MANAGEMENT INFORMATION SYSTEM OF DISTRIBUTION LPG IN PT.LIMAS RAGA INTI BANDUNG

Rismawanti[1], Riani Lubis [2]

[1,2] Teknik Informatika - Universitas Komputer Indonesia
Jl. Dipatiukur 112-114 Bandung
E-mail : rismawanti95@gmail.com[1], riani.lubis@email.unikom.ac.id[2]

ABSTRACT

PT. Limas Raga Inti is one of the distributors engaged in the distribution of LPG in the city of Bandung. The process of distribution or distribution of LPG is done from PERTAMINA to the central warehouse and to every warehouse of branch company according to company request, then conducted distribution by AM Logistics from company to every hotel, restaurant, and agent. During this time AM Logistic difficulty in determining the amount of LPG to be ordered to PERTAMINA so that the LPG stock in the warehouse to meet the demand, this causes the distribution of LPG to the consumer sometimes not in accordance with the demand. While in the sales, sales head difficulties in determining the delivery schedule due to the amount of LPG that does not meet the demand resulting in LPG delivery delay. Based on the problems that occurred in PT.Limas Raga Inti Bandung, solving the solution is how to build a distribution management information system to deal with the difficulty in determining the LPG stock which must be ordered as well as the scheduling planning of delivery in order to no longer shortage or delay of delivery. The method used to overcome the lack of LPG procurement is to forecast using Single Moving Average method, while for the planning of delivery scheduling using Distribution Requirement Planning method. Based on the test results, it can be concluded that this system is able to help AM Logistics and Sales Head at PT. Limas Raga Inti Bandung in finding solutions to solve the problem of determining procurement and shipping schedule.

Keywords : Management Information System (MIS), Distribution, Procurement, Single Moving Average, Distribution Requirement Planning.

1. INTRODUCTION

PT. Limas Raga Inti is one of the distributors engaged in the distribution of LPG in the city of Bandung. The process of distribution or distribution of LPG is done from PERTAMINA to the central warehouse and to every branch warehouse of PT. Limas Raga Core according to company request, then conducted the distribution from company to every hotel, restaurant, and agent. Based on the results of interviews with Mr. Richi Afrigani as Head of LPG Sales at PT.Limas Raga Inti, so far the number of consumer demand every month is uncertain, so AM Logistics difficulty in determining the amount of LPG to be ordered to PERTAMINA LPG stock to meet demand. While in the sales, there is currently no scheduling for the delivery of LPG resulting in the delivery is not well organized which affects the delay in delivery of LPG from PT.Limas Raga Inti Bandung to the consumer so that the delivery activity becomes hampered.

Pursuant to that matter, hence this research aims to build a distribution management information system by adopting method of Distribution Requirement Planning (DRP) which can assist data processing process of LPG distribution so that expected benefit of LPG distribution data processing at PT Limas Raga Inti can be well implemented All existing processes. DRP itself is a method that can be used for distribution of goods to customers. Where this method is able to provide information that is quite helpful in terms of sales forecasting and thus the company is able to provide sufficient stock of goods to meet customer demand.

In this thesis, this discussion is made into a thesis entitled "LPG Distribution Management Information System at PT. Limas Raga Inti Bandung ". While the purpose of this research is:

1. Help AM Logistics in determining the procurement of the amount of LPG that will be in the message to PERTAMINA.
2. Assist the Head of Sales plan the scheduling of LPG delivery to the consumer.

