FACILITY PLANNING AND ALTERNATIVE SELECTION FOR FINISH PRODUCT STORAGE (CASE STUDY: PT. UNILEVER INDONESIA TBK.)

FINAL PROJECT

Proposed to Fulfill
Engineering Bachelor Degree Requirement
At
Undergraduate Program of Industrial Engineering
Faculty of Industrial Technology
Sepuluh Nopember Institute of Technology

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Abstract

PT UNILEVER INDONESIA Tbk, one of the best companies in Indonesia, is a company that produces daily needs products, especially in nutrient, hygiene, and personal care. Their products spread all over Indonesia with the highest market share for most of its products. Plant SCC & C (Spread Cooking Category and Culinary) is one of the factories that they privately owned. It produce margarine based products and culinary seasonings.

The main concern in this research is about facility planning for finish product storage. By predicting the amount of the product that need to be kept, and then calculating the needs of facility and comparing it with the existing condition of the warehouse. The gaps are collected and improved. This improvement then involving the available alternative in finish product storage and selecting the best alternative based on cost and company's perspective.

Some aspects and parameters observed in this research shows that the existing condition facility need to be improved. Some aspects observed are storage space, material handling equipment and labor. From the field observation, it can be concluded that there is lacks of storage space in the finish product warehouse. The needs of storage is 3290 storage slots for three years ahead, and the existing facility only have 2000 storage slots, it means that the gap is 1290 storage slots. And then, after calculating the rate of incoming inventory for three years ahead and simulating it with ARENA, the needs for material handling equipments for facility adjustment alternative in year 2008 is 4 reach truck and 2 forklift, in year 2009 is 4 reach truck and 2 forklift, in year 2010 is 5 reach truck and 2 forklift. The needs for material handling equipments for lease public warehouse alternative in year 2008 is 3 reach truck and 2 forklift, in year 2009 is 3 reach truck and 2 forklift, in

year 2010 is 4 reach truck and 2 forklift. Special for lease public warehouse alternative, the material handling equipment need to be add with 1 forklift and 1 wings truck for certain period (following the lease warehouse period). In 2008 the period lies from July to September, in 2009 the period lies from May until September, in 2010 the period lies from April until September. The number of labors needed will precisely the same with number of material handling equipment of the chosen alternative. And from the alternative selection, the value of benefit / cost ratio for facility adjustment is 1.043 and 0.955 for the lease public warehouse alternative. So, based on the value of benefit / cost ratio, the best alternative is the facility adjustment.

Key words: facility planning, finish product warehouse, alternative selection

PREFACE

This final project research is carry out in order to fulfill engineering bachelor degree requirement in Industrial Engineering Department, Faculty of Industrial Technology, Sepuluh Nopember Institute of Technology, Surabaya.

In this occasion, nothing more appropriate than gratitude to Allah SWT for his permission and generosity that allow me to finish this final project research.

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13. And with sincere respect for other colleagues that already help this final project research but have not mentioned in this salutation.

This research hopefully could also valuable for others, especially in the name of academic literacy enlargement.

Surabaya, 1 January 2008

Writer

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CHAPTER I
INTRODUCTION

This chapter will define backgrounds of the final project research in PT. Unilever Indonesia Tbk. Besides the background of the research, goals and advantages to be achieved also defined. So does with the scope of the research.

1.1 Background

Good production system is a system that always maintains its inventory to the minimum possible value. Minimum inventory is the dream of many companies so that they could operate efficiently. But at some companies, small inventories are something that really hard to be reach because of one or another constraint. Warehouse as a facility that store inventories, is a non value added facility. But its appearance is something that really helpful for the company. Any problems that affect the warehouse could affect another division within the company. And in contrary, its great performance could push company's productivity.

PT Unilever Indonesia Tbk, one of the best companies in Indonesia, is a company that produces daily needs products, especially in nutrient, hygiene, and personal care. Their products spread all over Indonesia with the highest market share for most of its products. Plant SCC & C (Spread Cooking Category and Culinary) is one the factory that they privately owned. It produce margarine based products and culinary seasonings.

Currently, this factory has problems with their finish product storage facility. Their available storage facility and material handling equipment seems not capable to store and manage the amount of products produced by the production department. Many products damaged and its aisles filled with products, resulting in traffic within the warehouse. This condition could happen because of any reason. But the facility of the

warehouse, especially the three main resources of it, should be the priority in the problem analysis and improvement project.

Based on the reason above, the main concern in this research is focused in facility planning for finish product storage. By predicting the amount of the product that needs to be kept and comparing it with the existing condition of the warehouse, the gaps are collected and improved. This improvement then involving the available alternative in finish product storage and select the best alternative based on cost and company's preferences.

1.2 Problem Identification

Problem that will be solved in this final project research is the planning for finish product storage facility and choosing the best alternative between adding facility or use a public warehouse.

1.3 Goal of Research

Goals of the research that have to be achieved are:

1. Give recommendation to the company related with finish product storage facilities
2. Select the best alternative for finish product storage based on cost and company's preferences

1.4 Advantage of Research

Advantages of research that might be achieved are:

1. Company can have a proper facility related to its finish product storage
2. Company can have a recommendation for choosing the best alternative for finish product storage based on cost and company's preferences

1.5 Scope of Research

The boundaries of the research are:

1. Research only held at Finish Product Store of Plant SCC&C, PT. Unilever Indonesia Tbk.
2. Research not considering changes in warehouse management system and technology.

Assumptions used in this research are:

1. The value of interest in present value calculation is 9 % per year
2. The value of inflation will be 6.5 % for three years ahead
3. There is no strategic changes from the company related with this final project research

CHAPTER II
LITERATURE REVIEW

This chapter will mention the literatures that have relevancies with this final project research. Literatures that exist below will act as guidance within this research to solve the problems that mentioned before.

2.1 Warehouse

Definition of a warehouse is a facility that utilized to store materials or products. Generally, manufacturers have some constraints that not allow them to have a pure zero inventories. Even though the company already has efficient supply chains, for some reason, inventories will still be needed by the company.

Although it seems that warehouse is only a place to store products, in beneath, warehouse has a lot more functionalities, which is (Kulwiec, 1980):

1. Provide temporary storage of goods
2. Put together customer orders
3. Serve as a customer service facility
4. Protect goods
5. Segregate hazardous and contaminated materials
6. Perform value added service
7. Inventory

With the increase of complexity in supply chains, warehouses were developed into several types of warehouse with its own characteristic and objective. Types of warehouse that play vital role in the supply chain (Frazelle, 2001):

1. Raw material and component warehouse
2. Work in process warehouse
3. Finished goods warehouse
4. Distribution warehouse and distribution center
5. Fulfillment warehouse and fulfillment center
6. Local warehouse
7. Value added service warehouse

In common, warehouse operations have fundamental set of activities. The functions may be defined as follows (Frazelle, 2001):

1. Receiving
2. Prepackaging
3. Put away
4. Storage
5. Order picking
6. Packaging
7. Sortation
8. Unitizing and Shipping

Warehouse plays a critical role in supporting company's supply chain success. The main mission of a warehouse is to effectively ship product in any configuration to the next step of the supply chain, without damaging or altering the product's basic form. If the warehouse cannot process orders quickly, effectively, and accurately, then company's supply chains will be suffered. Tompkins et al (2003) identify opportunities within warehouse activities in order to increase its performance. The opportunities are:

1. Improving order picking operations
2. Utilizing cross docking
3. Increasing productivity (labor, space, and equipment)
4. Utilizing space
5. Increasing value added service

2.2 Facility Planning

Facility planning will determine how activities within the entire facilities arranged so that the facilities could support company's objective effectively and efficiently (Wignjosoebroto, 1996).

Figure 2.1 Scope of facility planning (Wignjosoebroto, 1996)

2.3 Warehouse Facility Planning

Warehouse facility planning is a facility planning activity within the warehouse. The design framework in warehouse design are as follow (Hassan, 2002):

1. Specifying the type and purpose of the warehouse
2. Forecasting and analysis of expected demand
3. Establishing operating policies
4. Determining inventory levels
5. Class formation
6. Departmentalization and the general lay out
7. Storage partition
8. Design of material handling, storage and sortation systems
9. Design of aisles
10. Determining space requirements
11. Determining the number and location of I/O points
12. Determining the number and location of docks
13. Arrangement of storage
14. Zone formation

And more specific activities in designing the general layout of warehouse are divided into several steps (daonil, 2005):

1. Warehouse configuration
   This is combination of length, width, and height of the warehouse. Decision in determining above values is depend on land and construction cost, material handling cost, inventory to be kept and product stackability.
2. Space layout
   After configuration are decided, there are another problem in deciding the layout of the lanes/racks and aisles. The common problem is in deciding whether the lanes/racks are placed paralel with the longest wall or the other one.
3. Stock location
   Stock location intend to minimizes complexities and risks in the warehouse operationals. It could minimizes the material handling, maximizes the storage utilities, and fulfilling the material location prerequisites.

2.4 Forecasting

Forecasting is an approach to estimate or deal with something that contains uncertainty and related with time in the future. Forecast is a way to estimate the future value in order to increase the precision of the estimation.

The recognition that forecasting techniques operate on the data generated by historical events leads to steps that need to do in the forecasting process:

1. Data collection
   This is a phase when the proper data's are collected and confirmed that they are the correct data
2. Data reduction or condensation
   This phase is necessary since there is possibility to have too many or too little data, as well as having irrelevant data's.
3. Model building and evaluation

This is the phase where forecasting model or method is chosen, so that the forecast could produce a quality result.

4. Model extrapolation (the actual forecast)
   This is the phase where the chosen model used to produce forecasted data's.
5. Forecast evaluation
   In this phase, forecasted data's are checked and compared with the previous data's to evaluate the precision of the forecast. This will be useful when there are several alternatives to pick.

In order to choose the best method in forecasting, we need to recognize the characteristic or pattern of the data's. There are four general data pattern in time series. The patterns are as follow:

1. Trend, data's with long term component that represent the growth or decline in the time series.
2. Cyclical, data's which has wavelike fluctuation around the trend.
3. Seasonal, data's which has pattern of change that repeats itself for each period.
4. Random or stationer, data's which their basic statistical properties, such as the mean and the variance, always move constant over time.

CHAPTER III
RESEARCH METHODOLOGY

There are some phases in this final project research, which is:

1. Initial phase
2. Data collecting phase
3. Data processing phase
4. Analysis phase
5. Conclusion and suggestion phase

3.1 Initial Phase

Initial phase is a phase to collect information in order to define, identify, and formulate problem, which include some phases below:

1. Pre observation
   This phase is the first phase of research which is observes the real condition of factory. In this phase, every factor that influence finish product store facility will be analyzed, in order to make a quality research method.
2. Problem identification
   Main activity in this phase is identifying the problem happened in the field. Real condition compared with ideal condition, thus gap between real and ideal condition can be found.
3. Literature review
   This phase is the phase to make some review that relevant with the identified problem. Theories that become the point of reference are warehouse facility planning, forecasting, aggregate planning, net present value, and analytical hierarchy process.
4. Field review
   In this phase, real problems in the field are observed. The observation includes the processes within the finish product store, condition of finish product store facility, and feasible alternatives.

3.2 Data Collecting Phase

This phase is continuing the process that already done in the previous phase. Data obtained on several ways, using company's data, by questionnaires, by interviews, and direct measurement.

Data obtained from company's data:

- Active Stock Keeping Units (SKUs)
- Historical demand
- Current facility of finish product store

Data obtained by questionnaires:

- Identification of finish product store current condition
- Criteria that need to be considered on alternative selection

Data obtained by interviews:

- Condition and problem within the finish product storage
- Time horizon of planning
- Method in planning the production quantity and time

Data obtained by direct measurement:

- Products dimension
- Pallet dimension
- Activities time for simulation

3.3 Data Processing Phase

In this phase, the obtained data will be processed qualitatively and quantitatively based on the literatures. Next, the data's will be used in the process of improvement generation. This part consists of several steps:

- Warehouse facility planning

  In this step, facilities are planned so it can operate effectively and efficiently. It involves the storage calculation, storage design, equipment planning, and layout design. In this case, the underlined thing is: good warehouse facility is a facility that can operate effectively for the main activity of the warehouse and maximize its utilization and efficiency.

- Net present value
  This step calculates numbers of cash flow involved and brings them to their present value so it can be compared with each other.
- Alternative selection
  This step calculates criteria that have effect on the decision making and give a suggestion based on the calculation.

3.4 Analysis Phase

In this phase, after all data has been processed, the results are analyzed for some critical factors that have relevancies with the problems and the alternative selection.

3.5 Conclusion and Suggestion

The research last phase are taking conclusions and give suggestions as a result of the research. Conclusion taken is the answer of the existing problem. Besides that, some suggestion will be given as a feedback related with the research.

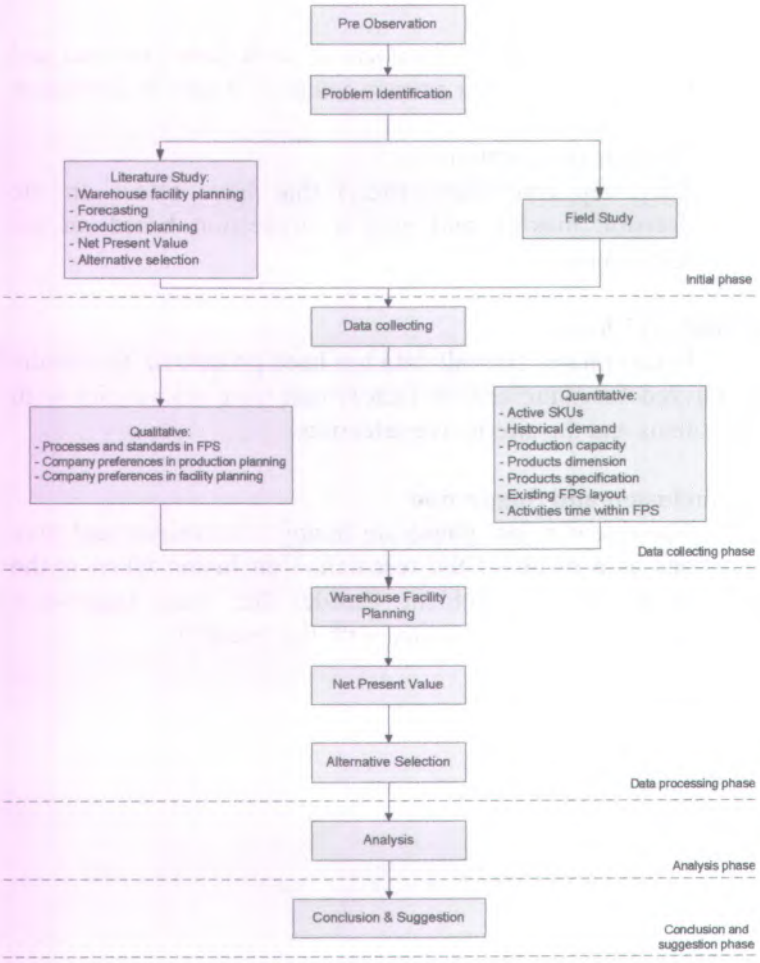


Figure 3.1 Research Methodology

2.5 Aggregate Planning

Aggregate planning is an operational activity that plan an aggregate production based on demand and production capacity. On this level of production plan, item to be planned are product families rather than the specific product.

Aggregate planning could give a recommendation to the management about the effective and efficient production plan. But the main objective of the aggregate planning is to make a production plan which effectively use the production capacity to fulfill the production demand.

2.6 Material Classification (Slotting Decision Tree)

Frazelle compose a hierarchy in material clustering in order to decide the layout and the placement of materials within the warehouse. The hierarchies are as follow:

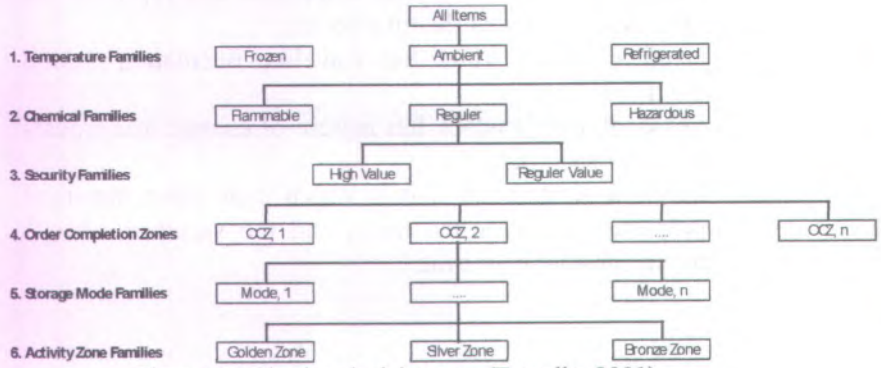


Figure 2.2 Slotting decision tree (Frazelle, 2001)

2.7 Storage Policy

Five main storage policies govern the storage of incoming items in a warehouse. They are:

1. Random storage policy

   This is the simplest storage policy where items can be stored at any available location within the warehouse. Theoretically, every location has the same probability to

be stored, but in practice, operators often pick the closest location. That's why many experts says that there is no pure random storage policy.

2. Dedicated storage policy
   In this policy, each item has a specific location for storage. Even if the location is empty, other items cannot be stored. That's why, in general, dedicated storage policy result to a bigger number of storage needs.
3. Cube per order index storage policy
   This policy based on the ratio of the item's storage space requirement (the cube) to the number of S/R transactions of that item.
4. Class based storage policy
   This policy based on Pareto's law. In this policy, products are categorized into three classes: A, B and C. Class A is fast moving items that responsible for 80% of the total of the S/R activities. This class has members in about 20% of the SKUs. The second one is Class B. This is medium moving items that take account of 15% from total of S/R activities and has members in about 30% of the items stored in the warehouse. The last one is Class C or slow moving item class. This class has the most member (50%) but only responsible for 5% of the total S/R activities.
5. Shared storage policy
   This policy falls between two extreme storage policy above (random and dedicated storage policy). As in the random storage policies, the same storage space may hold different items over time. However, the allocation of items to storage spaces is not random. Fast moving item are stored near the I/O point and in reverse for slow moving items. This policy could increase system throughput and improve space utilization.

2.8 Storage Operations

The objective of storage and warehousing functions is either to maximize resource utilization while satisfying customer requirements or to maximize customer satisfaction subjected to a resource constraint. In this case, storage and warehousing resources are space, equipment, and personnel (labor).

Customer requirements for storage and warehousing functions are to be able to obtain the desired goods quickly and in good condition. Therefore, in designing storage and warehousing systems, it is desireable to maximize:

- Space utilization
- Equipment utilization
- Labor utilization
- Material accessibility
- Material protection

2.9 Storage Media

For storing items, various accessories are available. Almost all storage will utilize one or more of these to develop an orderly storage facility:

1. Bins
2. Shelves
3. Racks
4. Stacking
5. Conveyor storage
6. Yard storage

The purpose of storage racks is to facilitate storage and retrieval of loads in the warehouse. Different types of racks are available in the market. The decision depends on the company needs. Below is the description of each product (Heragu, 1997):

- Stacking frames
- Cantilever racks
- Selective racks
- Flow racks

- Racks for Automated Storage and Retrieval Systems (AS/RS)

2.10 Configuring Selective rack

In configuring selective rack, there are several items that need to be considered. Those items are:

- Pallet & load

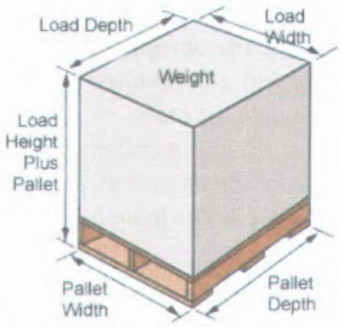


Figure 2.3 Dimension of load and pallet

1. Determine the depth and width of the pallet
2. Determine the load depth, load width, load height and weight of the largest load

- Depth

3. Determine the front to back depth of the uprights
   Subtract 6" from the value of pallet depth

- Beam width & capacity

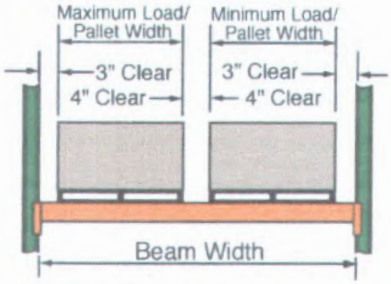


Figure 2.4 Beam width calculations

4. Determine the beam width (assumes 2 pallets/beam)
   Multiply load width with 2 and then add it with 12 inch. If required, round it up higher as additional allowance
5. Check the beam capacity
   Ensure the specified beam could carry the load (add some allowance from the maximum load weight)

- Up right height
  6. Determine the upright height
     - *Multiply the number of pallets high stored minus one with 10 inch.*
     - *Multiply the number of pallets high stored minus one by the maximum load height (include pallet)*
     - *Add the value from both calculations above*

2.11 Material Handling Equipment in a Warehouse

Materials moves within the warehouse following activities beneath it. The frequency of the movement will influence the selection of material handling equipment.

There is an enormous variety of configurations and options available for the modern lift truck going far beyond weight capacity and lift height. The most common types are as follow:

1. Standard forklift
2. Reach truck
3. Motorized pallet truck
4. Order selector
5. Swing mast and turret truck

2.12 Aisles in a Warehouse

The primary constraints to aisle width are the type of lift trucks used and the characteristics of the loads being handled. Since it is really hard to significantly change the characteristics of the loads being handled, then the aisle width decision is actually a material handling equipment decision.

Types of aisle in warehouse:

1. Wide Aisle, this type of aisle has width more than 11" or 12". This aisle commonly use for forklift or material handling equipment that has 48" deep of loads.
2. Narrow Aisle, this type of aisle has width between 8" to 10". This aisle primarily the domain for stand up reach and double deep reach trucks.
3. Very Narrow Aisle, this type of aisle has width less than 6". To operate in this type of aisle, needed a specific type of material handling equipment that could turn only the materials and not the whole body of the material handling equipment.

2.13 Storage Alternative

In warehousing, there are several alternative to store the products. In general, there are private warehouse and public warehouse. Each option has their advantages. The advantages of private warehouse are better control, lower costs (if utilization are high in most of the time), and future advantages especially in property ownership. And the advantages of public warehouse are flexibility and higher utilization for the facility (especially for seasonal inventory).

2.14 Costs in Warehousing

Costs within the warehouse are divided into three main categories:

1. Handling cost
   Handling costs are costs that related with physical movement of materials within the warehouse. These include direct labor cost, equipment cost, maintenance cost, and depreciation.
2. Storage cost
   Storage costs are costs that related with the physical safekeeping of the materials within the warehouse. These include direct labor cost, occupancy cost, utilities cost, facility maintenance cost, tax, insurance, and depreciation cost.
3. Clerical cost
   Clerical costs are costs that related with the support of storage and handling service provided. These include office staff, data processing, paperwork and communication.

2.15 Simulation in Warehousing

Simulation is a descriptive tool and not a prescriptive tool. It can be used to evaluate the system performance but cannot generate optimal solution. Though, this is still a popular tool in evaluating system performance.

The use of simulation is increasing these days. These phenomena could happen for several possible reasons:

1. Problems are more complex and dynamic, so the use of analytic solution is not satisfying
2. Simulation easy to understand
3. Simulation could develop several result in a shorter time compared with analytical method
4. Simulation could provide both transient and steady state analysis

2.16 Net Present Value (NPV)

Net present value (NPV) definition is a value of a project which acquired based on the difference between gained revenue/cash flow with investment made. Joesron (2001) said that proper NPV is the one with positive value. It means that the value of cash flow received is bigger than the investment made.

