regression equation is obtained, namely:

$$Y = 5.930 + [0.513X]_1 + [0.683X]_2 + [0.645X]_3 + [0.345X]_4 + [0.280X]_5 - 0.512X_6$$

From the multiple linear regression equation, the influence of each variable can be analyzed:

1. A constant value of 5.930 indicates that if all independent variables consisting of vegetable and fruit procurement (X1), vegetable and fruit sorting (X2), overstock (X3), vegetable and fruit quality (X4), labor quality (X5), vegetable and fruit sales (X6) have not changed or are valued at 0%, then the variable amount of vegetable and fruit waste (Y) is 5.930;
2. The regression coefficient of vegetable and fruit procurement (X1) of 0.513 is positive, meaning that between variables X1 and Y move in the same direction, meaning that when the procurement of vegetables and fruits (X1) increases by 1%, the amount of vegetable and fruit waste (Y) will increase by 0.513;
3. The regression coefficient of sorting vegetables and fruits (X2), of 0.683, is positive, meaning that the variables X2 and Y move in the same direction, meaning that when the sorting of vegetables and fruits (X2) increases by 1%, the amount of remaining vegetables and fruits (Y) will increase by 0.683;
4. The overstock regression coefficient (X3), of 0.645, is positive, meaning that the variables X3 and Y move in the same direction, meaning that when overstock (X3) increases by 1%, the amount of remaining vegetables and fruits (Y) will increase by 0.645;
5. The regression coefficient of vegetable and fruit quality (X4), of 0.345 is positive, meaning that the variables X4 and Y move in the same direction, meaning that when the quality of vegetables and fruits (X4), increases by 1%, the amount of remaining vegetables and fruits (Y) will increase by 0.345;

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- The regression coefficient of labor quality (X5), of 0.280 is positive, meaning that the variables X5 and Y move in the same direction, meaning that when the quality of labor (X5) increases by 1%, the amount of remaining vegetables and fruits (Y) will increase by 0.280;
- The regression coefficient of vegetable and fruit sales (X6) of -0.512 is negative, meaning that the variables X6 and Y move in opposite directions, meaning that when sales of vegetables and fruits (X6) increase by 1%, the amount of vegetable and fruit waste (Y) will decrease by 0.512.

### F Test Results

**Table 12. F Test Results**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	923.404	6	153.901	36.573	.000 <sup>b</sup>
	Residual	391.346	93	4.208		
	Total	1314.750	99			
a. Dependent Variable: the amount of residual vegetable & fruit products						
b. Predictors: (Constant), sale of vegetables and fruits, procurement of vegetables and fruits, quality of vegetables and fruits, sorting of vegetables and fruits, overstock, labor quality						

**Source:** SPSS Data Analysis, 2023

The f test is used to see the effect given by all independent variables together on the dependent variable. Determining the decision of the f test when the calculation > f table and the significance of < 0.05, the independent variable is used together to affect the dependent variable. The F value of the table is determined by means of  $\alpha=0.05=0.025$ ,  $df = n-k$ , where n number of samples and k number of all variables are used, so that the F value of the table is obtained. As per the spss output above, it shows the calculated f value (36.573) > f table (2.20) and the sig significance value.  $0.00 < 0.05$ . It was concluded that all independent variables namely the procurement of vegetables and fruits (X1), sorting of vegetables and fruits (X2), overstock (X3), quality of vegetables and fruits (X4), quality of labor (X5), sales of vegetables and fruits (X6) simultaneously affect the number of vegetable and fruit residues (X6). Based on, the hypothesis that has been determined is H1 Procurement of vegetables and fruits, sorting of vegetables and fruits, overstock, Quality of vegetables and fruits, quality of labor and sales of vegetables and fruits together affect the amount of vegetable and fruit waste received.

### V. CONCLUSION

- The main properties or characteristics of agricultural products are perishable or perishable. PT. X has determined the quality standards of vegetables and fruits they will sell to consumers such as shape, color, size and shelf life. Vegetable and fruit quality standards are made to meet customer needs so that customers are satisfied with vegetable and fruit products from PT.X. However, with predetermined standards, there are still remaining vegetable and fruit products amounting to 123907.13 Kg with a rupiah value of 1,576,082,428 for 4 months.
- Based on the results of the study, factors that affect the amount of vegetable and fruit waste at PT. X is the variables of vegetable and fruit procurement, vegetable and fruit sorting, overstock, quality of vegetables and fruit, labor quality and sales of vegetables and fruits together influential. Then, partially the variables of vegetable and fruit procurement, vegetable and fruit sorting, overstock, vegetable quality and labor quality have a positive and significant effect. However, the variable sales of vegetables and fruits partially had a negative and significant effect on the amount of vegetable and fruit waste.

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