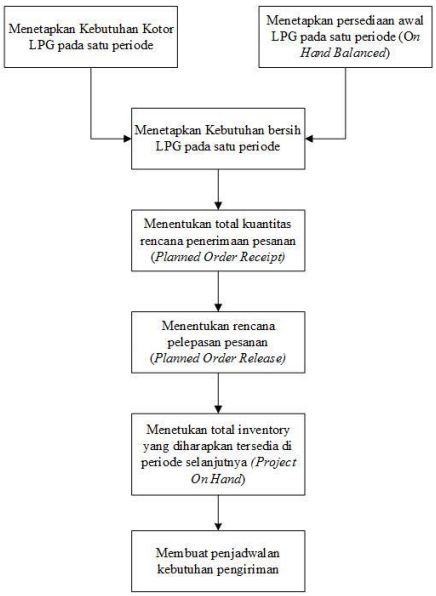
1.1 *Distribution Requirement Planning* (DRP)

The basic logic of DRP is as follows:

1. Gross Requirement / Forecast Demand obtained from forecasting results.
2. From the local distribution forecasting result, calculate Time Phased Net Requirement. The Net Requirement identifies when the inventory level (Scheduled Receipt - Projected On Hand Period earlier) is met by the Gross Requirement for a period.

Net Requirement = (Gross Requirement + Safety Stock) - (Schedule Receipt + Projected On Hand Previous Period)
The recorded Net Requirement value is a positive value.
3. After that is generated a Planned Order Receipt a number of Net Requirement (certain lot size) in that period.
4. Specified the day were to make the order (Planned Order Release) by reducing the scheduled day Planned Order Receipt with Lead Time.
5. In Projected On Hand calculated in that period, with equation 2.2
Projected On Hand = (On Hand Previous Period + Schedule Receipt + Planned Order Receipt) - (Gross Requirement)
6. The amount of Planned Order Release becomes Gross Requirement in the same period for the next level of the distribution network [5]

The stages of the process in the method of Distribution Requirement Planning (DRP) consist of:



Gambar 1.2 Stages of DRP

1.2 *Single Moving Average Forecasting Method*

The single moving average method uses a number of actual data of new requests to generate predictive value for future demand. This method will be effectively applied if we can assume that the market demand for the product will remain stable over time. This method has two special properties that are to make forecasts require data.

Historically over a period of time, the longer moving averages will result in a smoother moving average, a systematic moving average can be calculated by the following equation.

$$S_{t+1} = \frac{xt + xt-1 + \cdots + xt-n+1}{n}$$

Information:
S_{t+1} = Forecast for period t+1.
X_t = Data in period t.
N = Duration Moving Averages [7]

2. RESEARCH CONTENTS

2.1 Analysis of Distribution Requirement Planning Method

DRP method has several stages such as determining Lead Time, determining Lot Size, calculating Safety Stock, and Making DRP schedule. In making the schedule DRP consists of several stages as in Figure 1.2 above.

Before making a schedule of distribution / DRP needs planning, it must first be determined the value of lead time, lot size, and safety stock. By doing the calculation as follows:

1. Determining *Lead Time*

Lead Time is the time between the time the company makes an order to PERTAMINA until the order arrives company. The determination of lead time is based on company policy.

2. Specify *Lot Size*

Lot Size is the amount of LPG ordered in one order. Based on the Gross Requirement data of the previous period or February, it can be known Lot Size for LPG 12 KG is as much as 2480 tubes.

3. Calculating *Safety Stock*

Safety stock or security stock serves to protect errors in predicting demand during lead time. Here is the calculation of safety stock for LPG 12 KG:
Information :
Forecasting amount in March 2017 = 2408 tube
The number of working days in a month = 26 days
Lead time of procurement of goods to supplier (l) = 2 days
Average order in one month (d) = 2408/26 = 92.61
Standard deviation of March 2017 forecasting amount (sd) = 93/10 = 9.3 tubes
Standard deviation from lead time (sl) = 2/10 = 0.2
Sevice level 95% (Z) = 1.645
Safety Stock = Z x Sdl

$$Sdl = \sqrt{(d^2 x\, Sl^2) + (l\, x\, Sd^2)}$$
$$Sdl = \sqrt{(92.61^2 x\ 0.2^2) + (2\ x\ 9.3^2)}$$
$$Sdl = \sqrt{(8576.61x\ 0.04) + (2\ x\ 86.49)}$$
$$Sdl = \sqrt{(343.06) + (172.98)}$$
$$Sdl = \sqrt{516.04}$$
$$Sdl = 22.71$$

Safety Stock = 1.645 x 22.71 = 37.35 => 37 tubes (rounding result)

Based on the calculation of safety stock that has been done then PT Limas Raga Inti Bandung must provide safety stock LPG 12 KG of 37 tubes.