The principle of NPV is bringing all the values, whether it is an expense or revenue, to its present value, and then subtracting the revenues with the expenses (present value).

$$\text{NPV} = \sum_{t=0}^{n} \frac{(C)t}{(1+i)^{t}} \quad \sum_{t=0}^{n} \frac{(Co)t}{(1+i)^{t}}$$

Where,

NPV	= Net Present Value
(C)t	= Cash in in year-t.
(Co)t	= Cash out in year-t.
n	= Time horizon
I	= R*ate of return*
T	= Time

2.17 Analytical Hierarchy Process (AHP)

Analytical hierarchy process (AHP) that developed by Saaty (1980) is a structural hierarchy model that really helpful in the decision making process. The main advantage of this method placed on the capability to solve problem with qualitative data which usually hard to be assessed. But although it was usually used to process qualitative data, this method also could accommodate quantitative data problem, or even both (Novirsal et al, 2006). There are several steps in AHP, which is:

1. Hierarchy development
2. Pair-wise comparison
3. Inconsistency check
4. Evaluation

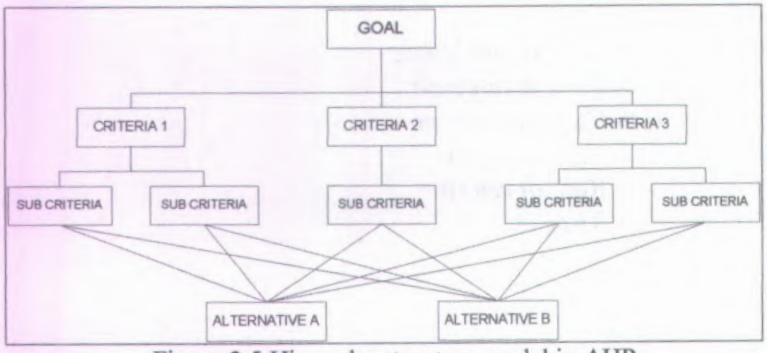


Figure 2.5 Hierarchy structure model in AHP
Source: Saaty (1980)

CHAPTER IV
DATA COLLECTING AND PROCESSING

The following phase of this research is the realization of the research itself. First activity in this chapter is collecting necessary data by using questionnaire, interview, field observation and recapping company's data. Then, the collected data will be processed within this chapter in order to fulfill the necessities for the decision making process.

4.1 Data Collecting

4.1.1 Finish Product Store in Plant SCC&C

Finish Product Store in Plant SCC&C is an internal division of Production Department. It usually called as Back of Factory Storage because of its functionality to store products that just produced by the production department and waiting for "release" status from Quality Control Department. That is why in this warehouse there is not much activities involved. The activities are:

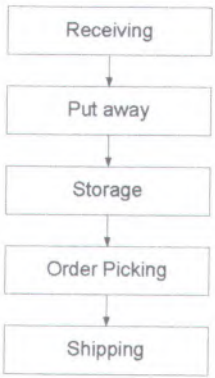


Figure 4.1 Activities in the Finish Product Store

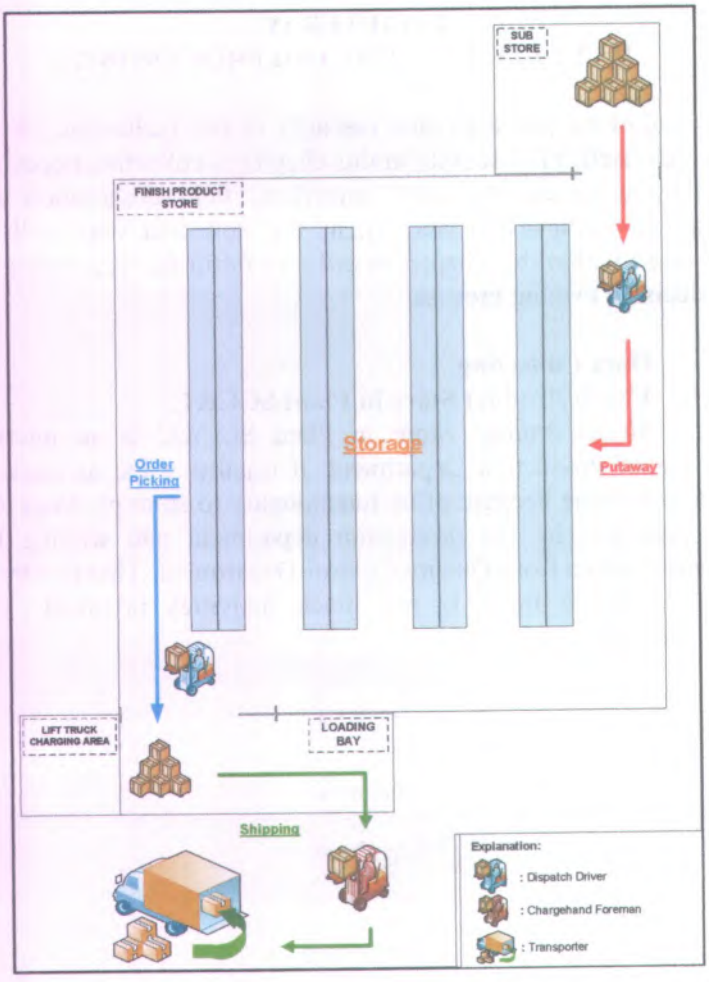


Figure 4.2 Rich picture of the activities within the Finish Product Store

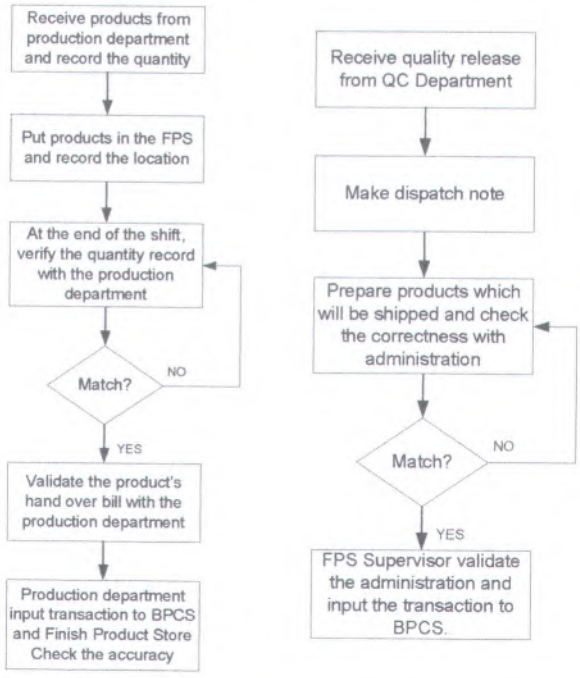


Figure 4.3 Flowchart for receiving and shipping in the finish products store

Finish Product Store (FPS) leads by 1 Finish Product Store Supervisor and helped by 1 Dispatch Clerk (DC), 2 Dispatch Driver (DD) and 1 Charge hand Foreman (CF) for each shift. Each position has specific job, which is:

1. Finish Product Store Supervisor
   Supervising activities in the Finish Product Store and responsible for all incident within it.
2. Dispatch Clerk
   Receive product demand from depot or CDC, inform the dispatch to Dispatch Driver, check the quantity and quality of products that have been prepared by Dispatch

Driver with the order, and release dispatch note to be approved by FPS Supervisor.

3. Dispatch Driver
   a. Receive products from production department, store it to the proper storage facility, and record the placement.
   b. Receive dispatch information from Dispatch Clerk, prepare the products to the loading bay and based on FIFO policy.
4. Charge hand Foreman
   Arrange products from loading bay to the transporter.

4.1.2 Warehouse Facility

Finish Product Store in Plant SCC&C has total space up to 2160 m^2 with 60 m length and 36 m width and height up to 8 m (layout are attached in appendix).

Currently, company already use racks for the storage media. There are 2000 of storage slot that lie in the selective pallet racks within the warehouse.

For material handling equipment, the company uses two kind of equipment, which are 2 reach trucks and 1 forklift. The reach truck is used for indoor utilization and forklift for outdoors.

Figure 4.4 Reach truck (left) and forklift (right)

4.1.3 Products Specification

Product specification is all the products character that has relevancies with its storage behavior. The specifications collected are data which specially related to finish product storage facility. The specifications are attached.

4.2 Data Processing

4.2.1 Problem analysis

Based on the existing condition, interview and literatures, the problem within this warehouse are as follow:

1. Numbers of damaged product
2. FIFO system implementation not done properly
3. Production stopped because of there is no space left in the packing hall
4. Traffic jam in the warehouse

From the above facts, and the interview with the company members, then it could be compiled that the problems are:

1. In the peak season, products to be stored has bigger amount compared with available storage facility and force the operator to put products not in the proper storage media.
2. Products that have no storage space are stacked and result in the damage of the product.
3. Products that putted within the aisle obstruct the other products to be picked, even when it is already the timing for its delivery.
4. Products that take other's space for its storage disturb the activity within the factory, and in the end will affect the production division.
5. Lacks of the material handling facility makes queue within the factory.

4.2.2 Forecasting

There are several types of demand that used within the company. In this case, demand data that collected are production demand. This is a demand that made by production planner and used by production department as a production guide. Historical production demands that still be able to collect are the previous three years production demand (2005 – 2007). The data are monthly production demand and specified in fibs for each active SKU. Complete data of historical production demand could be seen in the appendix section.

Table 4.1 Product family and its data characteristic

No	Product Family	Data Characteristic
1	Blue Band Retail	Seasonal with trend
2	Blue Band Food Solution	Seasonal with trend
3	Culinary Retail	Seasonal with trend
4	Culinary Food Solution	Trend
5	Ice Tea	Stationer

Based on the data analysis result, the literatures, and the error value, then the forecast method that used are as follow:

Table 4.2 Product family and its forecasting method

No	Product Family	Forecasting Method
1	Blue Band Retail	Decompotition
2	Blue Band Food Solution	Decompotition
3	Culinary Retail	Winter's
4	Culinary Food Solution	Linear
5	Sariwangi Powder (Ice Tea)	Random

From the above method, results of the forecast is attached in the appendix.

4.2.3 Aggregate Planning

Aggregate planning that used in this research is based on the method that company usually use, which is spreadsheet method with mix strategy. The goal is to minimize the inventory without losing any sales. The result of the aggregate planning is attached in the appendix.

4.2.4 Product Classification

Products are classified to minimize the material handling, so that operational of the warehouse could be more efficient. The classification based on the average demand of the company. The classification are attached in the appendix.

4.2.5 Storage Need Calculation

Based on the product classification, each class has their own storage location. By using production plan for year 2010, storage needs are count for each product. And then, each class is aggregated. The maximum number for one year period of each aggregated storage needs, used as the needs of the storage for each class. By adding those numbers, we could have the number of storage needs.

The storage need for class A is 2417, the storage need for class B is 739, and the storage need for class C is 135. Total storage needs are 3290 storage slots, and compared with the existing facility, the existing number of storages facility is 1290 slots less than the necessary. More detailed information is attached in appendix.

4.2.6 Storage Facility

4.2.6.1 Dimension of Storage Facility

Storage facility that most suitable for the products is selective pallet rack. The design of the selective pallet rack is following these steps:

1. Pallet and load dimension

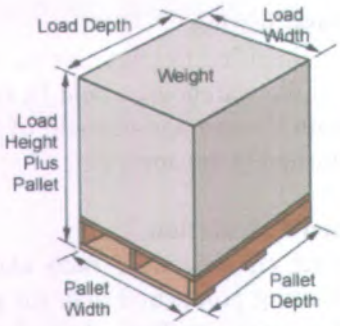


Figure 4.5 Pallet and load illustration

- Determine the pallet depth and width
  Pallet depth = 120 cm
  Pallet width = 100 cm
- Determine the load depth, width, load height and weight of the largest load.
  Max load depth = following pallet's
  Max load width = following pallet's
  Max load height (include pallet) = 122.5 cm
  Max weight load = 906.2 kg

2. Depth
   - Depth = Load depth – 15 cm
     = 120 cm – 15 cm
     = 105 cm

3. Beam width and capacity
   - Determine number of load above beam
     Number of load per beam = 2 load
   - Beam width
     = (Load width x 2) +10 cm + 7.5 cm + 7.5 cm
     = (100 cm x 2) + 25 cm
     = 225 cm
   - Capacity
     Capacity checked using SAP 2000 based on the maximum load of the products

4. Upright height
   - A = (number of pallet to stack – 1) x 25 cm
     A = (5 – 1) x 25 cm
     A = 100 cm

   - B = (number of pallet to stack – 1) x load height
     B = (5 – 1) x 122.5 cm
     B = 490 cm

   - Upright height = A + B
     = 100 cm + 490 cm = 590 cm

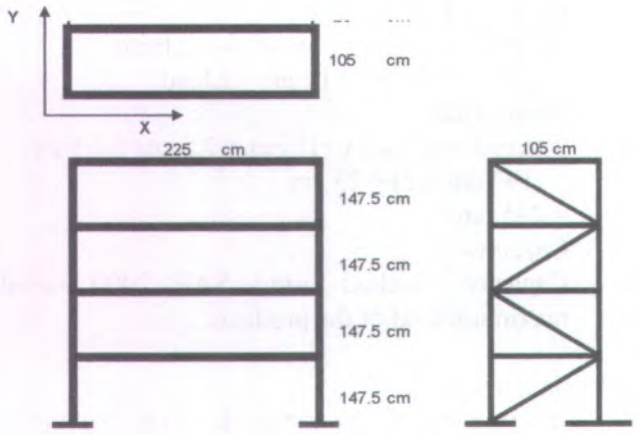


Figure 4.6 Rack Dimension

4.2.6.2 Storage Construction Analysis

The chosen storage type is selective pallet rack. This is a steel base construction and composed by several parts of profiled steel. To make sure that the construction is safe enough for products and humans, then the construction analysis need to be done. The analyses are as follow:

Maximum load	= 906.2 kg ~ 1000 kg
Selective pallet rack	= 2 pallet per rack
Rack load	= 1000 kg x 2 = 2000 kg
Allowance	= 300 kg

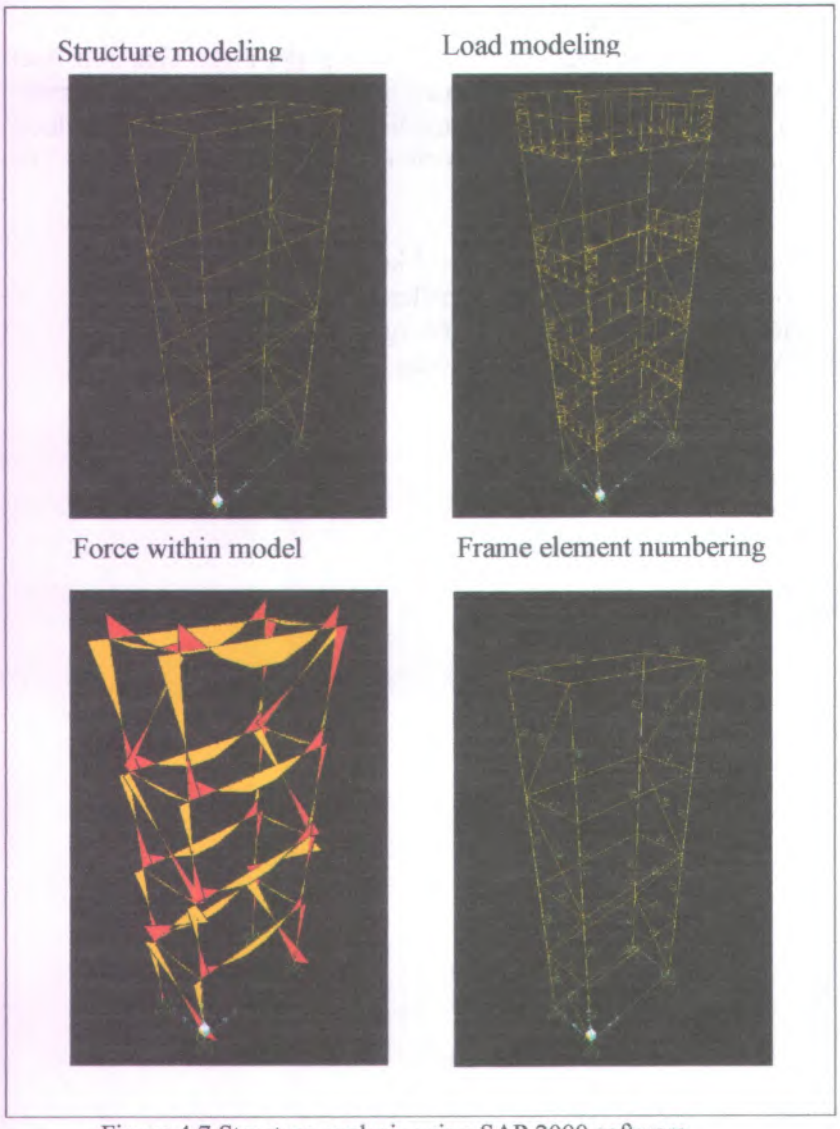


Figure 4.7 Structure analysis using SAP 2000 software

From the SAP 2000 output and based on steel chart, the specifications of the steel are as follow:

Table 4.3 Structure specification of storage media

	Beam width 100x100x10	Beam depth 100x100x10	Upright frame 175x175x12	Diagonal brace 90x90x10
Length (m)	2.25	1.05	5.9	1.81
Number of shaft per rack	8	8	4	8
Total length per rack (m)	18	8.4	23.6	14.48
Weight/m	14.9	14.9	31.8	13.3
Total weight per rack (kg)	268.2	125.16	750.48	192.584

4.2.6.3 Cost Calculation for Storage Media

In order to use the facility, the cost involved is not only the procurement cost but also the installation cost. Especially for structural type of media which will costly for the installation.

Table 4.4 Cost calculation for each work in storage media

NO	EXPLANATION	COEFF.	UNIT	PRICE PER UNIT	SUM
1	2	3	4	5	6 = (3 X 5)
	BOLT INSTALATION				
	Material				
	Bolt 16 d	1.0000	pcs	4,000.00	4,000.00
					4,000.00
	Labor cost	1.0000	ls	500.00	500.00
					500.00
				Total	**4,500.00**
				Overall	**4,500.00**
	PROFILED STEEL INSTALATION				
	Material				
	Profiled Steel	1.0000	Kg	15,000.00	15,000.00
					15,000.00
	Labor cost	1.0000	ls	2,000.00	2,000.00
					2,000.00
				Total	**17,000.00**
				Overall	**17,000.00**
	SYNCROMATE PAINTING PER M2				
	Material				
	Cyncromate paint	0.2500	Kg	6,000.00	1,500.00
	Labor				**1,500.00**
	Direct labor	0.0630	man/hr	35,000.00	2,205.00
	Supervisor	0.0025	man/hr	54,600.00	136.50
					2,341.50
				Total	**3,841.50**
	GLOSSY PAINTING PER M2				
	Material				
	GLOSSY PAINTING PER M2	0.2500	Kg	12,000.00	3,000.00
	Labor				**3,000.00**
	Direct labor	0.0630	man/hr	35,000.00	2,205.00
	Supervisor	0.0025	man/hr	54,600.00	136.50
					2,341.50
				Total	**5,341.50**

Number of racks to procure: 132 racks.

Table 4.5 Total cost calculation for storage media

No.	Job Description	Unit	Vol.	Price per Unit	Total
1	Beam width (Profiled steel 100.100.10)	Kg	35,402.40	17,000.00	601,840,800.00
2	Beam depth (Profiled steel 100.100.10)	Kg	16,521.12	17,000.00	280,659,040.00
3	Upright frame (Profiled steel 175.175.12)	Kg	99,063.36	17,000.00	1,684,077,120.00
4	Diagonal brace (Profiled steel 90.90.10)	Kg	25,421.09	17,000.00	432,158,496.00
5	Bolt joint (16 d)	pcs	10,560.00	4,500.00	47,520,000.00
6	Syncromate painting	m2	10,638.14	3,841.50	40,866,430.18
7	Glossy painting	m2	10,638.14	5,341.50	56,823,846.18
				Total	3,144,145,532.35

From above calculation, it can be known that the total investment for procuring and installing the storage facility is up to IDR. 3,144,145,532.35

These facilities are designed with 10 year economic lifetime.
By using steel's used price in the market as point of reference, then the depreciation rate can be calculated.

Price for used steel = IDR 3,300 per kg
Total weight of the steel = 176,408 kg

Value of the product that still remains in the end of the lifetime = IDR 582,146,294

The depreciation then:

$$D_t = \frac{P - S}{N}$$

$$D_t = \frac{3,144,145,532.35 - 582,146,294}{10}$$

Dt = IDR 256,199,924 per year

4.2.7 Material Handling Facility

By using simulation, the queuing problems could be analyzed and adjusted easily. In this research, simulation software will simulate processes within the warehouse for several scenarios related to the calculation of material handling equipment needs. The scenarios are as follow:

1. Using only private warehouse for 2008
2. Using both private and public warehouse for 2008
3. Using only private warehouse for 2009
4. Using both private and public warehouse for 2009
5. Using only private warehouse for 2010
6. Using both private and public warehouse for 2010

For each scenario, queues are analyzed and then the number of material handling equipment is adjusted until there is no queue left in the simulation. Based on the simulation, it can be figured out that in order to avoid products queue, the number of material handling equipments needed are as follow:

Table 4.6 Material handling equipment needed by the company (facility adjustment alternative)

Transporter	2008	2009	2010
Reach Truck	4	4	5
Forklift	2	2	2

Above numbers, compared with the existing facility, resulting in gaps that company needs to adjust:

Table 4.7 Material handling equipment that company needs to lease (facility adjustment alternative)

Transporter	2008	2009	2010
Reach Truck	2	2	3
Forklift	1	1	1

4.2.8 Space Layout and Configuration

After storage media and material handling equipment decided, then the last thing to do is compiling it with the space available that existed so that it could make an effective and efficient warehouse. The layout is attached in the appendix.

4.2.9 Cost Calculation for Facilities

Storage cost:

- Racks procurement
  Based on the calculation above, cost for procuring racks are: IDR 3,144,145,532 and the payment is in present

- Racks Depreciation
  Dt = IDR 256,199,924 per year

- Remaining value in the 3rd year
  = IDR 3,144,145,532 – [3 x (IDR 256,199,924)]
  = IDR 2,375,545,760

  P = F (P/F, 0.75%, 36)
  = IDR 1,815,154,515

Because of the racks procurement is an expense and this value is an asset, then it should be an opponent value. And since the objective of this calculation is to calculate the cost, then this value will be a negative.

Storage cost
= IDR 3,144,145,532 – IDR 1,815,154,515
= IDR 1,328,991,017

Material handling cost:
Base on the company's data:
Leasing reach truck = IDR 7,700,000 per month
Leasing forklift = IDR 5,000,000 per month.
Yearly price incremental is 8% for material handling equipment.