4. Make a Schedule of *Distribution Requirement Planning* (DRP)

The stages of making the Distribution Requirement Planning as described in Figure 1.2 are as follows:

a. Establish gross requirement of LPG 12 KG at one period

The gross requirement is done by using forecasting method. In determining the method of forecasting that will be used on the system to be built, first tested the demand data for each product sampled using several different forecasting methods to get the smallest error rate.

Based on the comparison of forecasting that has been done, it can be concluded that the single moving average method with the previous 5-month data produced the smallest error. From the table, the MSE value of the 5-month moving is 19544.04. The smallest error indicates that the accuracy of forecasting results is high. Forecasting results of 12 KG LPG Demand for the next period with 5-month moving, the Company is recommended to procure for LPG 12 KG in the next period that is March 2017 with Total 2408 tubes. Obtained from the calculation:

$$F_7 = (X_2 + X_3 + X_4 + X_5 + X_6) / N$$
$$= (2697+2265+2135+2492+2451)/5$$
$$= 2408 \text{ tubes}$$

So, the result of Gross Requirement by forecasting with Single Moving Average method is as much as 2408 tubes.

b. Assign inventory held at the beginning of the period (On Hand Balance) ie period 6 (Month of February).

On Hand Balance is the total supply held at the beginning of a certain period that will be used in the next period, in this case, example, which will be calculated procurement process is March, the On Hand Balance used in the previous period or February.

Tabel 2.1 On Hand Balanced

Bulan	On Hand Balanced (Sisa Persediaan) LPG 12 KG
September	33 Tabung
Oktober	-
November	35 Tabung
Desember	165 Tabung
Januari	8 Tabung
Februari	29 Tabung

In the sample data, ie the 6th or the month of February has 29 tubes remaining 12 kg of LPG stock. Then these results will be used for the next stage, ie to calculate the Net Requirement or net requirement.

c. Determining Net Requirements

Net Requirements indicate the amount of LPG that the company needs to make reservations to PERTAMINA in order to be able to meet the demand in that period. The data needed to calculate the net requirement is Gross Requirements data and Project on Hand data for period 6 from the previous stage.

How to process it with the following equation:

Net Requirement = (2408 + 0) – (0 + 29)
= **2379** tube

In the calculation of net requirements for example cases of LPG 12 KG obtained for 2379 tubes as a net requirement of LPG 12 KG.

d. Determining the total quantity of Planned Order Receipt

Planned Order Receipts is the number of refill orders that have been planned to be received for a certain period to meet net requirements. The value in the planned order receipts is always equal to the value in net requirements.

So the value of Planned Order Receipt for LPG 12 KG in the period to 7 or March is 2379 tube.

e. Determining a Planned Order Release

Planned Order Release is the number of planned orders placed or issued within a certain period for which LPG ordered will be available when needed. Planned order releases always have the same amount of planned order receipts, but are set backward by using the length of waiting time. So big Planned Order Release is equal to 2379 tube.

f. Calculating *Project On Hand*

Project On-Hand is the quantity that is expected to exist in the inventory at the end of the period and is available for demand in the next period. In this phase, the project will be calculated on hand for March 2017.

Projected On Hand = (*On Hand* periode sebelumnya + *Schedule Receipt* + *Planned Order Receipt*) - (*Gross Requirement*)

Projected On Hand = (29 + *0* + 2379) - (2408)
= 0 tube

g. Create table scheduling distribution requirement planning

The final step is to create a schedule of distribution needs based on the steps that have been done from steps 1 through 4. Schedule distribution requirements for LPG 12 KG products are as follows:

Tabel 2.2 Schedule of 12KG LPG Distribution Requirement for March

Safety stock : 37 Lot size : 2480 Lead time : 2 hari	Past due	Maret
Gross Requirement	2311	2408
Schedule Receipts	0	0
Project On Hand	29	0
Net Requirement	2310	2379
Planned Order Receipt	2475	**2379**
Planned Order Release	2379	

2.2 Non-Functional Requirement Analysis

Non-functional requirements analysis is performed to generate details about what the system does when it is implemented. Non-functional requirements analysis includes hardware requirement analysis, software requirement analysis, user/user analysis and encoding analysis. Here is an explanation of each non-functional requirement analysis that exists on the system.