Table 4.8 Material handling equipment cost
(facility adjustment alternative)

Transporter	Factor	2008	2009	2010
Reach truck	8%	7,700,000	8,316,000	8,981,280
Forklift	8%	5,000,000	5,400,000	5,832,000
Total		20,400,000	22,032,000	32,775,840

P = A (P/A, i%, N)
P 2008 = 20,400,000 (P/A, 0.75%, 12) = IDR 233,269,920
P 2009 = 22,032,000 (P/A, 0.75%, 12) = IDR 251,931,513
P 2010 = 32,775,840 (P/A, 0.75%, 12) = IDR 374,785,175

P = F (P/F, i%, N)
P = P2008 + P2009 (P/F, 0.75%, 12) + P2010 (P/F, 0.75%, 24)
. = IDR 776,831,159

Labor cost:

- Labor included here are direct labors. In warehouse, direct labors are material handling operators.
- Direct labors are paid using Jakarta's minimum rate of salary plus allowance. The minimum rate of salary for Jakarta is IDR 882,000. And with allowance the salary is IDR 1,000,000.

Table 4.9 Direct labor cost (facility adjustment alternative)

Labor	Inflation	2008	2009	2010
Direct Labor	6.5 %	1,000,000	1,065,000	1,134,225
Total		3,000,000	3,195,000	4,536,900

P = A (P/A, i%, N)
P 2008 = 3,000,000 (P/A, 0.75%, 12) = IDR 34,304,400
P 2009 = 3,195,000 (P/A, 0.75%, 12) = IDR 36,534,186
P 2010 = 4,536,900 (P/A, 0.75%, 12) = IDR 51,878,544

P = F (P/F, i%, N)
P = P2008 + P2009 (P/F, 0.75%, 12) + P2010 (P/F, 0.75%, 24)
. = IDR 111,064,039

NPV
= P Storage cost + P Material handling cost + P Labor cost
= IDR 2,216,886,215

4.2.10 Storage Alternative

Although invest for another facility is the most simple choice, there is another alternative in warehousing. It is using public warehousing.

The public warehouse that available and feasible from the company's perspective is a warehouse that owned by PT. Dynaplast at Jababeka Industrial Estate block E-9.

The rate of lease is IDR 25,000 per m^2 per month. And the warehouse itself has 3600 m^2.

Table 4.10 Material handling equipment needed by the company (lease warehouse alternative)

Transporter	2008	2009	2010
Reach Truck	3	3	4
Forklift	2	2	2

Data above, compared with existing facility, resulting in gaps that company need to react.

Table 4.11 Material handling equipment that company needs to lease (lease warehouse alternative)

Transporter	2008	2009	2010
Reach Truck	1	1	2
Forklift	1	1	1

Besides above data, the company also needs to lease another material handling facility when the period of lease came. The facilities are 1 forklift and 1 wings truck.

Table 4.12 Material handling equipment needed in the leased warehouse

Transporter	2008	2009	2010
Forklift	July until September	May until September	April until September
Wings truck			

4.2.11 Cost Calculation for Lease Public Warehouse Alternative

Storage cost:

Based on the calculation, the rate of leasing public warehouse is IDR 90,000,000.00 per month and paid monthly following the lease period.

Based on the information that the value of industrial property in Jabotabek is steady, then the value is not adjusted over year.

P = F (P/F, i%, N)

P =

90,000,000 (P/F, 0.75%,7) + 90,000,000(P/F, 0.75%,8) +
90,000,000(P/F, 0.75%,9) + 90,000,000(P/F, 0.75%,17) +
90,000,000 (P/F, 0.75%,18) + 90,000,000 (P/F, 0.75%,19) +
90,000,000 (P/F, 0.75%,20) + 90,000,000 (P/F, 0.75%,21) +
90,000,000 (P/F, 0.75%,28) + 90,000,000 (P/F, 0.75%,29) +
90,000,000 (P/F, 0.75%,30) + 90,000,000 (P/F, 0.75%,31) +
90,000,000 (P/F, 0.75%,32) + 90,000,000 (P/F, 0.75%,33)

P = IDR 1,074,789,000

Material handling cost:

Base on the company's data, material handling equipment lease price and its yearly incremental are as follow:

Table 4.13 Material handling equipment cost for the private warehouse (lease warehouse alternative)

Transporter	Factor	2008	2009	2010
Reach truck	8%	7,700,000	8,316,000	8,981,280
Forklift	8%	5,000,000	5,400,000	5,832,000
Total		12,700,000	13,716,000	23,794,560

P = A (P/A, i%, N)
P 2008 = 12,700,000 (P/A, 0.75%, 12) = IDR 145,221,960
P 2009 = 13,716,000 (P/A, 0.75%, 12) = IDR 156,839,716
P 2010 = 23,794,560 (P/A, 0.75%, 12) = IDR 272,086,034

P = F (P/F, i%, N)
P = P2008 + P2009 (P/F, 0.75%, 12) + P2010 (P/F, 0.75%, 24)
. = IDR 516,014,335

Table 4.14 Material handling equipment cost for the leased warehouse (lease warehouse alternative - only at the lease period)

Transporter	Factor	2008	2009	2010
Wings Truck	8%	27,000,000	29,160,000	31,492,800
Forklift	8%	5,000,000	5,400,000	5,832,000
Total		32,000,000	34,560,000	37,774,800

P =
32,000,000 (P/F, 0.75%,7) + 32,000,000 (P/F, 0.75%,8)+
32,000,000 (P/F, 0.75%,9) + 34,560,000 (P/F, 0.75%,17) +
34,560,000 (P/F, 0.75%,18) + 34,560,000 (P/F, 0.75%,19) +
34,560,000 (P/F, 0.75%,20) + 34,560,000 (P/F, 0.75%,21) +
37,774,800 (P/F,0.75%,28) + 37,774,800 (P/F, 0.75%,29) +
37,774,800 (P/F, 0.75%,30) + 37,774,800 (P/F, 0.75%,31) +
37,774,800 (P/F, 0.75%,32) + 37,774,800 (P/F, 0.75%,33)

= IDR 420,843,444

Labor cost:

- Labor included here are direct labors. In warehouse, direct labors are material handling operators.
- Direct labors are paid using Jakarta's minimum rate of salary plus allowance. The minimum rate of salary for Jakarta is IDR 882,000 and by adding it with allowance the salary are IDR 1,000,000

Table 4.15 Labor cost for the private warehouse
(lease warehouse alternative)

Labor	Inflation	2008	2009	2010
Direct Labors	6.5 %	1,000,000	1,065,000	1,134,225
Total		2,000,000	2,130,000	3,402,675

P = A (P/A, i%, N)
P 2008 = 2,000,000 (P/A,0.75%,12) = IDR 22,869,600
P 2009 = 2,130,000 (P/A,0.75%,12) = IDR 24,356,124
P 2010 = 3,402,675 (P/A,0.75%,12) = IDR 38,908,908

P = F (P/F, i%, N)
P = P2008 + P2009 (P/F, 0.75%, 12) + P2010 (P/F, 0.75%, 24)
. = IDR 80,656,033

Table 4.16 Labor cost for the leased warehouse
(lease warehouse alternative – only at the lease period)

Labor	Inflation	2008	2009	2010
Direct Labors	6.5 %	1,000,000	1,065,000	1,134,225
Total		2,000,000	2,130,000	2,268,450

P =
2,000,000 (P/F, 0.75%,7) + 2,000,000 (P/F, 0.75%,8) +
2,000,000 (P/F, 0.75%,9) + 2,130,000 (P/F, 0.75%,17) +
2,130,000 (P/F, 0.75%, 18) + 2,130,000 (P/F, 0.75%, 19) +
2,130,000 (P/F, 0.75%, 20) + 2,130,000 (P/F, 0.75%, 21) +
2,268,450 (P/F, 0.75%, 28) + 2,268,450 (P/F, 0.75%, 29) +
2,268,450 (P/F, 0.75%, 30) + 2,268,450 (P/F, 0.75%, 31) +
2,268,450 (P/F, 0.75%, 32) + 2,268,450 (P/F, 0.75%, 33)

= IDR 25,730,751

NPV
= P Storage cost + P Material handling cost + P Labor cost
= IDR 2,118,033,563

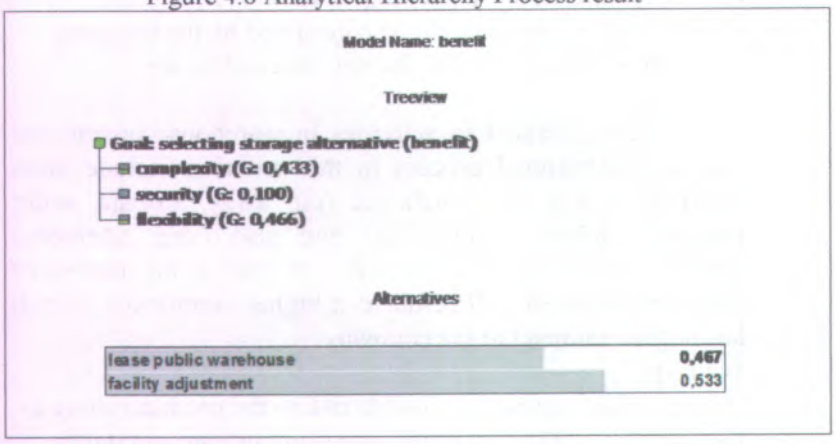
4.2.12 Criteria Calculation Using AHP

Beside cost, criteria that need to be considered by the company (based on questionnaire) in the alternative selection are:

1. Complexity
   This criterion related to activities in warehouse operational process. Operational process in this criterion include main activities within the warehouse (put away, storage, order picking, loading / unloading) and also other additional activities like administrative works. Increase in the number of activities involved will result to a higher complexity, which has negative impact to the company.
2. Security
   This criterion represents possible risk to the products along in the activities within the warehouse (both private and public warehouse). Increase in the risk will result to a lower security level, which has negative impact to the company.
3. Flexibility
   This criterion represents the ease in changing things related with the facility and operational of the warehouse. Increase in the number of permanent decision will result to increase in the complexity related with changing the facility and operational of the warehouse. This occasion will decrease the flexibility, and has negative impact to the company.

By using Expert Choice software, the preferences value for each criterion that gained from the questionnaire is processed.
The results are as follow:

Figure 4.8 Analytical Hierarchy Process result



4.2.13 Alternative Selection

Based on the net present value comparison, the cost ratio for both alternatives are as follow:

Cost ratio for facility adjustment alternative = 0.511
Cost ratio for lease public warehouse = 0.489

Based on the AHP calculations, the benefit ratio for both alternatives are as follow:

Benefit ratio for facility adjustment alternative = 0.533
Benefit ratio for lease public warehouse alternative = 0.467

Benefit / Cost Ratio for facility adjustment alt. = 1.043
Benefit / Cost Ratio for lease public warehouse alt. = 0.955

Benefit / Cost Ratio for facility adjustment alternative has bigger value than the lease public warehouse alternative, so based on Benefit / Cost Ratio, the best alternative in the decision of finish product facility is facility adjustment alternative.

CHAPTER V
ANALYSIS AND INTERPRETATION

After the data has been collected and processed, the next phase is analyzing the output from previous phase. The analyzing processes are as follow.

5.1 Existing Warehouse Facility

Finish product store in Plant SCC&C have its own characteristics, especially related to the facility. And based on Heragu (1997), that facility resources are divided into storage space, material handling equipment and labor. Then this analysis will be focused on those aspects.

Currently there are 2000 slot of storage available in the Finish Product Store Plant SCC&C with total of 2160 m^2 warehouse space. This space consists of storage spaces and aisles. The huge number of storage slot is a result of the usage of rack as the storage facility or media. Racks that used in this warehouse are selective pallet racks, with capacity of 5 vertical storages.

Material handling equipment used in the warehouse divided into two main categories, indoor and outdoor. Reach truck as the most utilized material handling equipment operate indoor, and have obligation to receive products from production department, store it to the proper storage place, and then if there were scheduled shipment, they also prepares the products to the loading bay. Another material handling equipment is forklifts that operates outdoor and have only one obligation, which is to load and arrange products from loading bay to the transporter. The existing number of material handling equipment operated by the company is 2 reach trucks and 1 forklift.

5.2 Existing Condition Analysis

Finish product store in Plant SCC&C usually called with back of factory storage. That name came because of the storage facility is only functionalized as a temporary storage during the

process of microbiology test in the Quality Control Department that take 4 working days lead time.

Because of its simple function, the activity in the warehouse involves only several variations. There are only five activities in this warehouse, which is receiving, put away, storage, order picking and shipping.

Among those activities, there are several problems that occur. And those problems have relevancies with each other. Products that have no storage space and putted in the aisle obstruct the other products flow and makes traffic within the warehouse. Especially when the peak season arrives, when products movements are on their peak, the lack of material handling equipment severed the condition. And because of the traffic, there are queues within location of the warehouse, and if it is urge, the products are stacked in order to keep the production flowing. But products have their own stack limitation, and with many SKUs within the warehouse, it is hard to remember all of those limitations. So, frequently, the over stacked incident are occurs and damaged numerous of products.

Based on passages above, there are relationships among the problems. And it's always related to the facility of the warehouse, both storage space and the material handling equipment. Therefore comprehensive and detailed analysis on the facility of finish product store is needed.

5.3 Products Specification

Finish Product Store of Plant SCC&C have an obligation to store products that already produced by the company. This facility kept numbers of Plant SCC&C's finish products. In order to calculate the needs of facility, the characteristics of the products to be kept are essentials.

In Finish Product Store, there are up to 47 active SKUs (Stock keeping unit) registered with its own characteristics. The characteristic collected in the previous page are specification that has strong relationship with the warehouse. The characteristics

are the temperature and chemical characteristic, dimension of products, dimension of pallet, weight of products, weight of pallet, and number of products per fib and per pallet.

Those data are collected because of its uses in calculating the needs of storage. Temperature and chemical characteristic will be used in the storage location decision. Pallet weight, product weight, pallet dimension and products dimensions will be used in designing a proper storage media. And then, number of product per pallet will be used to convert the production plan into the language of storage space. But, since the products are stored randomly in the entire warehouse, the dimension and weight specification that will be used is only for the biggest dimension or weight. So all the storage slot can keep any products received.

Based on the data, temperature and chemical characteristic for all products is uniform (ambient and regular), so there will be no constraint in the placement of the products. Then from the other data, the maximum weight of the load (product weight added with pallet weight) is 906200 gram. The dimensions of the load are following the pallet except the height of the load. The maximum dimensions are 122.5 cm for load height, 120 cm for load width and 100 cm for load depth.

5.4 Aggregate Planning

Based on collected data, there are 47 SKUs that need to be forecasted. In order to minimize the error value, products are clustered as far as possible and then aggregated. But before the aggregation, the demand values are converted from quantity unit to its weight unit to avoid distortion to data. Clustering process, result to five clusters of data, which are Blue Band Retail, Blue Band Food Solution, Royco Retail, Royco Food Solution, and Sariwangi Powder. Those data are clustered based on their characteristic of market and nature of the products. So the forecast result will be relevant.

Data collected is historical production demand from 2005 to 2007. The clustered historical production demand shows

several types of pattern, most of it are showing positive trend, with or without seasonal pattern. Only one clusters that not showing any trend or seasonal pattern, which is Sariwangi powder cluster. Therefore, based on those facts, the planning of finish product storage facility needs to consider the growth of the demand.

Because of the existence of machine capacity constraint, the determination of products arrival rate to Finish Product Store should not directly use demand data from forecasting. In order to compromise the demand with machine capacity constraint, aggregate planning is performed.

But before the aggregate planning processes started, the data are clustered again based on the type of machine that used to produce products and similarity of the product specification (especially related with storage need calculation). These activities needed in order to provide appropriate data for aggregate planning.

After the clustering process, aggregate production plan composed for each year, the result from each aggregate planning will be use as an arrival rate of products into the warehouse. And special for year 2010, aggregate production plan will also use in calculating the number of storages needed by the company (along with product classification).

5.5 Product Classification

Good warehouse is a warehouse that could maximize its utilization and minimize the material handling. In order to facilitate both of them, the products are classified. Products classified to three different categories, the first one is fast moving item. Products classified into this category because of their huge demand which increase its throughput. The second category is medium moving item. These products have an average throughput but much smaller than the fast moving item. The last one is the Slow moving item, have the biggest product variation but much smaller in the traffic. Minimizing travel time for products in the

first category will result to a significant effect because of its multiplying factor. That's why in the placement decision of the products, fast moving item should be putted in the location with the quickest access for put away and order picking. And in the contrary, slow moving items can be putted in the longest time for put away and order picking.

5.6 Storage Needs Calculation and Allocation

This type of storage allocation is a mix between random and dedicated storage policy. So the calculations are most likely like those policies. First, the products are clustered into their class, and then the storage needs for each class are summed. Maximum number of storage needs for each class will be summed again and become the reference for determine the number of storage needed. From the calculation, the number of storage needs is 3290 storage slots. Divided into three areas, the first area is for fast moving item storage, with 2417 storage slots. And then the second one is for medium moving item with 739 storage slots. And the last one is for slow moving item, with 135 storage slots. This lack of storage facility could be done by adding the facility or lease public warehouse during the period.

5.7 Storage Media Design

Based on the number of storage needs that in practice will not be affordable by the available space, racks will be the only choice for the company. Rack selection is based on types explained in the literatures and the availability in the market. From the references, types of rack that most suitable with the nature of the products is selective pallet rack. Selective pallet rack is a series of profiled steel structure. This rack assembles several parts of profiled steel into one storage media. Based on the building height limitation and the ease of operational, this rack designed to store 2 pallets per level and could store up to 5 products vertically. The dimension of the storage media is as follow:

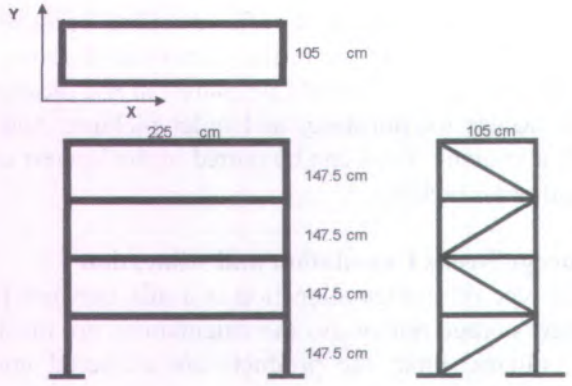


Figure 5.1 Rack Dimension

The design process using SAP 2000 intent to check the required material and structure so that the design is feasible to use and safe for long term usage. The design process results to a rack with specific specification as follow:

Table 5.1 Structure specifications of storage media (per rack)

	Beam width	Beam depth	Upright frame	Diagonal brace
	100x100x10	100x100x10	175x175x12	90x90x10
Length (m)	2.25	1.05	5.9	1.81
Number of shaft per rack	8	8	4	8
Total length per rack (m)	18	8.4	23.6	14.48
Weight/m	14.9	14.9	31.8	13.3
Total weight per rack (kg)	268.2	125.16	750.48	192.584

5.8 Material Handling Facility

By using simulation software, the number of material handling needed can be projected. Then based on the output of the simulation, the number of material handling equipment needed for each year if the facility adjustment alternative is chosen are as follow:

Table 5.2 Material handling equipment needed by the company (facility adjustment alternative)

Transporter	2008	2009	2010
Reach Truck	4	4	5
Forklift	2	2	2

And for the lease public warehouse alternative, the numbers of material handling equipment needed for each year are as follow:

Table 5.3 Material handling equipment needed by the company (lease warehouse alternative)

Transporter	2008	2009	2010
Reach Truck	3	3	4
Forklift	2	2	2

But since there is another need in transferring the products to the leased warehouse and configuring the products within it, in this alternative, the need of material handling equipment will be added with 1 wings truck and 1 fork lift, with period is as follow:

Table 5.4 Material handling equipment needed in the leased warehouse

Transporter	2008	2009	2010
Forklift	July until September	May until September	April until September
Wings truck			

5.9 Cost Analysis

Cost is one from several factors that need to be calculated in order to meet the preferences of the company. Costs that involved in this alternative selection are:

1. Storage facility cost
2. Material handling equipment cost
3. Direct labor cost

In this case, cost analysis is using NPV as a media to compare the cost that lies within the period.

From the calculation, adding facility or facility adjustment will cost IDR 2,216,886,215 and lease a warehouse resulting to IDR

2,118,033,563 cost. Compared with its total value, those numbers have only slight difference, but because of the alternative selection are not based only on cost, the investment value will be kept as one of the consideration in the next phase of alternative selection.

5.10 Alternative Selection

In the perspective of cost, adding facility and lease a public warehouse has almost similar amount of money for the company. The differences among them are slight. Based on net present value comparison for both alternatives, the cost ratio for facility adjustment alternative is 0.511, and for lease public warehouse alternative, the cost ratio is 0.489.

In this alternative selection, beside cost, there are other aspects that involved in the storage alternative selection. From the questionnaire that filled by the production manager of Plant SCC&C, the other factors that involved are security of the products, complexity of the operational, and flexibility towards the future. Based on AHP, the benefit ratio for facility adjustment alternative is 0.533 and for lease public warehouse alternative, the benefit ratio is 0.467.

By dividing the benefit ratio with the cost ratio, the benefit / cost ratio could obtained. The value of the benefit / cost ratio for facility adjustment alternative is 1.043 and the value of the benefit / cost ratio for lease public warehouse alternative is 0.955. Based on those values, it can be concludes that the facility adjustment alternative is the best alternative compared with the lease public warehouse alternative.

CHAPTER VI
CONCLUSION AND SUGGESTION

In this phase, will be concluded some points based on the previous phase, especially from data processing and data analysis phase. Some of these conclusions have to answer the goal of the research and give benefit to the company.

6.1 Conclusion

According to research done and some analysis produced, it can be taken some conclusion:

1. Problem that faced by the company is the lack of finish product storage facility (storage facility and material handling equipment), especially for three years ahead.
2. For three years ahead, the number of storages needed by the company is 3290 storage slots.
3. The suitable storage media for facility adjustment alternative is selective pallet racks.
4. Material handling equipment needed by the company if facility adjustment alternative is chosen:

Table 6.1 Material handling equipment needed by the company (facility adjustment alternative)

Transporter	2008	2009	2010
Reach Truck	4	4	5
Forklift	2	2	2

5. Material handling equipment needed by the company if leasing public warehouse alternative is chosen:

Table 6.2 Material handling equipment needed by the company (lease warehouse alternative)

Transporter	2008	2009	2010
Reach Truck	3	3	4
Forklift	2	2	2

Added with 1 wings truck and 1 forklift for the leased warehouse in period:

Table 6.3 Material handling equipment needed in the leased warehouse

Transporter	2008	2009	2010
Forklift	July until September	May until September	April until September
Wings truck			

6. The value of benefit/cost ratio for facility adjustment alternative is 1.043
7. The benefit/cost ratio for leasing public warehouse alternative is 0.955
8. Based on the cost calculation and company's preferences, facility adjustment or adding facility is the best alternative for finish product storage.

6.2 Suggestion

Based on the research that already done, the suggestions are as follow:

1. Expand the possible public warehouse alternative
2. Develop the untouched possible area in this research

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Appendix 1

SKUs for SCC

No.	Production Code	Products	Explanation
1	19438	Blue band sachet 200gr	Blue Band Retail
2	19437	Blue band tub 250gr	Blue Band Retail
3	19436	Blue band tin 1kg	Blue Band Retail
4	19435	Blue band tin 2kg	Blue Band Retail
5	19338	Blue band box 4.5kg	Blue Band Retail
6	19262	Pastry fat 15kg	BB Food Solution
7	19263	Cake margarine 15kg	BB Food Solution
8	19264	Gold margarine 15kg	BB Food Solution
9	19266	Multimargarine 15kg	BB Food Solution
10	19267	Biscuit fat 15kg	BB Food Solution
11	19269	White cream fat 15kg	BB Food Solution
12	19422	Minyak samin 2kg	BB Food Solution
13	19675	Frytol 18kg	BB Food Solution
14	19404	Royco FDS Chicken 8gr	Culinary Retail
15	19403	Royco FDS Beef 8gr	Culinary Retail
16	19325	Royco FDS Chicken 8gr MP	Culinary Retail
17	19326	Royco FDS Beef 8gr MP	Culinary Retail
18	19329	Royco FDS Chicken 50gr	Culinary Retail
19	19330	Royco FDS Beef 50gr	Culinary Retail
20	19215	Royco FDS Chicken 100gr	Culinary Retail
21	19219	Royco FDS Beef 100gr	Culinary Retail
22	19141	Royco Cream Mushroom 55gr	Culinary Retail
23	19142	Royco Cream Asparagus 56gr	Culinary Retail
24	19143	Royco Cream of Chicken 58gr	Culinary Retail
25	19144	Royco Cream of Corn 50gr	Culinary Retail
26	19225	Royco Guriz Jar 150gr	Culinary Retail
27	19305	Royco Guriz 50gr MT	Culinary Retail

No.	Production Code	Products	Explanation
28	19505	Royco FDS Chicken 1000gr	Culinary Food Solution
29	09099	Royco FDS Beef Powder 1000gr	Culinary Food Solution
30	09001	Knorr chicken powder 1kg	Culinary Food Solution
31	09009	PH New Orleans 6 kg	Culinary Food Solution
32	09078	Chicken seasoning 500gr	Culinary Food Solution
33	09108	Knorr beef powder 1 kg	Culinary Food Solution
34	09104	Knorr garlic aroma PWD 8gr	Culinary Food Solution
35	09107	Knorr garlic aroma PWD 1kg	Culinary Food Solution
36	09121	Knorr seas tenderizer 125gr	Culinary Food Solution
37	09122	Knorr chicken flavour 1kg	Culinary Food Solution
38	09134	Knorr bumbu bakso 8gr	Culinary Food Solution
39	09160	Marinades 250gr	Culinary Food Solution
40	09011	Knorr cream of chicken 900gr	Culinary Food Solution
41	09012	Knorr cream of asparagus 900gr	Culinary Food Solution
42	09013	Knorr cream of corn 900gr	Culinary Food Solution
43	09014	Knorr cream soup base 700gr	Culinary Food Solution
44	19361	Sariwangi madu 18gr	Sariwangi Powder
45	19625	Sariwangi jeruk nipis 18gr	Sariwangi Powder
46	19626	Sariwangi jahe 18gr	Sariwangi Powder
47	19627	Sariwangi susu 20gr	Sariwangi Powder

Appendix 2

Product Specifications

SKUs for Blue Band Retail

No.	Code	Product	Storage Environment Families (Temperature/Chemical Families)	Weight (gr)	Qty/Flb	Flb/Pallet	Weight/Pallet (gr)	Allowance	Pallet Weight (gr)	Total Weight (gr)	Load Height (cm)	Pallet Height (cm)	Total Height (cm)	Pallet Width (cm)	Pallet Depth (cm)
1	19438	Blue band sachet 200gr/60	Ambient/Regular	200	60	48	576000	0.1	35000	668600	96	14.5	110.5	120	100
2	19437	Blue band tub 250gr/48	Ambient/Regular	250	48	21	252000	0.1	35000	312200	78	14.5	92.5	120	100
3	19436	Blue band tin 1kg/12	Ambient/Regular	1000	12	49	588000	0.1	35000	681800	85	14.5	99.5	120	100
4	19435	Blue band tin 2kg/6	Ambient/Regular	2000	6	42	504000	0.1	35000	589400	90	14.5	104.5	120	100
5	19338	Blue band box 4.5kg/4	Ambient/Regular	4500	4	35	630000	0.1	35000	728000	80	14.5	94.5	120	100

SKUs for Blue Band Food Solution

No.	Code	Product	Storage Environment Families (Temperature/Chemical Families)	Weight (gr)	Qty/Flb	Flb/Pallet	Weight/Pallet (gr)	Allowance	Pallet Weight (gr)	Total Weight (gr)	Load Height (cm)	Pallet Height (cm)	Total Height (cm)	Pallet Width (cm)	Pallet depth (cm)
6	19262	Pastry fat 15kg	Ambient/Regular	15000	1	45	675000	0.1	35000	777500	90	14.5	104.5	120	100
7	19263	Cake margarine 15kg	Ambient/Regular	15000	1	45	675000	0.1	35000	777500	81	14.5	95.5	120	100
8	19264	Gold margarine 15kg	Ambient/Regular	15000	1	45	675000	0.1	35000	777500	78	14.5	92.5	120	100
9	19266	Multimargarine 15kg	Ambient/Regular	15000	1	45	675000	0.1	35000	777500	78	14.5	92.5	120	100
10	19267	Biscuit fat 15kg	Ambient/Regular	15000	1	45	675000	0.1	35000	777500	78	14.5	92.5	120	100
11	19269	White cream fat 15kg	Ambient/Regular	15000	1	45	675000	0.1	35000	777500	91.5	14.5	106	120	100
12	19422	Minyak samin	Ambient/Regular	2000	6	49	588000	0.1	35000	681800	98	14.5	112.5	120	100
13	19675	Frytol 18kg	Ambient/Regular	18000	1	24	432000	0.1	35000	510200	73	14.5	87.5	120	100

SKUs for Sariwangi Powder

No.	Code	Product	Storage Environment Families (Temperature/Chemical Families)	Weight (gr)	Qty/Flb	Flb/Pallet	Weight/Pallet (gr)	Allowance	Pallet Weight (gr)	Total Weight (gr)	Load Height (cm)	Pallet Height (cm)	Total Height (cm)	Pallet Width (cm)	Pallet depth (cm)
14	19361	Sariwangi madu 18gr	Ambient/Regular	18	120	80	172800	0.1	35000	225080	87.5	14.5	102	120	100
15	19625	Sariwangi jeruk nipis 18gr	Ambient/Regular	18	120	80	172800	0.1	35000	225080	87.5	14.5	102	120	100
16	19626	Sariwangi jahe 18gr	Ambient/Regular	18	120	80	172800	0.1	35000	225080	87.5	14.5	102	120	100
17	19627	Sariwangi susu 20gr	Ambient/Regular	20	120	80	192000	0.1	35000	246200	87.5	14.5	102	120	100

Product Specifications (cont')

SKUs for Culinary Retail

No.	Code	Product	Storage Environment Families (Temperature/Chemical Families)	Weight (gr)	Qty/Flb	Flb/Pallet	Weight/Pallet (gr)	Allowance	Pallet Weight (gr)	Total Weight (gr)	Load Height (cm)	Pallet Height (cm)	Total Height (cm)	Pallet Width (cm)	Pallet depth (cm)
18	19404	Royco FDS Chicken 8gr/720	Ambient/Regular	8	720	48	276480	0.1	35000	339128	100	14.5	114.5	120	100
19	19403	Royco FDS Beef 8gr/720	Ambient/Regular	8	720	48	276480	0.1	35000	339128	100	14.5	114.5	120	100
20	19325	Royco FDS Chicken 8gr MP	Ambient/Regular	8	288	90	207360	0.1	35000	263096	90	14.5	104.5	120	100
21	19326	Royco FDS Beef 8gr MP	Ambient/Regular	8	288	90	207360	0.1	35000	263096	90	14.5	104.5	120	100
22	19329	Royco FDS Chicken 50gr/60	Ambient/Regular	50	60	200	600000	0.1	35000	695000	104	14.5	118.5	120	100
23	19330	Royco FDS Beef 50gr/60	Ambient/Regular	50	60	200	600000	0.1	35000	695000	104	14.5	118.5	120	100
24	19215	Royco FDS Chicken 100gr/36	Ambient/Regular	100	36	150	540000	0.1	35000	629000	96	14.5	110.5	120	100
25	19219	Royco FDS Beef 100gr/36	Ambient/Regular	100	36	150	540000	0.1	35000	629000	96	14.5	110.5	120	100
26	19141	Royco Cream Mushroom 55gr/48	Ambient/Regular	55	48	75	198000	0.1	35000	252800	87.5	14.5	102	120	100
27	19142	Royco Cream Asparagus 56gr/48	Ambient/Regular	56	48	75	201600	0.1	35000	256760	87.5	14.5	102	120	100
28	19143	Royco Cream of Chicken 58/48	Ambient/Regular	58	48	75	208800	0.1	35000	264680	87.5	14.5	102	120	100
29	19144	Royco Cream of Corn	Ambient/Regular	50	48	75	180000	0.1	35000	233000	87.5	14.5	102	120	100
30	19225	Royco Guriz Jar 150gr/12	Ambient/Regular	150	12	80	144000	0.1	35000	193400	96	14.5	110.5	120	100
31	19305	Royco Guriz 50gr/48 MT	Ambient/Regular	50	48	80	192000	0.1	35000	246200	96	14.5	110.5	120	100

SKUs for Culinary Food Solution

No.	Code	Product	Storage Environment Families (Temperature/Chemical Families)	Weight (gr)	Qty/Flb	Flb/Pallet	Weight/Pallet (gr)	Allowance	Pallet Weight (gr)	Total Weight (gr)	Load Height (cm)	Pallet Height (cm)	Total Height (cm)	Pallet Width (cm)	Pallet depth (cm)
32	19505	Royco FDS Chicken 1000gr/6	Ambient/Regular	1000	6	80	480000	0.1	35000	563000	95	14.5	109.5	120	100
33	09099	Royco FDS Beef Powder 1000gr/6	Ambient/Regular	1000	6	80	480000	0.1	35000	563000	95	14.5	109.5	120	100
34	09001	Knorr chicken powder 1kg/6	Ambient/Regular	1000	6	80	480000	0.1	35000	563000	95	14.5	109.5	120	100
35	09009	PH New Orleans 6 kg/2	Ambient/Regular	6000	2	40	480000	0.1	35000	563000	96	14.5	110.5	120	100
36	09078	Chicken seasoning 500gr/24	Ambient/Regular	500	24	66	792000	0.1	35000	906200	96	14.5	110.5	120	100
37	09108	Knorr beef powder 1 kg/6	Ambient/Regular	1000	6	80	480000	0.1	35000	563000	108	14.5	122.5	120	100
38	09104	Knorr garlic aroma PWD 8gr	Ambient/Regular	8	288	90	207360	0.1	35000	263096	90	14.5	104.5	120	100
39	09107	Knorr garlic aroma PWD 1kg/6	Ambient/Regular	1000	6	108	648000	0.1	35000	747800	90	14.5	104.5	120	100
40	09121	Knorr seas tenderizer 125gr/24	Ambient/Regular	125	24	160	480000	0.1	35000	563000	96	14.5	110.5	120	100
41	09122	Knorr chicken flavour 1kg/6	Ambient/Regular	1000	6	80	480000	0.1	35000	563000	95	14.5	109.5	120	100
42	09134	Knorr bumbu bakso 8gr/300	Ambient/Regular	8	300	110	264000	0.1	35000	325400	90	14.5	104.5	120	100
43	09160	Marinades 250gr/24	Ambient/Regular	250	24	112	672000	0.1	35000	774200	95.2	14.5	109.7	120	100
44	09011	Knorr cream of chicken 900gr/6	Ambient/Regular	900	6	80	432000	0.1	35000	510200	95	14.5	109.5	120	100
45	09012	Knorr cream of asparagus 900gr/6	Ambient/Regular	900	6	80	432000	0.1	35000	510200	95	14.5	109.5	120	100
46	09013	Knorr cream of corn 900gr/6	Ambient/Regular	900	6	80	432000	0.1	35000	510200	95	14.5	109.5	120	100
47	09014	Knorr cream soup base 700gr/6	Ambient/Regular	700	6	80	336000	0.1	35000	404600	95	14.5	109.5	120	100

Appendix 3

Demand 2005

SKUs for Blue Band Retail Qty (fib)

No.	Code	Product	Explanation	2005												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				40,303	**29,335**	**50,404**	**59,278**	**106,714**	**185,638**	**274,020**	**298,557**	**278,175**	**8,453**	**0**	**0**	**1,330,878**
1	19438	Blue band sachet 200gr/60	BB	21,539	15,677	26,937	31,680	57,030	99,209	146,443	159,556	148,664	4,518	0	0	**711,253**
2	19437	Blue band tub 250gr/48	BB	8,178	5,953	10,228	12,029	21,655	37,670	55,604	60,584	56,448	1,715	0	0	**270,064**
3	19436	Blue band tin 1kg/12	BB	4,645	3,381	5,809	6,831	12,298	21,393	31,578	34,406	32,057	974	0	0	**153,370**
4	19435	Blue band tin 2kg/6	BB	4,489	3,267	5,614	6,603	11,886	20,677	30,521	33,254	30,984	942	0	0	**148,237**
5	19338	Blue band box 4.5kg/4	BB	1,452	1,057	1,816	2,136	3,845	6,689	9,874	10,758	10,023	305	0	0	**47,955**

SKUs for Blue Band Retail Qty (fib)

No.	Code	Product	Explanation	2005												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				50,277	**67,404**	**26,945**	**69,164**	**58,769**	**65,247**	**58,176**	**74,642**	**56,379**	**33,176**	**28,649**	**21,457**	**610,286**
6	19262	Pastry fat 15kg/1	BB Foods Solution	1,969	2,640	1,055	2,709	2,302	2,556	2,279	2,924	2,208	1,299	1,122	840	**23,905**
7	19263	Cake margarine 15kg/1	BB Foods Solution	36,013	48,281	19,301	49,542	42,096	46,737	41,671	53,466	40,384	23,764	20,521	15,369	**437,147**
8	19264	Gold margarine 15kg/1	BB Foods Solution	642	860	344	883	750	833	743	953	720	424	366	274	**7,791**
9	19266	Multimargarine 15kg/1	BB Foods Solution	3,636	4,875	1,949	5,002	4,250	4,719	4,207	5,398	4,077	2,399	2,072	1,552	**44,137**
10	19267	Biscuit fat 15kg/1	BB Foods Solution	448	600	240	616	523	581	518	665	502	295	255	191	**5,434**
11	19269	White cream fat 15kg/1	BB Foods Solution	1,495	2,005	801	2,057	1,748	1,940	1,730	2,220	1,677	987	852	638	**18,150**
12	19422	Minyak samin 2kg/6	BB Foods Solution	1,261	1,691	676	1,735	1,474	1,637	1,459	1,872	1,414	832	719	538	**15,309**
13	19675	Frytol 18kg/1	BB Foods Solution	4,812	6,452	2,579	6,620	5,625	6,245	5,568	7,144	5,396	3,175	2,742	2,054	**58,413**

SKUs for Sariwangi Powder Qty (fib)

No.	Code	Product	Explanation	2005												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				3,224	**4,079**	**3,053**	**3,079**	**3,056**	**3,356**	**3,033**	**2,935**	**2,007**	**2,812**	**2,689**	**2,169**	**35,490**
44	19361	Sariwangi madu 18gr/120	Sariwangi Powder	669	847	634	639	635	697	630	609	417	584	558	450	**7,369**
45	19625	Sariwangi jeruk nipis 18gr/120	Sariwangi Powder	787	995	745	751	746	819	740	716	490	686	656	529	**8,661**
46	19626	Sariwangi jahe 18gr/120	Sariwangi Powder	904	1,144	856	864	857	941	851	823	563	789	754	608	**9,955**
47	19627	Sariwangi susu 20gr/120	Sariwangi Powder	863	1,092	818	825	818	899	812	786	537	753	720	581	**9,506**

Demand 2005 (cont')

SKUs for Culinary Retail

Qty (fib)

No.	Code	Product	Explanation	2005												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				291,262	284,515	269,596	320,535	260,673	275,746	349,868	326,412	356,210	341,462	340,632	343,857	3,760,767
14	19404	Royco FDS Chicken 8gr/300	Royco FDS	170,483	166,533	157,800	187,616	152,578	161,400	204,786	191,056	208,498	199,865	199,380	201,267	2,201,262
15	19403	Royco FDS Beef 8gr/300	Royco FDS	99,460	97,156	92,061	109,456	89,014	94,161	119,473	111,463	121,638	116,602	116,319	117,420	1,284,224
16	19325	Royco FDS Chicken 8gr MP/288	Royco FDS	5,299	5,177	4,905	5,832	4,743	5,017	6,366	5,939	6,481	6,213	6,198	6,256	68,424
17	19326	Royco FDS Beef 8gr MP/288	Royco FDS	4,192	4,095	3,880	4,614	3,752	3,969	5,036	4,698	5,127	4,915	4,903	4,949	54,132
18	19329	Royco FDS Chicken 50gr/60	Royco FDS	751	734	695	827	672	711	902	842	919	881	878	887	9,699
19	19330	Royco FDS Beef 50gr/60	Royco FDS	520	508	482	573	466	493	625	583	636	610	609	614	6,718
20	19215	Royco FDS Chicken 100gr/36	Royco FDS	4,154	4,058	3,845	4,572	3,718	3,933	4,990	4,656	5,081	4,870	4,859	4,905	53,641
21	19219	Royco FDS Beef 100gr/36	Royco FDS	2,506	2,448	2,320	2,758	2,243	2,373	3,011	2,809	3,065	2,938	2,931	2,959	32,361
22	19141	Royco Cream Mushroom 55gr/48	Royco Soup	320	313	296	352	287	303	385	359	392	376	375	378	4,136
23	19142	Royco Cream Asparagus 56gr/48	Royco Soup	397	387	367	436	355	375	476	444	485	465	464	468	5,121
24	19143	Royco Cream of Chicken 58gr/48	Royco Soup	522	510	483	574	467	494	627	585	638	612	610	616	6,736
25	19144	Royco Cream of Corn 50gr/48	Royco Soup	571	558	529	629	511	541	686	640	699	670	668	674	7,375
26	19225	Royco Guriz Jar 150gr/12	Royco Granule	1,116	1,090	1,033	1,228	999	1,057	1,341	1,251	1,365	1,309	1,305	1,318	14,413
27	19305	Royco Guriz 50gr/48 MT	Royco Granule	970	948	898	1,068	868	918	1,165	1,087	1,186	1,137	1,135	1,145	12,526

SKUs for Culinary Food Solution

Qty (fib)

No.	Code	Product	Explanation	2005												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,025	1,083	846	881	941	960	1,368	1,033	1,324	950	1,616	943	12,970
28	19505	Royco FDS Chicken 1000gr/6	Royco FDS	108	114	89	93	99	101	144	109	140	100	170	99	1,366
29	09099	Royco FDS Beef Powder 1000gr/6	Royco FDS	46	48	38	39	42	43	61	46	59	42	72	42	577
30	09001	Knorr chicken powder 1kg/6	Knorr Boilon	441	466	364	379	405	413	588	444	569	408	695	405	5,577
31	09009	PH New Orleans 6 kg/2	Knorr Seasoning	38	40	31	32	34	35	50	38	48	35	59	35	475
32	09078	Chicken seasoning 500gr/24	Knorr Seasoning	23	24	19	20	21	22	31	23	30	21	36	21	290
33	09108	Knorr beef powder 1 kg/6	Knorr Seasoning	19	20	16	16	17	18	25	19	25	18	30	17	241
34	09104	Knorr garlic aroma PWD 8gr/288	Knorr Seasoning	12	13	10	11	11	12	16	12	16	11	19	11	156
35	09107	Knorr garlic aroma PWD 1kg/6	Knorr Seasoning	39	41	32	34	36	37	52	40	51	36	62	36	496
36	09121	Knorr seas tenderizer 125gr/24	Knorr Seasoning	7	7	5	6	6	6	9	7	9	6	10	6	84
37	09122	Knorr chicken flavour 1kg/6	Knorr Seasoning	48	51	40	41	44	45	64	48	62	44	75	44	606
38	09134	Knorr bumbu bakso 8gr/300	Knorr Seasoning	73	77	60	63	67	68	97	73	94	67	115	67	921
39	09160	Marinades 250gr/24	Knorr Seasoning	8	9	7	7	8	8	11	8	11	8	13	8	105
40	09011	Knorr cream of chicken 900gr/6	Knorr Soup	27	29	23	23	25	26	36	27	35	25	43	25	345
41	09012	Knorr cream of asparagus 900gr/6	Knorr Soup	12	12	10	10	11	11	15	12	15	11	18	11	146
42	09013	Knorr cream of corn 900gr/6	Knorr Soup	10	11	8	9	9	10	14	10	13	10	16	9	130
43	09014	Knorr cream soup base 700gr/6	Knorr Soup	115	121	95	99	106	108	153	116	148	107	181	106	1,454

Demand 2006

SKUs for Blue Band Retail

Qty (fib)

No.	Code	Product	Explanation	2006												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				62,998	52,107	73,029	81,841	128,944	207,315	295,078	319,443	299,205	31,371	2,265	0	1,553,595
1	19438	Blue band sachet 200gr/60	BB	35,828	29,634	41,532	46,544	73,332	117,902	167,814	181,670	170,161	17,841	1,288	0	883,546
2	19437	Blue band tub 250gr/48	BB	13,460	11,133	15,604	17,486	27,551	44,296	63,047	68,253	63,929	6,703	484	0	331,946
3	19436	Blue band tin 1kg/12	BB	5,514	4,561	6,392	7,164	11,287	18,147	25,829	27,962	26,190	2,746	198	0	135,990
4	19435	Blue band tin 2kg/6	BB	5,021	4,153	5,820	6,523	10,277	16,523	23,518	25,460	23,847	2,500	181	0	123,822
5	19338	Blue band box 4.5kg/4	BB	3,175	2,626	3,680	4,124	6,498	10,447	14,870	16,098	15,078	1,581	114	0	78,291

SKUs for Blue Band Retail

Qty (fib)

No.	Code	Product	Explanation	2006												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				53,702	70,806	30,401	72,564	62,183	68,652	61,590	78,035	59,796	36,623	32,103	24,920	651,375
6	19262	Pastry fat 15kg/1	BB Foods Solution	2,184	2,880	1,237	2,952	2,529	2,792	2,505	3,174	2,432	1,490	1,306	1,014	26,495
7	19263	Cake margarine 15kg/1	BB Foods Solution	38,410	50,643	21,744	51,900	44,475	49,103	44,051	55,813	42,768	26,194	22,961	17,824	465,888
8	19264	Gold margarine 15kg/1	BB Foods Solution	633	835	358	855	733	809	726	920	705	432	378	294	7,679
9	19266	Multimargarine 15kg/1	BB Foods Solution	3,575	4,713	2,024	4,830	4,139	4,570	4,100	5,194	3,980	2,438	2,137	1,659	43,357
10	19267	Biscuit fat 15kg/1	BB Foods Solution	559	737	317	756	647	715	641	812	623	381	334	259	6,782
11	19269	White cream fat 15kg/1	BB Foods Solution	1,512	1,993	856	2,043	1,751	1,933	1,734	2,197	1,683	1,031	904	702	18,337
12	19422	Minyak samin 2kg/6	BB Foods Solution	1,337	1,763	757	1,807	1,548	1,710	1,534	1,943	1,489	912	799	621	16,220
13	19675	Frytol 18kg/1	BB Foods Solution	5,492	7,241	3,109	7,421	6,360	7,021	6,299	7,981	6,115	3,745	3,283	2,549	66,617

SKUs for Sariwangi Powder

Qty (fib)