2.2.1 Hardware Requirement Analysis

The minimum requirement analysis of hardware needed in supporting LPG distribution management information system in PT. Limas Raga Inti can be seen in the following table:

Tabel 2.3 Hardware Analysis

No	Perangkat Keras	Spesifikasi
1.	Processor	Kecepatan 1,8 Ghz
2.	Monitor	Monitor 14'' Resolusi 1024 x 768
3.	Memori	RAM 1 GB
4.	Hardisk	256 GB
5.	VGA	256 MB
6.	Perangkat Keras Pendukung	Mosue, Keyboard

2.2.2 Software Requirements Analysis

Requirement analysis of minimum software needed to support LPG distribution management information system in PT. Limas Raga Inti can be seen in the following table:

Tabel 2.4 Software Analysis

No.	Perangkat Lunak	Spesifikasi
1.	Sistem Operasi	Microsoft Windows XP
2.	*Web Browser*	Internet explorer, Mozilla firefox

2.2.3 User Analysis

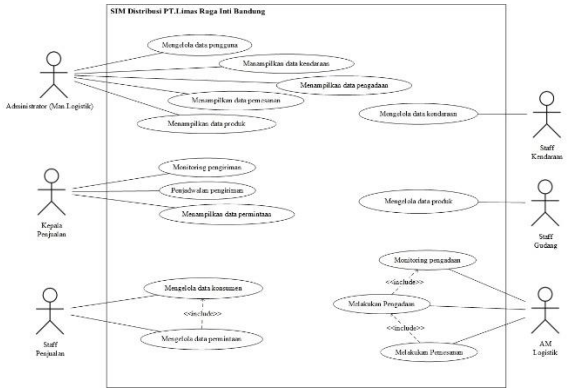
User Information System is intended for Logistics Manager, AM Logistics, Head of Sales, Vehicle Staff, Sales Staff, and Warehouse Staff in PT.Limas Raga Inti Bandung.

2.3 Functional Requirement Analysis

The analysis of the functional requirements of the LPG distribution management information system consists of the Use Case diagram and the class diagram.

2.3.1 Use Case Diagram

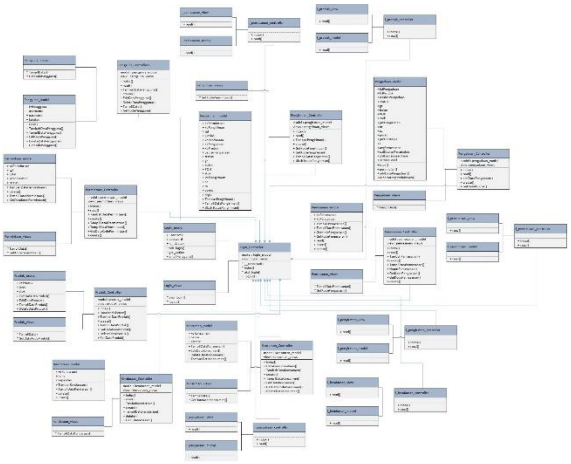
Use Case Diagram Distribution Management Information System in PT.Limas Raga Inti Bandung can be seen in the following figure:



Gambar 2.1 *Use Case Diagram*

2.3.2 Class Diagram

Class diagram Management Information System LPG Distribution in PT.Limas Raga Inti Bandung can be seen in the following figure:



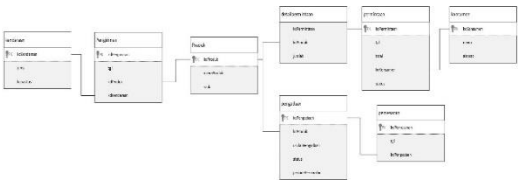
Gambar 2.3 *Class Diagram*

2.4 System Design

System Design consists of designing the relation diagram and menu structure design.

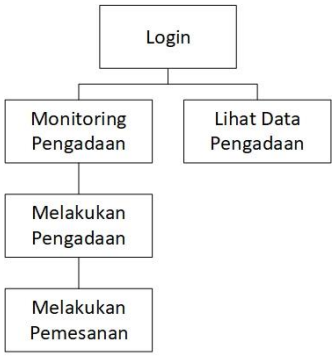
2.4.1 Design of Relation Chart

Relationship diagram The system to be built is described in the following figure:



Gambar 2.5 Relation Diagram

The design of AM Logistics menu structure can be seen in the following figure:

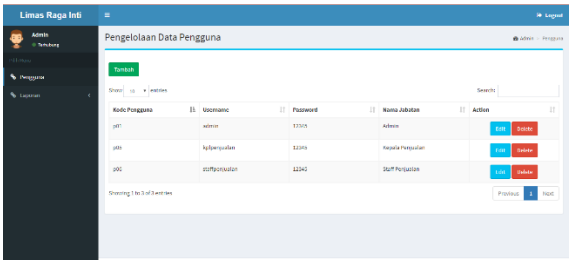


Gambar 2.7 AM Logistic Structure Menu

2.5 Interface Implementation

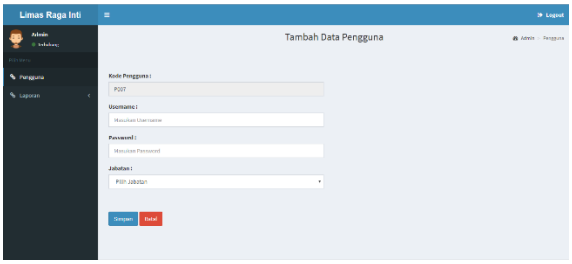
The interface implementation consists of a pre-designed interface implementation.

2.5.1 User Interface User Data Implementation



Gambar 2.10 User Interface Main Menu

2.5.2 Interface Implementation Menu Add User Data



Gambar 2.11 Add Data User Interface Menu

2.6 System Testing

Testing the system that is done blackbox testing and interview to the user application.

2.6.1 Blackbox Testing Scenario

Testing scenario in lpg distribution management information system that will be done can be seen in the following table:

Tabel 2.5 System Testing Scenario

Kelas Uji	Detail Pengujian	Jenis Pengujian	Hasil Pengujian
Laporan permintaan	Pencarian	Black box	[√] diterima [ ] ditolak
Laporan pengiriman	Pencarian	Black box	[√] diterima [ ] ditolak
Pengolahan Konsumen	Tambah data konsumen	Black box	[√] diterima [ ] ditolak
	Ubah data konsumen	Black box	[√] diterima [ ] ditolak
	Hapus data konsumen	Black box	[√] diterima [ ] ditolak
Pengolahan permintaan	Tambah data permintaan	Black box	[√] diterima [ ] ditolak
	Ubah data permintaan	Black box	[√] diterima [ ] ditolak
	Hapus data permintaan	Black box	[√] diterima [ ] ditolak
	Tambah detail permintaan	Black box	[√] diterima [ ] ditolak
Pengolahan pegiriman	Tambah pengiriman	Black box	[√] diterima [ ] ditolak

2.6.2 Conclusion Functional Testing

Based on the test results with the case of test samples that have been done on Distribution Management Information System in PT.Limas Raga Inti Bandung it gives the conclusion that the process is in accordance with the expected. Filtering process errors in the form of messages that appear is quite maximal. Functionally the system can already be considered to meet the expected needs.

2.6.3 User Interview Result Scenarios

This test is done by conducting direct test at the research place by using interview technique shown to Logistics Manager, AM Logistics, Vehicle Staff, Sales Head, Warehouse Staff, and Sales Staff.