No.	Code	Product	Explanation	2006												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				2,265	2,865	2,627	3,935	3,138	1,970	4,317	3,996	4,043	3,425	2,512	3,098	38,191
44	19361	Sariwangi madu 18gr/120	Sariwangi Powder	461	583	534	800	638	401	878	813	823	697	511	630	7,770
45	19625	Sariwangi jeruk nipis 18gr/120	Sariwangi Powder	595	753	690	1,034	824	517	1,134	1,050	1,062	900	660	814	10,033
46	19626	Sariwangi jahe 18gr/120	Sariwangi Powder	625	790	724	1,085	865	543	1,191	1,102	1,115	944	693	854	10,533
47	19627	Sariwangi susu 20gr/120	Sariwangi Powder	584	739	678	1,015	810	508	1,114	1,031	1,043	884	648	799	9,855

Demand 2006 (cont')

SKUs for Culinary Retail

Qty (fib)

No.	Code	Product	Explanation	2006												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				349,943	340,890	322,145	382,013	309,882	326,994	413,898	385,251	419,469	401,216	399,384	402,323	4,453,409
14	19404	Royco FDS Chicken 8gr/300	Royco FDS	206,485	201,143	190,083	225,408	182,847	192,944	244,222	227,319	247,509	236,739	235,658	237,392	2,627,751
15	19403	Royco FDS Beef 8gr/300	Royco FDS	119,956	116,852	110,427	130,949	106,223	112,089	141,879	132,059	143,788	137,531	136,903	137,911	1,526,566
16	19325	Royco FDS Chicken 8gr MP/288	Royco FDS	5,760	5,611	5,302	6,288	5,101	5,382	6,813	6,341	6,904	6,604	6,574	6,622	73,302
17	19326	Royco FDS Beef 8gr MP/288	Royco FDS	4,485	4,369	4,129	4,896	3,972	4,191	5,305	4,938	5,376	5,142	5,119	5,156	57,078
18	19329	Royco FDS Chicken 50gr/60	Royco FDS	679	662	625	742	602	635	804	748	814	779	775	781	8,646
19	19330	Royco FDS Beef 50gr/60	Royco FDS	483	471	445	528	428	452	572	532	579	554	552	556	6,150
20	19215	Royco FDS Chicken 100gr/36	Royco FDS	4,755	4,632	4,377	5,191	4,211	4,443	5,624	5,235	5,700	5,452	5,427	5,467	60,513
21	19219	Royco FDS Beef 100gr/36	Royco FDS	3,339	3,253	3,074	3,645	2,957	3,120	3,950	3,676	4,003	3,829	3,811	3,839	42,498
22	19141	Royco Cream Mushroom 55gr/48	Royco Soup	318	310	293	347	282	297	376	350	381	365	363	366	4,049
23	19142	Royco Cream Asparagus 56gr/48	Royco Soup	435	424	400	475	385	406	515	479	521	499	496	500	5,536
24	19143	Royco Cream of Chicken 58gr/48	Royco Soup	556	542	512	607	492	519	657	612	666	637	634	639	7,074
25	19144	Royco Cream of Corn 50gr/48	Royco Soup	593	577	546	647	525	554	701	652	710	679	676	681	7,542
26	19225	Royco Guriz Jar 150gr/12	Royco Granule	1,108	1,080	1,020	1,210	982	1,036	1,311	1,220	1,329	1,271	1,265	1,274	14,106
27	19305	Royco Guriz 50gr/48 MT	Royco Granule	990	964	911	1,081	877	925	1,171	1,090	1,187	1,135	1,130	1,138	12,598

SKUs for Culinary Food Solution

Qty (fib)

No.	Code	Product	Explanation	2006												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,676	2,333	2,274	2,430	3,119	3,472	5,021	5,398	5,842	5,270	6,061	5,453	48,349
28	19505	Royco FDS Chicken 1000gr/6	Royco FDS	497	692	674	721	925	1,030	1,489	1,601	1,733	1,563	1,798	1,617	14,341
29	09099	Royco FDS Beef Powder 1000gr/6	Royco FDS	47	66	64	68	88	98	141	152	165	148	171	154	1,362
30	09001	Knorr chicken powder 1kg/6	Knorr Boilon	497	692	674	721	925	1,030	1,489	1,601	1,733	1,563	1,798	1,617	14,341
31	09009	PH New Orleans 6 kg/2	Knorr Seasoning	33	47	45	48	62	69	100	108	116	105	121	109	964
32	09078	Chicken seasoning 500gr/24	Knorr Seasoning	21	30	29	31	40	44	64	69	75	67	77	70	617
33	09108	Knorr beef powder 1 kg/6	Knorr Seasoning	17	24	23	25	32	35	51	55	60	54	62	56	494
34	09104	Knorr garlic aroma PWD 8gr/288	Knorr Seasoning	33	47	45	48	62	69	100	108	116	105	121	109	964
35	09107	Knorr garlic aroma PWD 1kg/6	Knorr Seasoning	40	56	54	58	75	83	120	129	140	126	145	130	1,157
36	09121	Knorr seas tenderizer 125gr/24	Knorr Seasoning	6	8	8	8	11	12	17	19	20	18	21	19	166
37	09122	Knorr chicken flavour 1kg/6	Knorr Seasoning	45	62	60	65	83	92	134	144	155	140	161	145	1,286
38	09134	Knorr bumbu bakso 8gr/300	Knorr Seasoning	267	372	363	388	498	554	801	861	932	841	967	870	7,713
39	09160	Marinades 250gr/24	Knorr Seasoning	18	25	24	26	33	37	53	57	62	56	64	58	514
40	09011	Knorr cream of chicken 900gr/6	Knorr Soup	22	31	30	32	41	46	66	71	77	69	80	72	637
41	09012	Knorr cream of asparagus 900gr/6	Knorr Soup	10	14	14	14	19	21	30	32	35	31	36	32	287
42	09013	Knorr cream of corn 900gr/6	Knorr Soup	9	12	12	12	16	18	26	28	30	27	31	28	248
43	09014	Knorr cream soup base 700gr/6	Knorr Soup	113	157	153	164	210	234	338	364	394	355	408	367	3,258

Demand 2007

SKUs for Blue Band Retail

Qty (fib)

No.	Code	Product	Explanation	2007												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				0	**0**	**0**	**60,241**	**178,206**	**254,612**	**336,759**	**389,996**	**362,254**	**111,115**	**65,346**	**43,889**	**1,802,419**
1	19438	Blue band sachet 200gr/60	BB	0	0	0	34,815	102,991	147,148	194,623	225,391	209,358	64,217	37,765	25,365	**1,041,673**
2	19437	Blue band tub 250gr/48	BB	0	0	0	13,004	38,470	54,963	72,697	84,189	78,200	23,987	14,106	9,474	**389,090**
3	19436	Blue band tin 1kg/12	BB	0	0	0	4,992	14,766	21,097	27,904	32,316	30,017	9,207	5,415	3,637	**149,351**
4	19435	Blue band tin 2kg/6	BB	0	0	0	4,380	12,958	18,514	24,487	28,358	26,341	8,080	4,752	3,191	**131,061**
5	19338	Blue band box 4.5kg/4	BB	0	0	0	3,050	9,021	12,889	17,048	19,743	18,338	5,625	3,308	2,222	**91,244**

SKUs for Blue Band Retail

Qty (fib)

No.	Code	Product	Explanation	2007												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				57,849	**72,682**	**36,154**	**73,939**	**63,721**	**70,292**	**65,579**	**94,870**	**61,693**	**48,128**	**38,501**	**21,527**	**704,935**
6	19262	Pastry fat 15kg/1	BB Foods Solution	2,133	2,680	1,333	2,726	2,350	2,592	2,418	3,498	2,275	1,775	1,420	794	**25,993**
7	19263	Cake margarine 15kg/1	BB Foods Solution	43,000	54,026	26,874	54,960	47,365	52,249	48,746	70,519	45,857	35,775	28,618	16,001	**523,992**
8	19264	Gold margarine 15kg/1	BB Foods Solution	620	779	387	792	683	753	703	1,017	661	516	413	231	**7,555**
9	19266	Multimargarine 15kg/1	BB Foods Solution	3,339	4,195	2,087	4,268	3,678	4,057	3,785	5,476	3,561	2,778	2,222	1,242	**40,687**
10	19267	Biscuit fat 15kg/1	BB Foods Solution	386	485	241	493	425	469	438	633	412	321	257	144	**4,704**
11	19269	White cream fat 15kg/1	BB Foods Solution	1,521	1,911	951	1,944	1,676	1,848	1,724	2,495	1,622	1,266	1,012	566	**18,537**
12	19422	Minyak samin 2kg/6	BB Foods Solution	1,925	2,418	1,203	2,460	2,120	2,339	2,182	3,157	2,053	1,601	1,281	716	**23,456**
13	19675	Frytol 18kg/1	BB Foods Solution	4,925	6,187	3,078	6,294	5,425	5,984	5,583	8,076	5,252	4,097	3,278	1,833	**60,010**

SKUs for Sariwangi Powder

Qty (fib)

No.	Code	Product	Explanation	2007												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				3,527	**3,064**	**2,843**	**3,891**	**2,638**	**2,880**	**3,965**	**3,358**	**3,905**	**3,289**	**3,569**	**3,452**	**40,380**
44	19361	Sariwangi madu 18gr/120	Sariwangi Powder	706	614	569	779	528	577	794	672	782	659	715	691	**8,086**
45	19625	Sariwangi jeruk nipis 18gr/120	Sariwangi Powder	940	816	757	1,037	703	767	1,056	894	1,040	876	951	920	**10,757**
46	19626	Sariwangi jahe 18gr/120	Sariwangi Powder	977	848	787	1,077	730	797	1,098	930	1,081	911	988	956	**11,181**
47	19627	Sariwangi susu 20gr/120	Sariwangi Powder	905	786	729	998	677	739	1,017	861	1,002	843	915	885	**10,356**

Demand 2007 (cont')

SKUs for Culinary Retail

Qty (fib)

No.	Code	Product	Explanation	2007												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				414,210	469,509	384,261	451,702	282,810	315,752	478,595	490,036	506,070	491,430	492,945	492,500	5,269,820
14	19404	Royco FDS Chicken 8gr/300	Royco FDS	246,166	279,031	228,367	268,448	168,075	187,652	284,430	291,230	300,759	292,058	292,958	292,694	3,131,868
15	19403	Royco FDS Beef 8gr/300	Royco FDS	144,209	163,462	133,783	157,263	98,462	109,931	166,626	170,609	176,191	171,094	171,621	171,466	1,834,717
16	19325	Royco FDS Chicken 8gr MP/288	Royco FDS	5,102	5,783	4,733	5,564	3,483	3,889	5,895	6,036	6,233	6,053	6,072	6,066	64,908
17	19326	Royco FDS Beef 8gr MP/288	Royco FDS	4,190	4,749	3,887	4,569	2,861	3,194	4,841	4,957	5,119	4,971	4,986	4,982	53,303
18	19329	Royco FDS Chicken 50gr/60	Royco FDS	634	719	588	691	433	483	732	750	775	752	754	754	8,066
19	19330	Royco FDS Beef 50gr/60	Royco FDS	487	552	451	531	332	371	562	576	594	577	579	579	6,190
20	19215	Royco FDS Chicken 100gr/36	Royco FDS	5,345	6,058	4,958	5,829	3,649	4,074	6,176	6,323	6,530	6,341	6,361	6,355	68,001
21	19219	Royco FDS Beef 100gr/36	Royco FDS	3,981	4,513	3,693	4,341	2,718	3,035	4,600	4,710	4,864	4,723	4,738	4,734	50,650
22	19141	Royco Cream Mushroom 55gr/48	Royco Soup	326	369	302	355	222	248	376	385	398	386	387	387	4,142
23	19142	Royco Cream Asparagus 56gr/48	Royco Soup	449	509	416	489	306	342	519	531	548	533	534	534	5,711
24	19143	Royco Cream of Chicken 58gr/48	Royco Soup	581	659	539	634	397	443	672	688	710	690	692	691	7,396
25	19144	Royco Cream of Corn 50gr/48	Royco Soup	620	703	575	676	423	473	716	734	758	736	738	737	7,889
26	19225	Royco Guriz Jar 150gr/12	Royco Granule	1,125	1,275	1,044	1,227	768	857	1,300	1,331	1,374	1,335	1,339	1,337	14,311
27	19305	Royco Guriz 50gr/48 MT	Royco Granule	996	1,129	924	1,086	680	759	1,150	1,178	1,216	1,181	1,185	1,184	12,668

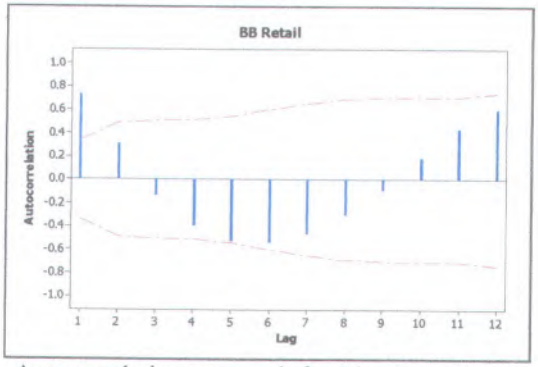
SKUs for Culinary Food Solution

Qty (fib)

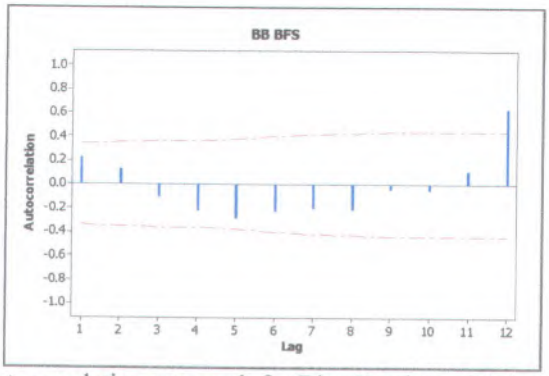
No.	Code	Product	Explanation	2007												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				9,710	10,265	8,016	8,350	8,918	9,099	12,966	9,788	12,548	9,002	15,310	8,935	122,906
28	19505	Royco FDS Chicken 1000gr/6	Royco FDS	2,509	2,652	2,071	2,157	2,304	2,351	3,350	2,529	3,242	2,326	3,955	2,308	31,752
29	09099	Royco FDS Beef Powder 1000gr/6	Royco FDS	194	205	160	167	178	182	259	195	250	180	305	178	2,452
30	09001	Knorr chicken powder 1kg/6	Knorr Boilon	2,509	2,652	2,071	2,157	2,304	2,351	3,350	2,529	3,242	2,326	3,955	2,308	31,752
31	09009	PH New Orleans 6 kg/2	Knorr Seasoning	119	125	98	102	109	111	158	120	153	110	187	109	1,502
32	09078	Chicken seasoning 500gr/24	Knorr Seasoning	74	79	61	64	68	70	99	75	96	69	117	68	940
33	09108	Knorr beef powder 1 kg/6	Knorr Seasoning	70	74	57	60	64	65	93	70	90	65	110	64	882
34	09104	Knorr garlic aroma PWD 8gr/288	Knorr Seasoning	71	75	59	61	66	67	95	72	92	66	112	66	903
35	09107	Knorr garlic aroma PWD 1kg/6	Knorr Seasoning	216	228	178	186	198	202	289	218	279	200	341	199	2,735
36	09121	Knorr seas tenderizer 125gr/24	Knorr Seasoning	40	43	33	35	37	38	54	41	52	37	64	37	512
37	09122	Knorr chicken flavour 1kg/6	Knorr Seasoning	210	222	173	181	193	197	281	212	271	195	331	193	2,659
38	09134	Knorr bumbu bakso 8gr/300	Knorr Seasoning	2,816	2,977	2,325	2,421	2,586	2,639	3,760	2,838	3,639	2,610	4,440	2,591	35,641
39	09160	Marinades 250gr/24	Knorr Seasoning	312	330	258	268	287	293	417	315	403	289	492	287	3,952
40	09011	Knorr cream of chicken 900gr/6	Knorr Soup	72	76	59	62	66	67	96	72	93	67	113	66	909
41	09012	Knorr cream of asparagus 900gr/6	Knorr Soup	35	37	29	30	32	33	47	35	45	33	55	32	445
42	09013	Knorr cream of corn 900gr/6	Knorr Soup	29	30	24	25	26	27	38	29	37	27	45	26	364
43	09014	Knorr cream soup base 700gr/6	Knorr Soup	435	460	359	374	399	408	581	438	562	403	686	400	5,506

Appendix 4

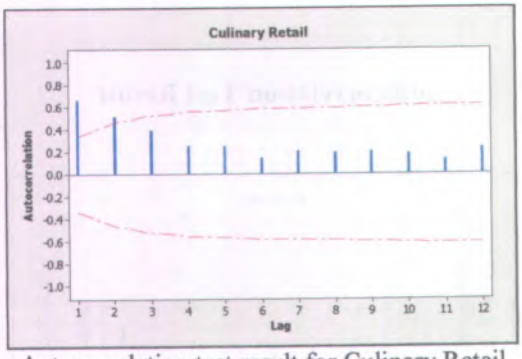
Autocorrelation Test Result



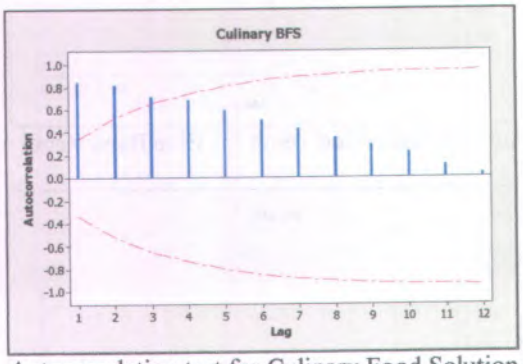
Autocorrelation test result for Blue Band Retail



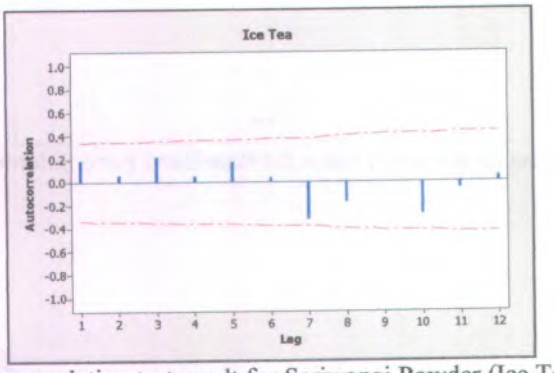
Autocorrelation test result for Blue Band Food Solution



Autocorrelation test result for Culinary Retail



Autocorrelation test for Culinary Food Solution



Autocorrelation test result for Sariwangi Powder (Ice Tea)

Appendix 5

Demand 2008 (in kg)

SKUs for Blue Band Retail

No.	Code	Product	Explanation	2008												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				898,143	**810,883**	**913,835**	**1,310,545**	**2,383,249**	**3,247,625**	**4,160,769**	**4,498,537**	**4,290,151**	**1,827,943**	**798,696**	**768,526**	**25,028,862**
1	19438	Blue band sachet 200gr/60	BB	491,992	444,192	500,587	717,900	1,261,669	1,779,008	2,279,217	2,464,242	2,350,091	563,094	437,516	420,989	**13,710,498**
2	19437	Blue band tub 250gr/48	BB	185,103	167,119	188,337	270,096	474,679	669,318	857,512	927,125	884,177	211,854	164,607	158,389	**5,158,316**
3	19436	Blue band tin 1kg/12	BB	83,646	75,519	85,108	122,054	214,503	302,459	387,502	418,959	399,551	95,735	74,384	71,575	**2,330,994**
4	19435	Blue band tin 2kg/6	BB	77,262	69,755	78,612	112,738	198,131	279,374	357,926	386,982	369,056	88,428	68,707	66,112	**2,153,083**
5	19338	Blue band box 4.5kg/4	BB	60,141	54,298	61,192	87,756	154,226	217,466	278,611	301,229	287,275	68,833	53,482	51,462	**1,675,971**

SKUs for Blue Band Food Solution

No.	Code	Product	Explanation	2008												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				947,062	**1,185,978**	**598,358**	**1,204,314**	**1,044,882**	**1,145,685**	**1,062,545**	**1,313,931**	**1,036,462**	**684,008**	**617,047**	**509,440**	**11,349,712**
6	19262	Pastry fat 15kg	BB Foods Solution	36,359	45,532	22,972	46,236	40,115	43,985	40,793	50,444	39,791	26,260	23,689	19,558	**435,734**
7	19263	Cake margarine 15kg	BB Foods Solution	677,575	848,508	428,095	861,626	747,561	819,680	760,198	940,052	741,537	489,373	441,466	364,479	**8,120,149**
8	19264	Gold margarine 15kg	BB Foods Solution	10,988	13,760	6,942	13,972	12,123	13,292	12,328	15,244	12,025	7,936	7,159	5,910	**131,678**
9	19266	Multimargarine 15kg	BB Foods Solution	61,240	76,689	38,692	77,874	67,565	74,083	68,707	84,962	67,021	44,230	39,900	32,942	**733,904**
10	19267	Biscuit fat 15kg	BB Foods Solution	8,093	10,135	5,113	10,291	8,929	9,790	9,080	11,228	8,857	5,845	5,273	4,353	**96,989**
11	19269	White cream fat 15kg	BB Foods Solution	26,225	32,841	16,569	33,349	28,934	31,725	29,423	36,384	28,701	18,941	17,087	14,107	**314,288**
12	19422	Minyak samin 2kg	BB Foods Solution	20,757	25,993	13,114	26,395	22,901	25,110	23,288	28,798	22,716	14,992	13,524	11,166	**248,754**
13	19675	Frytol 18kg	BB Foods Solution	105,825	132,521	66,860	134,570	116,755	128,019	118,729	146,818	115,814	76,431	68,949	56,925	**1,268,215**

SKUs for Sariwangi Powder

No.	Code	Product	Explanation	2008												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				6,488	**6,749**	**7,945**	**5,958**	**7,063**	**8,420**	**8,403**	**5,592**	**8,394**	**5,510**	**5,438**	**5,009**	**80,970**
44	19361	Sariwangi madu 18gr	Sariwangi Powder	1,285	1,337	1,573	1,180	1,399	1,668	1,664	1,107	1,662	1,091	1,077	992	**16,035**
45	19625	Sariwangi jeruk nipis 18gr	Sariwangi Powder	1,625	1,690	1,990	1,492	1,769	2,109	2,105	1,400	2,102	1,380	1,362	1,255	**20,280**
46	19626	Sariwangi jahe 18gr	Sariwangi Powder	1,751	1,822	2,144	1,608	1,906	2,273	2,268	1,509	2,266	1,487	1,468	1,352	**21,854**
47	19627	Sariwangi susu 20gr	Sariwangi Powder	1,827	1,901	2,237	1,678	1,989	2,371	2,366	1,575	2,364	1,552	1,531	1,411	**22,800**

Demand 2008 (in kg) – cont'

SKUs for Culinary Retail

No.	Code	Product	Explanation	2008												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,199,268	1,241,656	1,146,372	1,298,619	1,055,588	1,118,905	1,394,566	1,369,461	1,438,102	1,404,940	1,409,703	1,419,836	15,497,016
14	19404	Royco FDS Chicken 8gr/300	Royco FDS	699,849	724,585	668,980	757,826	616,002	652,952	813,817	799,167	839,223	819,871	822,651	828,564	**9,043,486**
15	19403	Royco FDS Beef 8gr/300	Royco FDS	408,288	422,719	390,279	442,111	359,372	380,928	474,776	466,229	489,598	478,308	479,930	483,379	**5,275,919**
16	19325	Royco FDS Chicken 8gr MP	Royco FDS	17,832	18,463	17,046	19,310	15,696	16,637	20,736	20,363	21,384	20,891	20,961	21,112	**230,430**
17	19326	Royco FDS Beef 8gr MP	Royco FDS	14,170	14,671	13,545	15,344	12,473	13,221	16,478	16,181	16,992	16,601	16,657	16,777	**183,111**
18	19329	Royco FDS Chicken 50gr/60	Royco FDS	2,991	3,097	2,859	3,239	2,633	2,791	3,478	3,416	3,587	3,504	3,516	3,541	**38,651**
19	19330	Royco FDS Beef 50gr/60	Royco FDS	2,146	2,222	2,052	2,324	1,889	2,003	2,496	2,451	2,574	2,515	2,523	2,541	**27,736**
20	19215	Royco FDS Chicken 100gr/36	Royco FDS	24,176	25,030	23,110	26,179	21,279	22,556	28,113	27,607	28,990	28,322	28,418	28,622	**312,402**
21	19219	Royco FDS Beef 100gr/36	Royco FDS	16,467	17,049	15,740	17,831	14,494	15,363	19,148	18,804	19,746	19,291	19,356	19,495	**212,783**
22	19141	Royco Cream Mushroom 55gr/48	Royco Soup	1,216	1,259	1,162	1,317	1,070	1,134	1,414	1,388	1,458	1,424	1,429	1,439	**15,711**
23	19142	Royco Cream Asparagus 56gr/48	Royco Soup	1,634	1,691	1,562	1,769	1,438	1,524	1,900	1,866	1,959	1,914	1,920	1,934	**21,111**
24	19143	Royco Cream of Chicken 58/48	Royco Soup	2,194	2,272	2,097	2,376	1,931	2,047	2,551	2,506	2,631	2,570	2,579	2,598	**28,353**
25	19144	Royco Cream of Corn	Royco Soup	2,037	2,109	1,947	2,206	1,793	1,901	2,369	2,326	2,443	2,387	2,395	2,412	**26,326**
26	19225	Royco Guriz Jar 150gr/12	Royco Granule	2,882	2,984	2,755	3,120	2,536	2,689	3,351	3,291	3,456	3,376	3,387	3,412	**37,237**
27	19305	Royco Guriz 50gr/48 MT	Royco Granule	3,386	3,506	3,237	3,667	2,981	3,160	3,938	3,867	4,061	3,967	3,981	4,009	**43,760**

SKUs for Culinary Food Solution

No.	Code	Product	Explanation	2008												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				59,180	60,961	62,741	64,522	66,303	68,084	69,865	71,646	73,426	75,207	76,988	78,769	827,692
28	19505	Royco FDS Chicken 1000gr/6	Royco FDS	14,829	15,275	15,721	16,168	16,614	17,060	17,506	17,953	18,399	18,845	19,291	19,738	**207,399**
29	09099	Royco FDS Beef Powder 1000gr/6	Royco FDS	2,002	2,062	2,122	2,182	2,243	2,303	2,363	2,423	2,483	2,544	2,604	2,664	**27,995**
30	09001	Knorr chicken powder 1kg/6	Knorr Boilon	21,450	22,096	22,741	23,386	24,032	24,677	25,323	25,968	26,613	27,259	27,905	28,550	**300,000**
31	09009	PH New Orleans 6 kg/2	Knorr Seasoning	2,952	3,041	3,130	3,219	3,307	3,396	3,485	3,574	3,663	3,752	3,840	3,929	**41,288**
32	09078	Chicken seasoning 500gr/24	Knorr Seasoning	1,839	1,894	1,949	2,005	2,060	2,115	2,171	2,226	2,281	2,337	2,392	2,447	**25,717**
33	09108	Knorr beef powder 1 kg/6	Knorr Seasoning	774	797	820	843	867	890	913	937	960	983	1,006	1,030	**10,820**
34	09104	Knorr garlic aroma PWD 8gr	Knorr Seasoning	329	339	349	359	369	379	389	399	408	418	428	438	**4,605**
35	09107	Knorr garlic aroma PWD 1kg/6	Knorr Seasoning	1,837	1,892	1,947	2,002	2,058	2,113	2,168	2,224	2,279	2,334	2,389	2,445	**25,688**
36	09121	Knorr seas tenderizer 125gr/24	Knorr Seasoning	153	158	162	167	171	176	181	185	190	195	199	204	**2,141**
37	09122	Knorr chicken flavour 1kg/6	Knorr Seasoning	2,053	2,115	2,177	2,238	2,300	2,362	2,424	2,485	2,547	2,609	2,671	2,733	**28,713**
38	09134	Knorr bumbu bakso 8gr/300	Knorr Seasoning	4,753	4,896	5,039	5,182	5,325	5,468	5,611	5,754	5,897	6,040	6,183	6,326	**66,474**
39	09160	Marinades 250gr/24	Knorr Seasoning	1,167	1,202	1,237	1,272	1,308	1,343	1,378	1,413	1,448	1,483	1,518	1,553	**16,323**
40	09011	Knorr cream of chicken 900gr/6	Knorr Soup	907	935	962	989	1,016	1,044	1,071	1,098	1,126	1,153	1,180	1,208	**12,689**
41	09012	Knorr cream of asparagus 900gr/6	Knorr Soup	402	414	426	438	450	462	475	487	499	511	523	535	**5,622**
42	09013	Knorr cream of corn 900gr/6	Knorr Soup	349	360	370	381	391	402	412	423	433	444	454	465	**4,882**
43	09014	Knorr cream soup base 700gr/6	Knorr Soup	3,385	3,486	3,588	3,690	3,792	3,894	3,996	4,098	4,199	4,301	4,403	4,505	**47,337**

Demand 2009 (in kg)

SKUs for Blue Band Retail

No.	Code	Product	Explanation	2009												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,141,740	1,054,479	1,157,432	1,554,141	2,546,806	3,491,221	4,404,366	4,742,133	4,533,747	1,271,539	1,042,293	1,012,122	27,952,019
1	19438	Blue band sachet 200gr/60	BB	625,431	577,630	634,027	851,339	1,395,109	1,912,447	2,412,657	2,597,681	2,483,530	696,533	570,955	554,428	**15,311,767**
2	19437	Blue band tub 250gr/48	BB	235,307	217,323	238,541	320,300	524,883	719,522	907,716	977,328	934,381	262,057	214,811	208,593	**5,760,763**
3	19436	Blue band tin 1kg/12	BB	106,333	98,206	107,794	144,741	237,190	325,145	410,188	441,645	422,238	118,421	97,071	94,261	**2,603,234**
4	19435	Blue band tin 2kg/6	BB	98,217	90,711	99,567	133,693	219,086	300,329	378,881	407,937	390,011	109,383	89,662	87,067	**2,404,545**
5	19338	Blue band box 4.5kg/4	BB	76,453	70,610	77,503	104,068	170,538	233,777	294,923	317,540	303,587	85,144	69,794	67,773	**1,871,710**

SKUs for Blue Band Food Solution

No.	Code	Product	Explanation	2009												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,004,841	1,243,757	656,136	1,262,093	1,102,660	1,203,464	1,120,324	1,371,709	1,094,241	741,786	674,826	567,219	12,043,056
6	19262	Pastry fat 15kg	BB Foods Solution	38,577	47,750	25,190	48,454	42,333	46,203	43,011	52,662	42,010	28,478	25,908	21,776	**462,353**
7	19263	Cake margarine 15kg	BB Foods Solution	718,913	889,846	469,432	902,964	788,898	861,018	801,536	981,389	782,874	530,711	482,804	405,817	**8,616,202**
8	19264	Gold margarine 15kg	BB Foods Solution	11,658	14,430	7,612	14,643	12,793	13,962	12,998	15,914	12,695	8,606	7,829	6,581	**139,722**
9	19266	Multimargarine 15kg	BB Foods Solution	64,976	80,425	42,428	81,610	71,301	77,819	72,443	88,699	70,757	47,966	43,636	36,678	**778,738**
10	19267	Biscuit fat 15kg	BB Foods Solution	8,587	10,629	5,607	10,785	9,423	10,284	9,574	11,722	9,351	6,339	5,767	4,847	**102,914**
11	19269	White cream fat 15kg	BB Foods Solution	27,825	34,441	18,169	34,949	30,534	33,325	31,023	37,984	30,301	20,541	18,687	15,707	**333,487**
12	19422	Minyak samin 2kg	BB Foods Solution	22,023	27,260	14,381	27,662	24,167	26,377	24,554	30,064	23,983	16,258	14,790	12,432	**263,950**
13	19675	Frytol 18kg	BB Foods Solution	112,281	138,977	73,317	141,026	123,211	134,475	125,185	153,275	122,270	82,887	75,405	63,381	**1,345,689**

SKUs for Sariwangi Powder

No.	Code	Product	Explanation	2009												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				7,589	7,011	8,468	7,279	6,359	4,814	7,852	5,923	4,734	8,314	7,878	5,802	82,024
44	19361	Sariwangi madu 18gr	Sariwangi Powder	1,503	1,388	1,677	1,441	1,259	953	1,555	1,173	938	1,647	1,560	1,149	**16,244**
45	19625	Sariwangi jeruk nipis 18gr	Sariwangi Powder	1,901	1,756	2,121	1,823	1,593	1,206	1,967	1,483	1,186	2,082	1,973	1,453	**20,544**
46	19626	Sariwangi jahe 18gr	Sariwangi Powder	2,048	1,892	2,286	1,965	1,716	1,299	2,119	1,599	1,278	2,244	2,126	1,566	**22,138**
47	19627	Sariwangi susu 20gr	Sariwangi Powder	2,137	1,974	2,384	2,050	1,791	1,356	2,211	1,668	1,333	2,341	2,218	1,634	**23,097**

Demand 2009 (in kg) – cont'

SKUs for Culinary Retail

No.	Code	Product	Explanation	2009												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,442,560	1,484,949	1,389,665	1,541,911	1,298,881	1,362,198	1,637,859	1,612,754	1,681,395	1,648,233	1,652,996	1,663,129	18,416,530
14	19404	Royco FDS Chicken 8gr/300	Royco FDS	841,825	866,561	810,957	899,802	757,979	794,928	955,794	941,144	981,200	961,848	964,627	970,541	10,747,207
15	19403	Royco FDS Beef 8gr/300	Royco FDS	491,116	505,547	473,108	524,940	442,201	463,757	557,603	549,058	572,427	561,137	562,758	566,208	6,269,860
16	19325	Royco FDS Chicken 8gr MP	Royco FDS	21,450	22,080	20,663	22,927	19,313	20,255	24,354	23,981	25,001	24,508	24,579	24,730	273,842
17	19326	Royco FDS Beef 8gr MP	Royco FDS	17,045	17,546	16,420	18,219	15,347	16,096	19,353	19,056	19,867	19,475	19,532	19,651	217,607
18	19329	Royco FDS Chicken 50gr/60	Royco FDS	3,598	3,704	3,466	3,846	3,240	3,397	4,085	4,022	4,194	4,111	4,123	4,148	45,933
19	19330	Royco FDS Beef 50gr/60	Royco FDS	2,582	2,658	2,487	2,760	2,325	2,438	2,931	2,886	3,009	2,950	2,958	2,977	32,962
20	19215	Royco FDS Chicken 100gr/36	Royco FDS	29,080	29,935	28,014	31,083	26,184	27,460	33,017	32,511	33,895	33,226	33,322	33,527	371,256
21	19219	Royco FDS Beef 100gr/36	Royco FDS	19,807	20,389	19,081	21,171	17,834	18,704	22,489	22,144	23,087	22,631	22,697	22,836	252,870
22	19141	Royco Cream Mushroom 55gr/48	Royco Soup	1,462	1,505	1,409	1,563	1,317	1,381	1,660	1,635	1,705	1,671	1,676	1,686	18,670
23	19142	Royco Cream Asparagus 56gr/48	Royco Soup	1,965	2,023	1,893	2,101	1,769	1,856	2,231	2,197	2,291	2,245	2,252	2,266	25,088
24	19143	Royco Cream of Chicken 58/48	Royco Soup	2,639	2,717	2,542	2,821	2,376	2,492	2,997	2,951	3,076	3,016	3,024	3,043	33,694
25	19144	Royco Cream of Corn	Royco Soup	2,451	2,523	2,361	2,619	2,207	2,314	2,782	2,740	2,856	2,800	2,808	2,825	31,286
26	19225	Royco Guriz Jar 150gr/12	Royco Granule	3,466	3,568	3,339	3,705	3,121	3,273	3,936	3,875	4,040	3,960	3,972	3,996	44,252
27	19305	Royco Guriz 50gr/48 MT	Royco Granule	4,073	4,193	3,924	4,354	3,668	3,847	4,625	4,554	4,748	4,654	4,668	4,696	52,004

SKUs for Culinary Food Solution

No.	Code	Product	Explanation	2009												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				80,550	82,331	84,111	85,892	87,673	89,454	91,235	93,016	94,796	96,577	98,358	100,139	1,084,132
28	19505	Royco FDS Chicken 1000gr/6	Royco FDS	20,184	20,630	21,076	21,522	21,969	22,415	22,861	23,307	23,753	24,200	24,646	25,092	271,656
29	09099	Royco FDS Beef Powder 1000gr/6	Royco FDS	2,724	2,785	2,845	2,905	2,965	3,026	3,086	3,146	3,206	3,266	3,327	3,387	36,668
30	09001	Knorr chicken powder 1kg/6	Knorr Boilon	29,196	29,841	30,486	31,132	31,777	32,423	33,068	33,714	34,359	35,005	35,650	36,296	392,947
31	09009	PH New Orleans 6 kg/2	Knorr Seasoning	4,018	4,107	4,196	4,285	4,373	4,462	4,551	4,640	4,729	4,818	4,906	4,995	54,081
32	09078	Chicken seasoning 500gr/24	Knorr Seasoning	2,503	2,558	2,613	2,669	2,724	2,779	2,835	2,890	2,945	3,001	3,056	3,111	33,685
33	09108	Knorr beef powder 1 kg/6	Knorr Seasoning	1,053	1,076	1,100	1,123	1,146	1,169	1,193	1,216	1,239	1,262	1,286	1,309	14,172
34	09104	Knorr garlic aroma PWD 8gr	Knorr Seasoning	448	458	468	478	488	498	508	517	527	537	547	557	6,031
35	09107	Knorr garlic aroma PWD 1kg/6	Knorr Seasoning	2,500	2,555	2,610	2,666	2,721	2,776	2,832	2,887	2,942	2,997	3,053	3,108	33,647
36	09121	Knorr seas tenderizer 125gr/24	Knorr Seasoning	208	213	218	222	227	231	236	241	245	250	254	259	2,804
37	09122	Knorr chicken flavour 1kg/6	Knorr Seasoning	2,794	2,856	2,918	2,980	3,041	3,103	3,165	3,227	3,289	3,350	3,412	3,474	37,610
38	09134	Knorr bumbu bakso 8gr/300	Knorr Seasoning	6,469	6,612	6,755	6,898	7,041	7,184	7,327	7,470	7,613	7,756	7,899	8,042	87,069
39	09160	Marinades 250gr/24	Knorr Seasoning	1,589	1,624	1,659	1,694	1,729	1,764	1,799	1,834	1,870	1,905	1,940	1,975	21,381
40	09011	Knorr cream of chicken 900gr/6	Knorr Soup	1,235	1,262	1,289	1,317	1,344	1,371	1,399	1,426	1,453	1,481	1,508	1,535	16,620
41	09012	Knorr cream of asparagus 900gr/6	Knorr Soup	547	559	571	583	595	608	620	632	644	656	668	680	7,364
42	09013	Knorr cream of corn 900gr/6	Knorr Soup	475	486	496	507	517	528	538	549	559	570	580	591	6,395
43	09014	Knorr cream soup base 700gr/6	Knorr Soup	4,607	4,709	4,810	4,912	5,014	5,116	5,218	5,320	5,422	5,523	5,625	5,727	62,003

Demand 2010 (in kg)

SKUs for Blue Band Retail

No.	Code	Product	Explanation	2010												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,385,336	1,298,076	1,401,028	1,797,738	2,790,402	3,734,818	4,647,962	4,985,730	4,777,344	1,515,136	1,285,889	1,255,719	30,875,178
1	19438	Blue band sachet 200gr/60	BB	758,870	711,070	767,466	984,778	1,528,547	2,045,887	2,546,096	2,731,121	2,616,969	829,973	704,394	687,867	**16,913,037**
2	19437	Blue band tub 250gr/48	BB	285,510	267,527	288,744	370,504	575,087	769,726	957,920	1,027,532	984,585	312,261	265,015	258,797	**6,363,210**
3	19436	Blue band tin 1kg/12	BB	129,019	120,893	130,481	167,427	259,876	347,832	432,875	464,332	444,925	141,108	119,758	116,948	**2,875,475**
4	19435	Blue band tin 2kg/6	BB	119,172	111,666	120,522	154,649	240,042	321,284	399,836	428,893	410,966	130,338	110,617	108,022	**2,656,007**
5	19338	Blue band box 4.5kg/4	BB	92,764	86,921	93,815	120,379	186,850	250,089	311,235	333,852	319,898	101,456	86,105	84,085	**2,067,449**

SKUs for Blue Band Food Solution

No.	Code	Product	Explanation	2010												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,062,619	1,301,535	713,915	1,319,871	1,160,439	1,261,242	1,178,102	1,429,488	1,152,019	799,564	732,604	624,997	12,736,395
6	19262	Pastry fat 15kg	BB Foods Solution	40,796	49,968	27,408	50,672	44,551	48,421	45,229	54,880	44,228	30,697	28,126	23,995	**488,971**
7	19263	Cake margarine 15kg	BB Foods Solution	760,251	931,183	510,770	944,301	830,236	902,355	842,873	1,022,727	824,212	572,048	524,141	447,154	**9,112,251**
8	19264	Gold margarine 15kg	BB Foods Solution	12,328	15,100	8,283	15,313	13,463	14,633	13,668	16,585	13,366	9,276	8,500	7,251	**147,766**
9	19266	Multimargarine 15kg	BB Foods Solution	68,712	84,161	46,164	85,347	75,037	81,555	76,179	92,435	74,493	51,702	47,372	40,414	**823,571**
10	19267	Biscuit fat 15kg	BB Foods Solution	9,081	11,122	6,101	11,279	9,917	10,778	10,067	12,216	9,845	6,833	6,260	5,341	**108,839**
11	19269	White cream fat 15kg	BB Foods Solution	29,425	36,041	19,769	36,549	32,134	34,925	32,623	39,584	31,901	22,141	20,287	17,307	**352,687**
12	19422	Minyak samin 2kg	BB Foods Solution	23,290	28,526	15,647	28,928	25,434	27,643	25,821	31,330	25,249	17,524	16,057	13,698	**279,147**
13	19675	Prytol 18kg	BB Foods Solution	118,737	145,433	79,773	147,482	129,667	140,931	131,641	159,731	128,726	89,343	81,861	69,837	**1,423,163**

SKUs for Sariwangi Powder

No.	Code	Product	Explanation	2010												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				4,580	6,712	6,961	6,103	8,721	8,509	6,522	7,776	7,757	6,810	8,321	5,961	84,733
44	19361	Sariwangi madu 18gr	Sariwangi Powder	907	1,329	1,379	1,209	1,727	1,685	1,292	1,540	1,536	1,349	1,648	1,181	**16,780**
45	19625	Sariwangi jeruk nipis 18gr	Sariwangi Powder	1,147	1,681	1,744	1,528	2,184	2,131	1,634	1,948	1,943	1,706	2,084	1,493	**21,223**
46	19626	Sariwangi jahe 18gr	Sariwangi Powder	1,236	1,811	1,879	1,647	2,354	2,297	1,760	2,099	2,094	1,838	2,246	1,609	**22,870**
47	19627	Sariwangi susu 20gr	Sariwangi Powder	1,290	1,890	1,960	1,718	2,456	2,396	1,837	2,190	2,184	1,918	2,343	1,679	**23,860**

Demand 2010 (in kg) – cont'

SKUs for Culinary Retail

No.	Code	Product	Explanation	2010												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,685,853	1,728,241	1,632,958	1,785,204	1,542,174	1,605,491	1,881,152	1,856,047	1,924,688	1,891,526	1,896,289	1,906,422	21,336,045
14	19404	Royco FDS Chicken 8gr/300	Royco FDS	983,802	1,008,538	952,934	1,041,779	899,956	936,905	1,097,771	1,083,120	1,123,177	1,103,825	1,106,604	1,112,517	**12,450,928**
15	19403	Royco FDS Beef 8gr/300	Royco FDS	573,944	588,375	555,936	607,768	525,029	546,585	640,433	631,886	655,255	643,965	645,587	649,036	**7,263,801**
16	19325	Royco FDS Chicken 8gr MP	Royco FDS	25,068	25,698	24,281	26,545	22,931	23,873	27,971	27,598	28,619	28,126	28,197	28,347	**317,253**
17	19326	Royco FDS Beef 8gr MP	Royco FDS	19,920	20,421	19,295	21,094	18,222	18,970	22,227	21,931	22,742	22,350	22,406	22,526	**252,104**
18	19329	Royco FDS Chicken 50gr/60	Royco FDS	4,205	4,310	4,073	4,452	3,846	4,004	4,692	4,629	4,800	4,718	4,730	4,755	**53,214**
19	19330	Royco FDS Beef 50gr/60	Royco FDS	3,017	3,093	2,923	3,195	2,760	2,873	3,367	3,322	3,445	3,385	3,394	3,412	**38,187**
20	19215	Royco FDS Chicken 100gr/36	Royco FDS	33,985	34,839	32,919	35,988	31,088	32,365	37,922	37,416	38,799	38,131	38,227	38,431	**430,110**
21	19219	Royco FDS Beef 100gr/36	Royco FDS	23,148	23,730	22,421	24,512	21,175	22,044	25,829	25,485	26,427	25,972	26,037	26,176	**292,956**
22	19141	Royco Cream Mushroom 55gr/48	Royco Soup	1,709	1,752	1,655	1,810	1,563	1,628	1,907	1,882	1,951	1,918	1,922	1,933	**21,630**
23	19142	Royco Cream Asparagus 56gr/48	Royco Soup	2,297	2,354	2,225	2,432	2,101	2,187	2,563	2,528	2,622	2,577	2,583	2,597	**29,066**
24	19143	Royco Cream of Chicken 58/48	Royco Soup	3,084	3,162	2,988	3,266	2,822	2,937	3,442	3,396	3,521	3,461	3,469	3,488	**39,036**
25	19144	Royco Cream of Corn	Royco Soup	2,864	2,936	2,774	3,033	2,620	2,727	3,196	3,153	3,270	3,213	3,221	3,239	**36,245**
26	19225	Royco Guriz Jar 150gr/12	Royco Granule	4,051	4,153	3,924	4,290	3,706	3,858	4,520	4,460	4,625	4,545	4,556	4,581	**51,267**
27	19305	Royco Guriz 50gr/48 MT	Royco Granule	4,760	4,880	4,611	5,041	4,355	4,534	5,312	5,241	5,435	5,341	5,355	5,383	**60,248**