Tabel 2.6 User Interview Result

No	User	Jabatan	Hasil Penqujian
4	Staffpenjualan	Staff Penjualan	Kesimpulan berdasarkan hasil wawancara dengan responden dapat disimpulkan bahwa sistem yang dibangun untuk level staff penjualan sudah memenuhi kebutuhan pengguna dengan baik.
5	Amlogistik	AM Logistik	Kesimpulan berdasarkan hasil wawancara dengan responden dapat disimpulkan bahwa sistem yang dibangun untuk level AM Logistik sudah memenuhi kebutuhan pengguna dengan baik.
6	Kplpenjualan	Kepala Penjualan	Kesimpulan berdasarkan hasil wawancara dengan responden dapat disimpulkan bahwa sistem yang dibangun untuk level Kepala Penjualan sudah memenuhi kebutuhan pengguna dengan baik.

2.6.4 Conclusion Testing User Interview Results

Based on the tests that have been done, it can be concluded that the system in terms of functionality has met the needs of employees based on research objectives. The overall look of the system is good.

3. CLOSING

3.1 Conclusions

The conclusion that can be obtained after doing analysis and testing on LPG Distribution Management Information System in PT.Limas Raga Inti which is built is:

1. This information system can assist AM Logistics in determining the amount of LPG procurement that will be in the message to PERTAMINA by using the method of Single Moving Average forecasting..
2. Built-in system can help Head of Sales plan scheduling kebutuhna delivery of LPG to the consumer and can control the distribution activities

3.2 Suggestions

Based on the conclusions that have been put forward, basically the system built already meet the intended purpose and objectives, but the system is built need further development for the system to be better and can maximize its function, then the suggestions are expected to build a distribution system LPG This to be better is:

1. . Further development of this information system is needed, especially in terms of back-up automatically, display reports, and print reports, so as to reduce the possibility of things that are not desirable such as data loss due to damage to computers and so forth.
2. Perform additional shipping cost calculation in DRP method. In order for shipping costs incurred by the company can be more efficient.

BIBLIOGRAPHY

[1] K. C. Laudon, Sistem Informasi Manajemen, Salemba Empat.

[2] G. B. Davis, Kerangka Dasar Sistem Informasi Manajemen, PT.Gramedia.

[3] L. Haussen, Writer, *Continuous Improvement Methodology-PDCA*. [Performance]. Advocate Health Care, 2012.

[4] D. M.Sc, Ilmu Pengetahuan Sosial Ekonomi, Erlangga.

[5] R. S. Surya, "Implementasi Metode Distribution Requirement Planning pada CV Karya Mandiri Sejahtera," *Jurnal Ilmiah Mahasiswa Universitas Surabaya*, vol. 2 No.1, 2013.

[6] S. Assauri, Teknik & Metoda Peramalan penerapannya dalam ekonomi dan dunia usaha, Fakultas Ekonomi Universitas Indonesia.

[7] M. Ekananda, Analisis Data Time Series, Bekasi: Mitrawacanamedia, 2014.

[8] M. R, Manajemen Logistik Terintegrasi, Jakarta: PPM Manajemen, 2015.

[9] O. Muhammad Muslihudin, Analisis dan Perancangan Sistem Informasi Menggunakan Model Terstruktur dan UML, Yogyakarta: CV ANDI OFFSET, 2016.

[10] I. B. H. M.T, Rekayasa Sistem Berorientasi Objek, Bandung: Informatika Bandung, 2004.

[11] M. Fowler, UML Distilled 3th Ed. Panduan Singkat Bahasa Pemodelan Objek Standar, Jakarta: Andi, 2005.

[12] J. Hutahean, Konsep Sistem Informasi, Yogyakarta: Deepublish, 2014.

[13] H. Kristanto, Konsep dan Perancangan DATABASE, ANDI.

[14] D. D. Prasetyo, Belajar Sendiri Administrasi Database Server MySQL, PT Elex Media Komputindo.

[15] B. Sunarfrihantono, PHP dan MySQL untuk web, Yogyakarta: Andi, 2002.

[16] R. Ph.d, Rekayasa Perangkat Lunak, Yogyakarta: Andi, 2010.