SKUs for Culinary Food Solution

No.	Code	Product	Explanation	2010												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				101,920	103,701	105,482	107,262	109,043	110,824	112,605	114,386	116,167	117,947	119,728	121,509	1,340,574
28	19505	Royco FDS Chicken 1000gr/6	Royco FDS	25,539	25,985	26,431	26,877	27,323	27,770	28,216	28,662	29,108	29,555	30,001	30,447	**335,914**
29	09099	Royco FDS Beef Powder 1000gr/6	Royco FDS	3,447	3,507	3,568	3,628	3,688	3,748	3,809	3,869	3,929	3,989	4,050	4,110	**45,342**
30	09001	Knorr chicken powder 1kg/6	Knorr Boilon	36,941	37,587	38,232	38,877	39,523	40,169	40,814	41,460	42,105	42,750	43,396	44,041	**485,895**
31	09009	PH New Orleans 6 kg/2	Knorr Seasoning	5,084	5,173	5,262	5,351	5,439	5,528	5,617	5,706	5,795	5,884	5,972	6,061	**66,873**
32	09078	Chicken seasoning 500gr/24	Knorr Seasoning	3,167	3,222	3,277	3,333	3,388	3,443	3,499	3,554	3,609	3,665	3,720	3,775	**41,653**
33	09108	Knorr beef powder 1 kg/6	Knorr Seasoning	1,332	1,356	1,379	1,402	1,425	1,449	1,472	1,495	1,519	1,542	1,565	1,588	**17,525**
34	09104	Knorr garlic aroma PWD 8gr	Knorr Seasoning	567	577	587	597	607	617	626	636	646	656	666	676	**7,458**
35	09107	Knorr garlic aroma PWD 1kg/6	Knorr Seasoning	3,163	3,218	3,274	3,329	3,384	3,440	3,495	3,550	3,605	3,661	3,716	3,771	**41,606**
36	09121	Knorr seas tenderizer 125gr/24	Knorr Seasoning	264	268	273	277	282	287	291	296	300	305	310	314	**3,468**
37	09122	Knorr chicken flavour 1kg/6	Knorr Seasoning	3,536	3,597	3,659	3,721	3,783	3,845	3,906	3,968	4,030	4,092	4,153	4,215	**46,506**
38	09134	Knorr bumbu bakso 8gr/300	Knorr Seasoning	8,185	8,328	8,472	8,614	8,758	8,901	9,044	9,187	9,330	9,473	9,616	9,759	**107,665**
39	09160	Marinades 250gr/24	Knorr Seasoning	2,010	2,045	2,080	2,115	2,150	2,186	2,221	2,256	2,291	2,326	2,361	2,396	**26,438**
40	09011	Knorr cream of chicken 900gr/6	Knorr Soup	1,562	1,590	1,617	1,644	1,672	1,699	1,726	1,754	1,781	1,808	1,835	1,863	**20,551**
41	09012	Knorr cream of asparagus 900gr/6	Knorr Soup	692	704	716	729	741	753	765	777	789	801	813	825	**9,105**
42	09013	Knorr cream of corn 900gr/6	Knorr Soup	601	612	622	633	643	654	664	675	685	696	706	717	**7,907**
43	09014	Knorr cream soup base 700gr/6	Knorr Soup	5,829	5,931	6,033	6,134	6,236	6,338	6,440	6,542	6,644	6,746	6,847	6,949	**76,670**

Appendix 6

Average demand 2008 – 2010 (in kg)

SKUs for Blue Band Retail

No.	Code	Product	Explanation	AVG												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,141,740	1,054,479	1,157,432	1,554,141	2,546,806	3,491,221	4,404,366	4,742,133	4,533,747	1,271,539	1,042,293	1,012,122	27,952,020
1	19438	Blue band sachet 200gr/60	BB	625,431	577,631	634,027	851,339	1,395,108	1,912,447	2,412,657	2,597,681	2,483,530	696,533	570,955	554,428	**15,311,767**
2	19437	Blue band tub 250gr/48	BB	235,306	217,323	238,541	320,300	524,883	719,522	907,716	977,329	934,381	262,058	214,811	208,593	**5,760,763**
3	19436	Blue band tin 1kg/12	BB	106,333	98,206	107,794	144,741	237,190	325,145	410,188	441,646	422,238	118,421	97,071	94,261	**2,603,234**
4	19435	Blue band tin 2kg/6	BB	98,217	90,711	99,567	133,693	219,086	300,329	378,881	407,937	390,011	109,383	89,662	87,067	**2,404,545**
5	19338	Blue band box 4.5kg/4	BB	76,453	70,610	77,503	104,068	170,538	233,778	294,923	317,540	303,587	85,144	69,794	67,773	**1,871,710**

SKUs for Blue Band Food Solution

No.	Code	Product	Explanation	AVG												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,004,841	1,243,757	656,136	1,262,093	1,102,660	1,203,464	1,120,324	1,371,709	1,094,241	741,786	674,826	567,219	12,043,054
6	19262	Pastry fat 15kg	BB Foods Solution	38,577	47,750	25,190	48,454	42,333	46,203	43,011	52,662	42,010	28,478	25,908	21,776	**462,353**
7	19263	Cake margarine 15kg	BB Foods Solution	718,913	889,845	469,433	902,964	788,898	861,018	801,535	981,389	782,874	530,711	482,804	405,816	**8,616,201**
8	19264	Gold margarine 15kg	BB Foods Solution	11,658	14,430	7,612	14,643	12,793	13,962	12,998	15,914	12,695	8,606	7,829	6,581	**139,722**
9	19266	Multimargarine 15kg	BB Foods Solution	64,976	80,425	42,428	81,610	71,301	77,819	72,443	88,699	70,757	47,966	43,636	36,678	**778,738**
10	19267	Biscuit fat 15kg	BB Foods Solution	8,587	10,629	5,607	10,785	9,423	10,284	9,574	11,722	9,351	6,339	5,767	4,847	**102,914**
11	19269	White cream fat 15kg	BB Foods Solution	27,825	34,441	18,169	34,949	30,534	33,325	31,023	37,984	30,301	20,541	18,687	15,707	**333,487**
12	19422	Minyak samin 2kg	BB Foods Solution	22,023	27,260	14,381	27,662	24,167	26,377	24,554	30,064	23,983	16,258	14,790	12,432	**263,950**
13	19675	Frytol 18kg	BB Foods Solution	112,281	138,977	73,317	141,026	123,211	134,475	125,185	153,275	122,270	82,887	75,405	63,381	**1,345,689**

SKUs for Sariwangi Powder

No.	Code	Product	Explanation	AVG												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				6,219	6,824	7,792	6,446	7,381	7,248	7,593	6,430	6,962	6,878	7,212	5,591	82,575
44	19361	Sariwangi madu 18gr	Sariwangi Powder	1,232	1,351	1,543	1,277	1,462	1,435	1,504	1,273	1,379	1,362	1,428	1,107	**16,353**
45	19625	Sariwangi jeruk nipis 18gr	Sariwangi Powder	1,558	1,709	1,952	1,615	1,849	1,815	1,902	1,611	1,744	1,723	1,806	1,400	**20,682**
46	19626	Sariwangi jahe 18gr	Sariwangi Powder	1,679	1,842	2,103	1,740	1,992	1,956	2,049	1,736	1,879	1,856	1,947	1,509	**22,287**
47	19627	Sariwangi susu 20gr	Sariwangi Powder	1,751	1,922	2,194	1,815	2,078	2,041	2,138	1,811	1,960	1,937	2,031	1,574	**23,253**

Average demand 2008 – 2010 (in kg) – cont'

SKUs for Culinary Retail

No.	Code	Product	Explanation	AVG												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				1,442,560	**1,484,949**	**1,389,665**	**1,541,911**	**1,298,881**	**1,362,198**	**1,637,859**	**1,612,754**	**1,681,395**	**1,648,233**	**1,652,996**	**1,663,129**	**18,416,530**
14	19404	Royco FDS Chicken 8gr/300	Royco FDS	841,825	866,561	810,957	899,803	757,979	794,928	955,794	941,144	981,200	961,848	964,627	970,541	**10,747,207**
15	19403	Royco FDS Beef 8gr/300	Royco FDS	491,116	505,547	473,108	524,940	442,201	463,757	557,605	549,058	572,427	561,137	562,758	566,208	**6,269,860**
16	19325	Royco FDS Chicken 8gr MP	Royco FDS	21,450	22,080	20,663	22,927	19,313	20,255	24,354	23,981	25,001	24,508	24,579	24,730	**273,842**
17	19326	Royco FDS Beef 8gr MP	Royco FDS	17,045	17,546	16,420	18,219	15,347	16,096	19,353	19,056	19,867	19,475	19,532	19,651	**217,607**
18	19329	Royco FDS Chicken 50gr/60	Royco FDS	3,598	3,704	3,466	3,846	3,240	3,397	4,085	4,022	4,194	4,111	4,123	4,148	**45,933**
19	19330	Royco FDS Beef 50gr/60	Royco FDS	2,582	2,658	2,487	2,760	2,325	2,438	2,931	2,886	3,009	2,950	2,958	2,977	**32,962**
20	19215	Royco FDS Chicken 100gr/36	Royco FDS	29,080	29,935	28,014	31,083	26,184	27,460	33,017	32,511	33,895	33,226	33,322	33,527	**371,256**
21	19219	Royco FDS Beef 100gr/36	Royco FDS	19,807	20,389	19,081	21,171	17,834	18,704	22,489	22,144	23,087	22,631	22,697	22,836	**252,870**
22	19141	Royco Cream Mushroom 55gr/48	Royco Soup	1,462	1,505	1,409	1,563	1,317	1,381	1,660	1,635	1,705	1,671	1,676	1,686	**18,670**
23	19142	Royco Cream Asparagus 56gr/48	Royco Soup	1,965	2,023	1,893	2,101	1,769	1,856	2,231	2,197	2,291	2,245	2,252	2,266	**25,088**
24	19143	Royco Cream of Chicken 58/48	Royco Soup	2,639	2,717	2,542	2,821	2,376	2,492	2,997	2,951	3,076	3,016	3,024	3,043	**33,694**
25	19144	Royco Cream of Corn 50 gr/48	Royco Soup	2,451	2,523	2,361	2,619	2,207	2,314	2,782	2,740	2,856	2,800	2,808	2,825	**31,286**
26	19225	Royco Guriz Jar 150gr/12	Royco Granule	3,466	3,568	3,339	3,705	3,121	3,273	3,936	3,875	4,040	3,960	3,972	3,996	**44,252**
27	19305	Royco Guriz 50gr/48 MT	Royco Granule	4,073	4,193	3,924	4,354	3,668	3,847	4,625	4,554	4,748	4,654	4,668	4,696	**52,004**

SKUs for Culinary Food Solution

No.	Code	Product	Explanation	AVG												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
				80,550	**82,331**	**84,111**	**85,892**	**87,673**	**89,454**	**91,235**	**93,016**	**94,796**	**96,577**	**98,358**	**100,139**	**1,084,133**
28	19505	Royco FDS Chicken 1000gr/6	Royco FDS	20,184	20,630	21,076	21,522	21,969	22,415	22,861	23,307	23,754	24,200	24,646	25,092	**271,656**
29	09099	Royco FDS Beef Powder 1000gr/6	Royco FDS	2,724	2,785	2,845	2,905	2,965	3,026	3,086	3,146	3,206	3,266	3,327	3,387	**36,668**
30	09001	Knorr chicken powder 1kg/6	Knorr Boilon	29,196	29,841	30,486	31,132	31,777	32,423	33,068	33,714	34,359	35,005	35,650	36,296	**392,947**
31	09009	PH New Orleans 6 kg/2	Knorr Seasoning	4,018	4,107	4,196	4,285	4,373	4,462	4,551	4,640	4,729	4,818	4,906	4,995	**54,081**
32	09078	Chicken seasoning 500gr/24	Knorr Seasoning	2,503	2,558	2,613	2,669	2,724	2,779	2,835	2,890	2,945	3,001	3,056	3,111	**33,685**
33	09108	Knorr beef powder 1 kg/6	Knorr Seasoning	1,053	1,076	1,100	1,123	1,146	1,169	1,193	1,216	1,239	1,262	1,286	1,309	**14,172**
34	09104	Knorr garlic aroma PWD 8gr	Knorr Seasoning	448	458	468	478	488	498	508	517	527	537	547	557	**6,031**
35	09107	Knorr garlic aroma PWD 1kg/6	Knorr Seasoning	2,500	2,555	2,610	2,666	2,721	2,776	2,832	2,887	2,942	2,997	3,053	3,108	**33,647**
36	09121	Knorr seas tenderizer 125gr/24	Knorr Seasoning	208	213	218	222	227	231	236	241	245	250	254	259	**2,804**
37	09122	Knorr chicken flavour 1kg/6	Knorr Seasoning	2,794	2,856	2,918	2,980	3,041	3,103	3,165	3,227	3,289	3,350	3,412	3,474	**37,610**
38	09134	Knorr bumbu bakso 8gr/300	Knorr Seasoning	6,469	6,612	6,755	6,898	7,041	7,184	7,327	7,470	7,613	7,756	7,899	8,042	**87,069**
39	09160	Marinades 250gr/24	Knorr Seasoning	1,589	1,624	1,659	1,694	1,729	1,764	1,799	1,834	1,870	1,905	1,940	1,975	**21,381**
40	09011	Knorr cream of chicken 900gr/6	Knorr Soup	1,235	1,262	1,289	1,317	1,344	1,371	1,399	1,426	1,453	1,481	1,508	1,535	**16,620**
41	09012	Knorr cream of asparagus 900gr/6	Knorr Soup	547	559	571	583	595	608	620	632	644	656	668	680	**7,364**
42	09013	Knorr cream of corn 900gr/6	Knorr Soup	475	486	496	507	517	528	538	549	559	570	580	591	**6,395**
43	09014	Knorr cream soup base 700gr/6	Knorr Soup	4,607	4,709	4,810	4,912	5,014	5,116	5,218	5,320	5,422	5,523	5,625	5,727	**62,003**

Appendix 7

Product Classification (ABC Classification)

Code	Product	Number of Pallet/Year	Percentage	Cummulative Percentage	Product Rank	Classification
19404	Royco FDS Chicken 8gr/720	38,872	25.94%	25.94%	1	Fast Moving Item
19438	Blue band sachet 200gr/60	26,583	17.74%	43.68%	2	
19437	Blue band tub 250gr/48	22,860	15.25%	58.93%	3	
19403	Royco FDS Beef 8gr/720	22,677	15.13%	74.06%	4	
19263	Cake margarine 15kg	12,765	8.52%	82.58%	5	Medium Moving Item
19435	Blue band tin 2kg/6	4,771	3.18%	85.76%	6	
19436	Blue band tin 1kg/12	4,427	2.95%	88.72%	7	
19675	Frytol 18kg	3,115	2.08%	90.80%	8	
19338	Blue band box 4.5kg/4	2,971	1.98%	92.78%	9	
19325	Royco FDS Chicken 8gr MP	1,321	0.88%	93.66%	10	
19266	Multimargarine 15kg	1,154	0.77%	94.43%	11	
19326	Royco FDS Beef 8gr MP	1,049	0.70%	95.13%	12	
09001	Knorr chicken powder 1kg/6	819	0.55%	95.68%	13	Slow Moving Item
19215	Royco FDS Chicken 100gr/36	688	0.46%	96.13%	14	
19262	Pastry fat 15kg	685	0.46%	96.59%	15	
19505	Royco FDS Chicken 1000gr/6	566	0.38%	96.97%	16	
19269	White cream fat 15kg	494	0.33%	97.30%	17	
19219	Royco FDS Beef 100gr/36	468	0.31%	97.61%	18	
19422	Minyak samin	449	0.30%	97.91%	19	
09134	Knorr bumbu bakso 8gr/300	330	0.22%	98.13%	20	
19225	Royco Guriz Jar 150gr/12	307	0.21%	98.34%	21	
19305	Royco Guriz 50gr/48 MT	271	0.18%	98.52%	22	
19264	Gold margarine 15kg	207	0.14%	98.66%	23	
09014	Knorr cream soup base 700gr/6	185	0.12%	98.78%	24	
19144	Royco Cream of Corn	174	0.12%	98.89%	25	
19143	Royco Cream of Chicken 58/48	161	0.11%	99.00%	26	
19267	Biscuit fat 15kg	152	0.10%	99.10%	27	
19626	Sariwangi jahe 18gr	129	0.09%	99.19%	28	
19142	Royco Cream Asparagus 56gr/48	124	0.08%	99.27%	29	
19627	Sariwangi susu 20gr	121	0.08%	99.35%	30	
19625	Sariwangi jeruk nipis 18gr	120	0.08%	99.43%	31	
09009	PH New Orleans 6 kg/2	113	0.08%	99.51%	32	
19361	Sariwangi madu 18gr	95	0.06%	99.57%	33	
19141	Royco Cream Mushroom 55gr/48	94	0.06%	99.63%	34	
09122	Knorr chicken flavour 1kg/6	78	0.05%	99.69%	35	
19329	Royco FDS Chicken 50gr/60	77	0.05%	99.74%	36	
09099	Royco FDS Beef Powder 1000gr/6	76	0.05%	99.79%	37	
19330	Royco FDS Beef 50gr/60	55	0.04%	99.83%	38	
09107	Knorr garlic aroma PWD 1kg/6	52	0.03%	99.86%	39	
09078	Chicken seasoning 500gr/24	43	0.03%	99.89%	40	
09011	Knorr cream of chicken 900gr/6	38	0.03%	99.91%	41	
09160	Marinades 250gr/24	32	0.02%	99.94%	42	
09108	Knorr beef powder 1 kg/6	30	0.02%	99.96%	43	
09104	Knorr garlic aroma PWD 8gr	29	0.02%	99.97%	44	
09012	Knorr cream of asparagus 900gr/6	17	0.01%	99.99%	45	
09013	Knorr cream of corn 900gr/6	15	0.01%	100.00%	46	
09121	Knorr seas tenderizer 125gr/24	6	0.00%	100.00%	47	
		149,863	100.00%			

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Appendix 8

Production Plan 2008 (in pallets)

No	Month	Machine Output (monthly) - 2008										
		BB Sachet	BB Tub	BB Tin 1kg	BB Tin 2 kg	BB Semin	BB BIB	BB Shortening	BB Margarine	Gold Margarine	BB Pastry	Frytol
1	January	854	735	142	153	35	95	51	1,095	16	54	245
2	February	771	663	128	138	44	86	64	1,371	20	67	307
3	March	869	747	145	156	22	97	32	692	10	34	155
4	April	1,246	1,072	208	224	45	139	65	1,392	21	68	312
5	May	2,190	1,884	365	393	39	245	56	1,208	18	59	270
6	June	3,089	2,656	514	554	43	345	62	1,324	20	65	296
7	July	3,957	3,403	659	710	40	442	57	1,228	18	60	275
8	August	4,278	3,679	713	768	49	478	71	1,519	23	75	340
9	September	4,080	3,509	680	732	39	456	56	1,198	18	59	268
10	October	978	841	163	175	25	109	37	791	12	39	177
11	November	760	653	127	136	23	85	33	713	11	35	160
12	December	731	629	122	131	22	82	27	589	9	29	132

No	Month	Machine Output & Product (monthly) - 2008									
		Royco 8gr reg	Royco 8gr mp	Knorr Bakso 8gr	Royco 50gr	Royco 100gr	Royco Soup	Guriz Jar 150gr	Guriz MT 50gr	BFS Manual	Ice Tea
1	January	4,008	154	18	9	75	36	20	18	115	36
2	February	4,150	160	19	9	78	37	21	18	119	38
3	March	3,831	148	19	8	72	34	19	17	122	45
4	April	4,340	167	20	9	81	39	22	19	126	34
5	May	3,528	136	20	8	66	32	18	16	129	40
6	June	3,739	144	21	8	70	34	19	16	132	47
7	July	4,661	179	21	10	88	42	23	21	136	47
8	August	4,577	176	22	10	86	41	23	20	139	31
9	September	4,806	185	22	10	90	43	24	21	143	47
10	October	4,695	181	23	10	88	42	23	21	146	31
11	November	4,711	181	23	10	88	42	24	21	150	31
12	December	4,745	175	24	10	89	43	24	21	153	28

Production Plan 2009 (in pallets)

No	Month	Machine Output (monthly) - 2009										
		BB Sachet	BB Tub	BB Tin 1kg	BB Tin 2 kg	BB Samin	BB BIB	BB Shortening	BB Margarine	Gold Margarine	BB Pastry	Frytol
1	January	1,066	934	181	195	37	121	54	1,161	17	57	260
2	February	1,003	862	167	180	46	112	67	1,437	21	71	322
3	March	1,101	947	183	198	24	123	35	758	11	37	170
4	April	1,478	1,271	246	265	47	165	68	1,459	22	72	326
5	May	2,422	2,083	403	435	41	271	59	1,274	19	63	285
6	June	3,442	2,855	553	596	45	371	65	1,391	21	68	311
7	July	4,296	3,709	698	752	42	468	60	1,295	19	64	290
8	August	4,296	3,771	751	809	51	504	74	1,585	24	78	355
9	September	4,296	3,706	718	774	41	482	59	1,265	19	62	283
10	October	1,209	1,040	201	217	28	135	40	857	13	42	192
11	November	991	852	165	178	25	111	36	780	12	38	175
12	December	963	828	160	173	25	108	30	656	10	32	147

No	Month	Machine Output (monthly) - 2009									
		Royco 8gr reg	Royco 8gr mp	Knorr Bakso 8gr	Royco 50gr	Royco 100gr	Royco Soup	Guriz Jar 150gr	Guriz MT 50gr	BFS Manual	Ice Tea
1	January	4,821	186	25	10	91	43	24	21	157	95
2	February	4,963	191	25	11	93	45	25	22	160	88
3	March	4,644	179	26	10	87	42	23	20	163	106
4	April	5,153	198	26	11	97	46	26	23	167	91
5	May	4,341	167	27	9	82	39	22	19	170	79
6	June	4,553	175	27	10	85	41	23	20	174	60
7	July	5,474	211	28	12	103	49	27	24	177	98
8	August	5,390	208	28	12	101	49	27	24	181	74
9	September	5,619	216	29	12	106	51	28	25	184	59
10	October	5,508	212	29	12	103	50	28	24	187	104
11	November	5,524	213	30	12	104	50	28	24	191	98
12	December	5,558	205	30	12	104	50	28	24	194	73

Production Plan 2010 (in pallets)

No	Month	Machine Output & Product										
		BB Sachet	BB Tub	BB Tin 1kg	BB Tin 2 kg	BB Samin	BB BIB	BB Shortening	BB Margarine	Gold Margarine	BB Pastry	Frytol
1	January	1,317	1,133	219	236	40	147	57	1,228	18	60	275
2	February	1,234	1,062	206	222	49	138	70	1,504	22	74	337
3	March	1,332	1,146	222	239	27	149	38	825	12	41	185
4	April	1,710	1,470	285	307	49	191	71	1,525	23	76	341
5	May	2,727	2,282	442	476	43	297	62	1,341	20	66	300
6	June	4,296	3,526	592	637	47	397	68	1,458	22	72	326
7	July	4,296	3,771	736	793	44	494	63	1,362	20	67	305
8	August	4,296	3,771	790	851	53	530	77	1,652	25	81	370
9	September	4,296	3,771	757	815	43	508	62	1,331	20	66	298
10	October	1,441	1,239	240	259	30	161	43	924	14	45	207
11	November	1,223	1,052	204	219	27	137	39	847	13	42	189
12	December	1,194	1,027	199	214	27	133	34	722	11	36	162

No	Month	Machine Output & Product									
		Royco 8gr reg	Royco 8gr mp	Knorr Bakso 8gr	Royco 50gr	Royco 100gr	Royco Soup	Guriz Jar 150gr	Guriz MT 50gr	BFS Manual	Ice Tea
1	January	5,634	217	31	12	106	51	28	25	198	26
2	February	5,776	222	32	12	108	52	29	25	201	38
3	March	5,457	210	32	12	102	49	27	24	205	39
4	April	5,966	230	33	13	112	53	30	26	208	34
5	May	5,154	198	33	11	97	46	26	23	212	49
6	June	5,366	207	34	11	101	48	27	24	215	48
7	July	6,287	242	34	13	118	56	31	28	218	37
8	August	6,203	239	35	13	116	55	31	27	222	44
9	September	6,432	248	35	14	121	57	32	28	225	44
10	October	6,322	243	36	14	119	56	32	28	229	38
11	November	6,337	244	36	14	119	57	32	28	232	47
12	December	6,371	236	37	14	120	57	32	28	236	34

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Appendix 9

Storage needs calculation - based on 2010

A Classification

No	Month	Production Output			Total	Turnover ratio	Need of Storage
		BB Sachet	BB Tub	Royco 8 gr reg			
1	January	1,317	1,133	5,634	8,085	0.17	1,347
2	February	1,234	1,062	5,776	8,072	0.17	1,345
3	March	1,332	1,146	5,457	7,936	0.17	1,323
4	April	1,710	1,470	5,966	9,146	0.17	1,524
5	May	2,727	2,282	5,154	10,163	0.17	1,694
6	June	4,296	3,526	5,366	13,188	0.17	2,198
7	July	4,296	3,771	6,287	14,354	0.17	2,392
8	August	4,296	3,771	6,203	14,270	0.17	2,378
9	September	4,296	3,771	6,432	14,500	0.17	2,417
10	October	1,441	1,239	6,322	9,002	0.17	1,500
11	November	1,223	1,052	6,337	8,612	0.17	1,435
12	December	1,194	1,027	6,371	8,593	0.17	1,432

B Classification

No	Month	Production Output						Total	Turnover ratio	Need of storage
		BB Tin 1kg	BB Tin 2 kg	BB BIB	BB Margarine	Frytol	Royco 8gr mp			
1	January	219	236	147	1,228	275	217	2,323	0.17	387
2	February	206	222	138	1,504	337	222	2,628	0.17	438
3	March	222	239	149	825	185	210	1,830	0.17	305
4	April	285	307	191	1,525	341	230	2,879	0.17	480
5	May	442	476	297	1,341	300	198	3,055	0.17	509
6	June	592	637	397	1,458	326	207	3,616	0.17	603
7	July	736	793	494	1,362	305	242	3,932	0.17	655
8	August	790	851	530	1,652	370	239	4,431	0.17	739
9	September	757	815	508	1,331	298	248	3,957	0.17	659
10	October	240	259	161	924	207	243	2,034	0.17	339
11	November	204	219	137	847	189	244	1,840	0.17	307
12	December	199	214	133	722	162	236	1,666	0.17	278

Storage needs calculation – based on 2010 (cont')

C Classification

No	Month	Production Output							
		BB Samin	BB Shortening	Gold Margarine	BB Pastry	Knorr Bakso 8 gr	Royco 50gr	Royco 100gr	Royco Soup
1	January	40	57	18	60	31	12	106	51
2	February	49	70	22	74	32	12	108	52
3	March	27	38	12	41	32	12	102	49
4	April	49	71	23	75	33	13	112	53
5	May	43	62	20	66	33	11	97	46
6	June	47	68	22	72	34	11	101	48
7	July	44	63	20	67	34	13	118	56
8	August	53	77	25	81	35	13	116	55
9	September	43	62	20	66	35	14	121	57
10	October	30	43	14	45	36	14	119	56
11	November	27	39	13	42	36	14	119	57
12	December	27	34	11	36	37	14	120	57

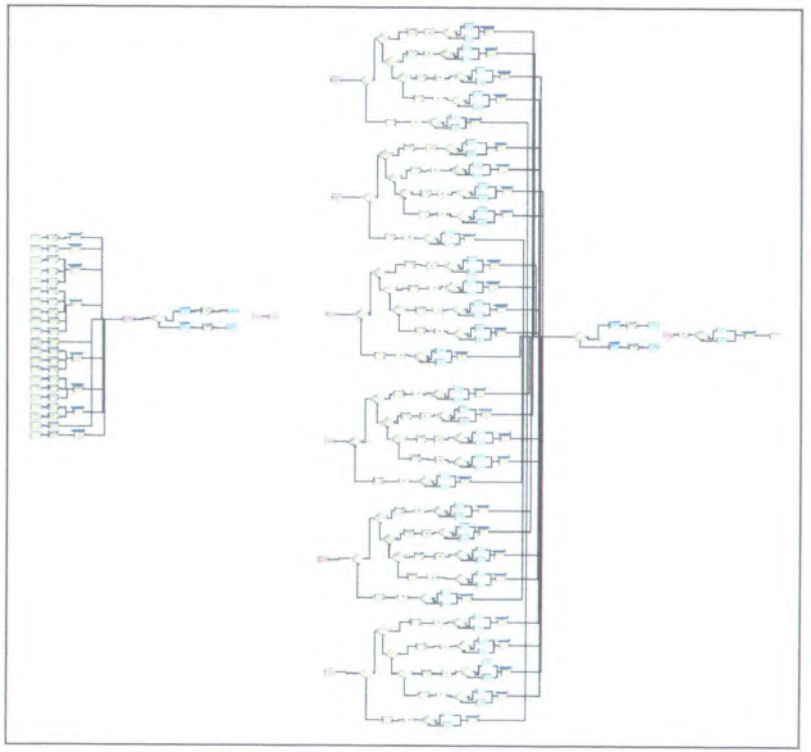
C Classification

No	Month	Production Output				Total	Turnover ratio	Need of storage
		Guriz Jar 150gr	Guriz MT 50gr	BFS Manual	Ice Tea			
1	January	28	25	198	26	676	0.17	113
2	February	29	25	201	38	737	0.17	123
3	March	27	24	205	39	632	0.17	105
4	April	30	26	208	34	753	0.17	126
5	May	26	23	212	49	710	0.17	118
6	June	27	24	215	48	739	0.17	123
7	July	31	28	218	37	758	0.17	126
8	August	31	27	222	44	807	0.17	135
9	September	32	28	225	44	775	0.17	129
10	October	32	28	229	38	711	0.17	118
11	November	32	28	232	47	713	0.17	119
12	December	32	28	236	34	691	0.17	115

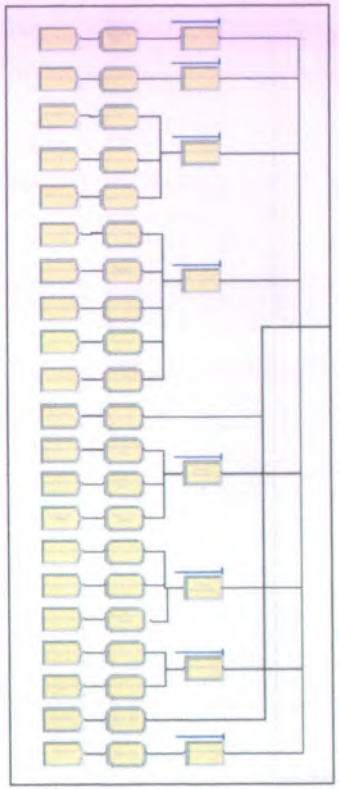
Total Storage Needs = Max needs of class A + Max needs of class B + Max needs of class C
= 2417 + 739 +135
= 3291

Appendix 10

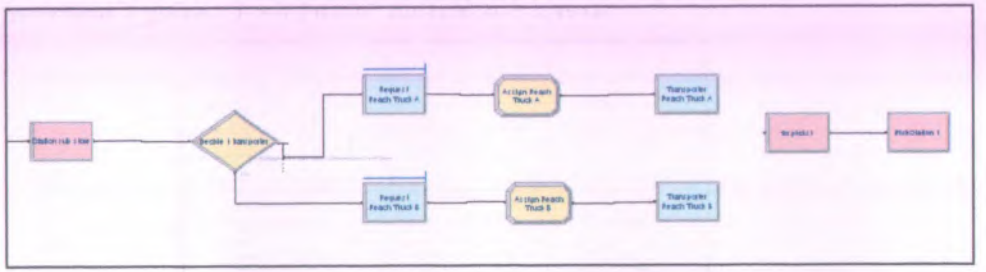
Arena Simulation Model for Existing Condition



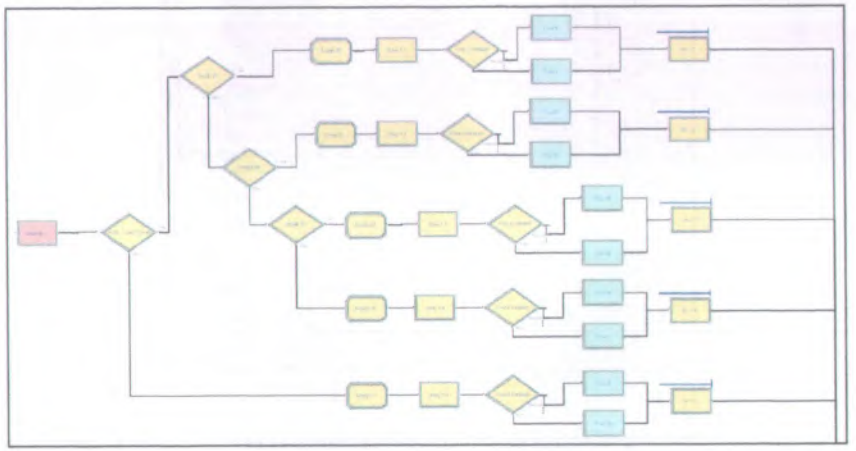
Arrival Part



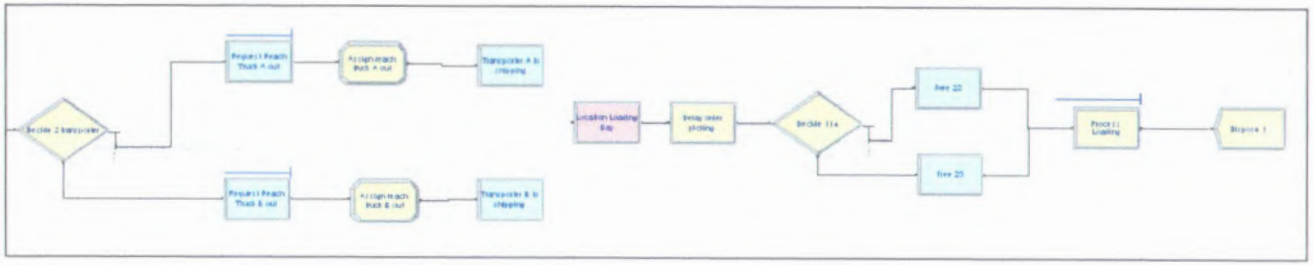
Material Handling Queue and Location Selection Part



Put Away and Storage Part



Order Picking and Loading Part



Appendix 11

QUESTIONNAIRE 1

(Determining research objectives)

1. Based on the actual condition in the field and the supporting data's, is it necessary to make an adjustment related to the facility of finish product warehouse?

   ☑ Yes ☐ No

2. If "Yes", what kind of adjustment which necessary to do related to the current condition of the finish product warehouse? (Allowed to choose more than one option)

   ☑ Capacity of storage facility

   ☑ Capacity of internal material handling facility

   ☐ Capacity of external material handling facility

   ☑ Others, ... material transfer vehicle

3. Is it possible to rent a public warehouse related to the first option above (capacity of storage facility)

   ☑ Yes ☐ No

**(If "Yes", continue to questionnaire 2)*

QUESTIONNAIRE 2

(Determining factors influencing alternative selection)

State factors that need to be involved in the analysis of alternative selection (expand or lease) for finish product storage:

A. Security

B. flexibility

C. complexity

D. -

E. .....

F. .....

G. .....

QUESTIONNAIRE 3

(Weighting factors that influence alternative selection)

Directions:

1. Choose the proper value based on explanation below:

Level of Importance	Definition
1	Both elements has the same importance
3	Have slight importances compared to the other
5	Have more importances compared to the other
7	Have high importances compared to the other
9	Have a definite importances compared to the other
2, 4, 6, 8	Compromise value between the closest values

2. Make a constant sign at the proper value for each category

QUESTIONNAIRE 3 (cont')

Weighting (Level 1) - Pairwise Comparison

Complexity	9	8	7	6	5	~~4~~	3	2	1	2	3	4	5	6	7	8	9	Security
Complexity	9	8	7	6	5	4	3	2	~~1~~	2	3	4	5	6	7	8	9	Flexibility
Security	9	8	7	6	5	4	3	2	1	2	3	4	~~5~~	6	7	8	9	Flexibility

Weighting (Level 2) - Complexity Perspective

Lease Public Warehouse	9	8	7	6	5	4	3	2	1	2	3	4	5	6	~~7~~	8	9	Facility Adjustment

Weighting (Level 2) - Security Perspective

Lease Public Warehouse	9	8	7	6	~~5~~	4	3	2	1	2	3	4	~~5~~	6	7	8	9	Facility Adjustment

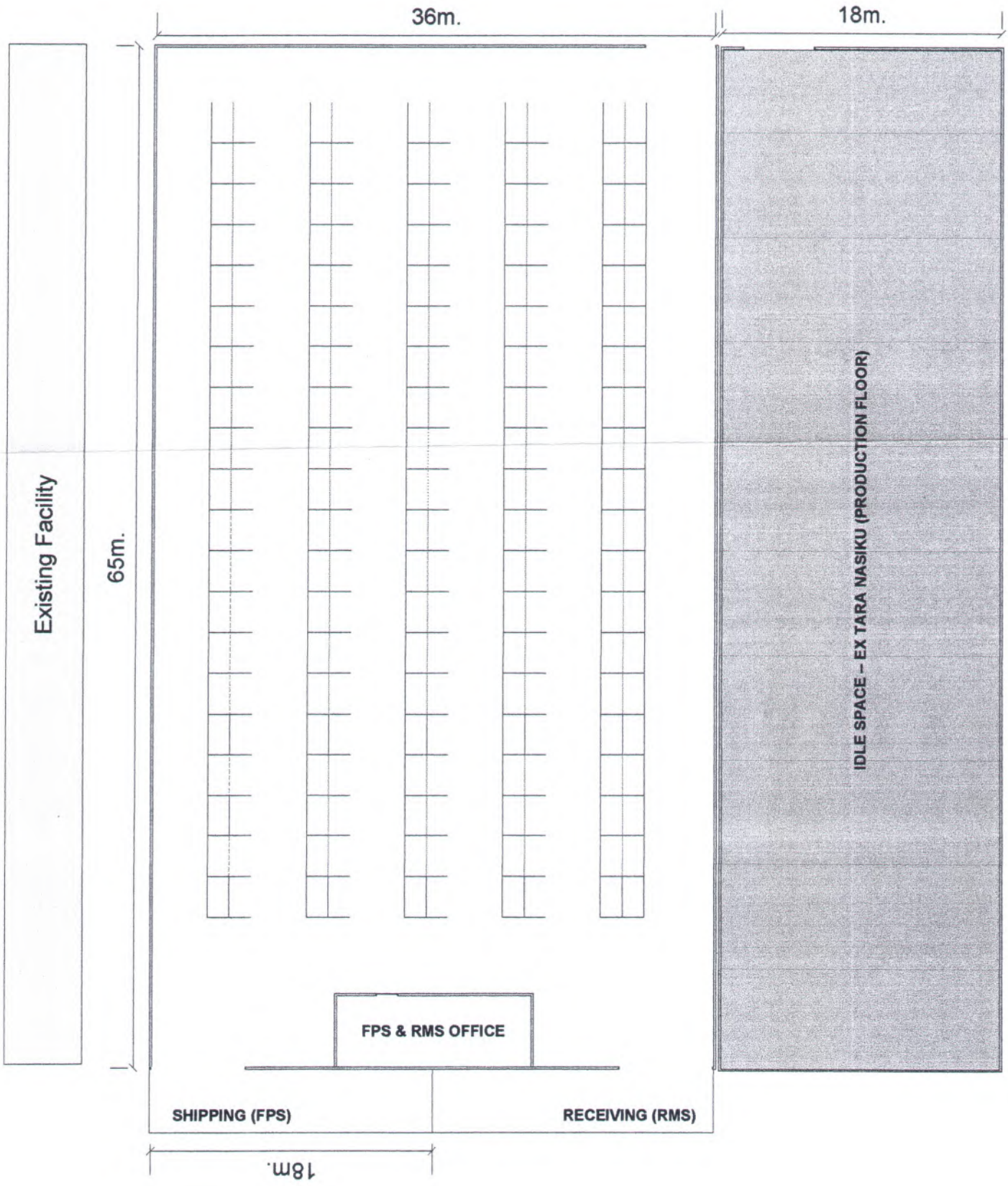
Weighting (Level 2) - Flexibility Perspective

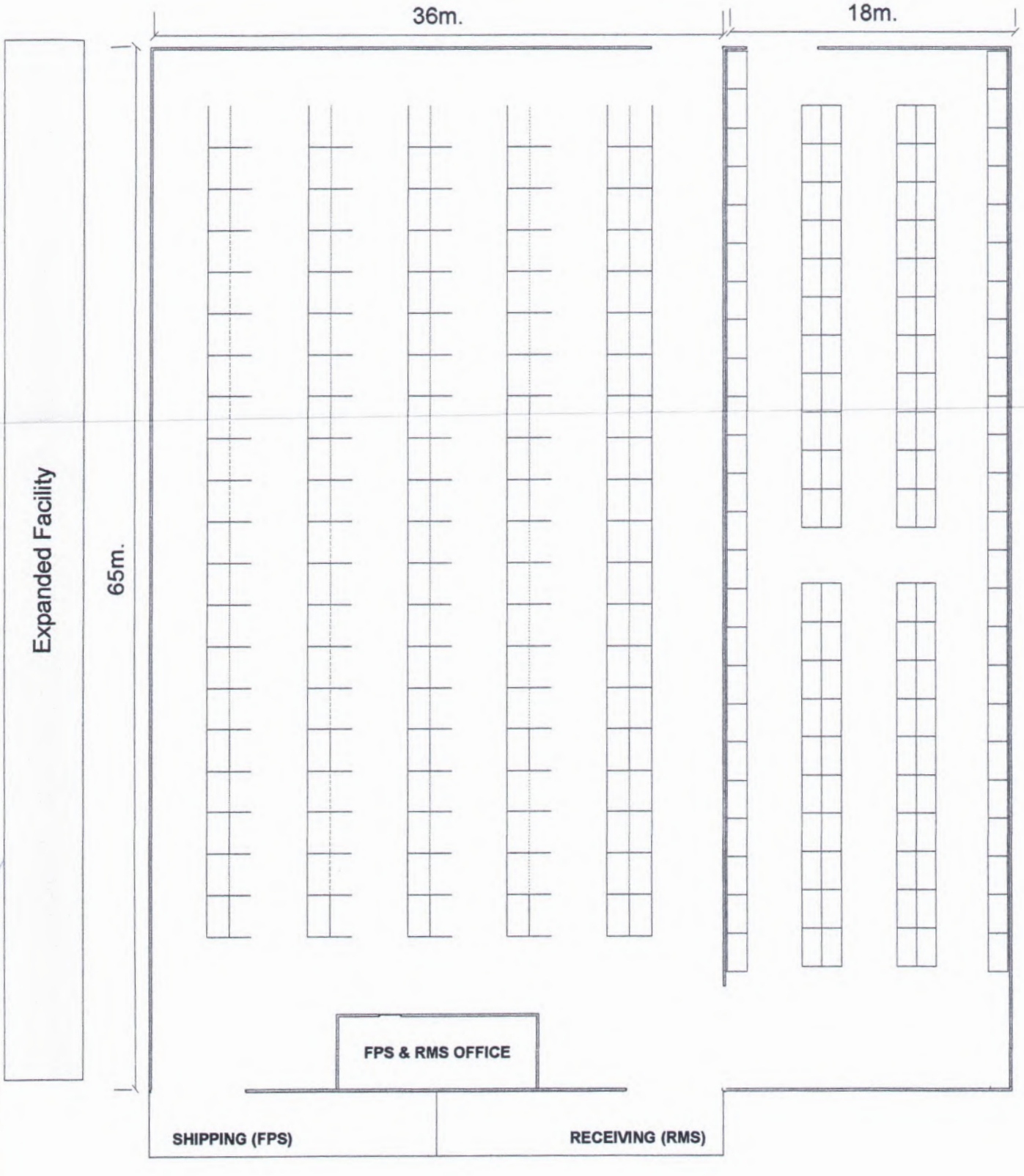
Lease Public Warehouse	9	8	7	6	~~5~~	4	3	2	1	2	3	4	5	6	7	8	9	Facility Adjustment

APPROVAL PAGE

Cikarang, 29 November 2007

Surveyor	Production Manager Plant SCC&C
	
Ardhi Iqra **NRP. 2503 100 056**	**Noer Iman** **NIP. 971275**


36m.
18m.
Existing Facility
65m.
IDLE SPACE – EX TARA NASIKU (PRODUCTION FLOOR)
FPS & RMS OFFICE
SHIPPING (FPS)
RECEIVING (RMS)
18m.


36m.
18m.
Expanded Facility
65m.
FPS & RMS OFFICE
SHIPPING (FPS)
RECEIVING (RMS)

WRITER'S BIOGRAPHY

Writer was born in Bandung, 29 January 1986. He is a child from Drs. Hendra Setiawan and Dra. Lia Nafoliana couple. He has one sister and one little brother, named Jella and Adli.

The writer grew in a great culture of a family. Sincerity, devotion and knowledge are things that always putted as a customary. That is why education is always become the priority in the family. Writer graduated from Al-Marjan Kindergarten (Bekasi) in 1991, moved from As-syafiiyah Elementary School (Bekasi) in 1996 to 03 Pagi Elementary School (Jakarta) and graduated in 1997. Afterwards the education continue in 109 Junior High School (Jakarta), then 71 Senior High School (Jakarta), and then by passing national intake selection in 2003, the writer start his education in Sepuluh Nopember Institute of Technology (Surabaya), majoring Industrial Engineering.

During his time in the university, writer had involved in several organizations and had some experiences. Some of those experiences are: Head of Public Relation Department in IMAJAS (2004), Head of Entrepreneur Department in HMTI (2005), Chief committee for Industrial Engineering Study Tour to Jakarta and Bandung (2005), Supervising Committee in the Industrial Engineering Freshmen Orientation (2005), Head of Internal and Public Relation of Ergonomics and Work Design Laboratory (2006), and then Assistant Coordinator of Ergonomics and Work Design Laboratory (2007). He also once gets the opportunity to follow the basic management workshop of Industrial Engineering Department (P3MTI) in 2004.

In the academic activities, the writer has several experiences. He is an assistant for Ergonomics and Work Design Practical Work (2006 – 2008), and assistant for Facility Planning Lecture (2006). He also once trusted to be a trainer in basic level optimization using Lindo (2006) and basic level workshop in work measurement using work sampling method (2007).

Writer had interest in several subjects of Industrial Engineering, the most of them are facility planning, ergonomics, work measurement and work design.