Business Intelligence System For Logistics and Distribution, PETRONAS Chemicals Marketing

By
Saleemah Sadoh

Progress Report of

Extended Proposal submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Business Information System)

SEPTEMBER 2012

UniversitiTeknologi PETRONAS
Bandar Seri Iskandar,
31750 Tronoh
Perak Darul Ridzuan

ABSTRACT

Business Intelligence system is specialized tools for data analysis, query , and reporting that support organizational decision-making which will enhance the performance of a range of business process. This project is developed for Logistic and Distribution Department of PCG. The objectives of developing this system are to find the appropriate tool to collect, store and analyze data that organization has, also to analyze those data. Other than that, is to increase confidence in making decisions in order to develop a business report. This project is using a technology of data warehousing, web-based in order to input data as well as technology of Business Intelligence dashboard as a tool to assist the user to analyze the data. The result consists of the findings from the literature review section, conclusion and recommendation conclude the whole chapter of the project and recommendation for future implementation of the project.

LIST OF FIGURES

LIST OF TABLES

Table 3.2:Gantt Chart

19

TABLE OF CONTENT

CHAPTER 1

INTRODUCTION

Modern business generates huge volumes of data and information on a daily basis. The recent advancements in information technology have given organizations the ability to capture and store these data in an efficient and effective manner. However, there is a widening gap between this data storage and usage of data. One of the solution introduced by Information Technologist in narrow down the gap between this data storage and usage of data is Business Intelligence.

1.1 Introduction of Business Intelligence

1.1.1 Business Intelligence

Business Intelligence, or BI for short, is a term that refers to competencies, processes, technologies, applications and practices used to support evidence-based decision making in organizations. In the widest sense it can be defined as a collection of approaches for gathering, storing, analyzing and providing access to data that helps users to gain insights and make better fact-based business decision.

1.1.2 What is Business Intelligence used for?

Organizations are using Business Intelligence to gain data-driven insights on anything related to business performance. It is used to understand and improve performance and to cut costs and identify new business opportunities, this can include, among many other things:

- Analyzing customer behaviors, buying patterns and sales trends.
- Measuring, tracking and predicting sales and financial performance
- Budgeting and financial planning and forecasting
- Tracking the performance of marketing campaigns
- Optimizing processes and operational performance

- Improving delivery and supply chain effectiveness
- Web and e-commerce analytics
- Customer relationship management
- Risk analysis
- Strategic value driver analysis

1.1.3 The basics of Business Intelligence

The basic components of Business Intelligence are gathering, storing, analyzing and providing access to data as shown in the figure below:

Figure 1.1: The basic components of Business Intelligence

- **Gathering Data**

Gathering data are concerned with collecting or accessing data which can then be used to inform decision making. Gathering data can come in many formats and basically refers to the automated measurement and collection of performance data. For example, these can come from transactional systems that keep logs of past

transactions, point-of-sale systems, web site software, production systems that measure and track quality, etc. A major challenge of gathering data is making sure that the relevant data is collected in the right way at the right time. If the data quality is not controlled at the data gathering stage then it can jeopardize the entire BI efforts that might follow – always remember the old adage - garbage in garbage out.

- **Storing Data**

Storing Data is concerned with making sure the data are filed and stored in appropriate ways to ensure it can be found and used for analysis and reporting. When storing data the same basic principles apply that you would use to store physical goods – say books in a library – you are trying to find the most logical structure that will allow you to easily find and use the data. The advantages of modern data-bases (often called data warehouses because of the large volumes of data) is that they allow multi-dimensional formats so you can store the same data under different categories – also called data marts or data-warehouse access layers. Like in the physical world, good data storage starts with the needs and requirements of the end users and a clear understanding of what they want to use the data for.

- **Analyzing Data**

The next component of BI is analyzing the data. Here we take the data that has been gathered and inspect, transform or model it in order to gain new insights that will support our business decision making. Data analysis comes in many different formats and approaches, both quantitative and qualitative. Analysis techniques include the use of statistical tools, data mining approaches as well as visual analytics or even analysis of unstructured data such as text or pictures.

- **Providing Access**

In order to support decision making the decision makers need to have access to the data. Access is needed to perform analysis or to view the results of the analysis. The former is provided by the latest software tools that allow end-users to perform data

analysis while the latter is provided through reporting, dashboard and scorecard applications.

1.2 Problem Statement

Centralized Logistic & Distribution Department in PCG is a new established department in PCG. This Department can significantly influence the success of a company. These days it operates in a dynamic, complex environment and in order to operate efficiently and effectively it has to create appropriate structures and make use of suitable instruments.

A decision-making process is an important process for any business. Logistics and Distribution Department, PETRONAS Chemicals Group has lots of data and information in developing a business report hence it's hard for them to take all this information to create a business report, the department has faced problems regarding to these data. Therefore, the problem statement for this project are:

- Datais often incomplete and scattered
- Datais not integrated.
- No appropriate tools for the department to collect, store and analyze data they have to develop the business report

1.3 Objective and Scope of Study

The objective of this project is to develop an archive business decision-making system of Centralized Logistics and Distribution Department (CLD). The objectives are:

- To find the appropriate tool to collect, store and analyze department's data
- To analyze data they have and develop the business report
- To increase confidence in making decision and developing business report

1.4 Scope of Study

The primary objectives of this project is to design a decision-based making system for Centralized Logistic and Distribution Department, PCG for them to utilize the system in terms of developing a business report. In line with designing the decision-making system, data warehouse will be built to store the data that has been gathered by the users. To input those data in order to analyze it, web-based will be a platform for users to enter the data.

The software platforms that will be used in this project are MySQL which will used to write a code to store the data, PHP for creating a web to be a platform for input the data. Another main tool used for analyzing the data is BI Dashboard, which is a free open source that can download from an internet.

1.5 Project Feasibility

1.5.1 Technical Feasibility

In terms of familiarity of developer with tools and technology used, the developer is familiar with the tools and technology. However, in creating a data warehouse might cause the developer a trouble but the guidance and suggestion from the expert and supervisor, the developer believes that she can go through it.

The size of the project is small which can be completed within eight months.

1.5.2 Economic Feasibility

This project requires no cost for development purpose. As the software used in this project is an open source which can be downloaded from the internet.

1.5.3 Organizational Feasibility

This project will be used in Logistics and Distribution Department of PCG. The system will be designed according to the department's needs. Logistics and Distribution Department also pay a corporation with the developer to develop the system.

Within eight months, this project can be completed at least the minimum requirements. It also depends on the amount of scope creep that would be encountered which is inevitable. Due to the scope creep and testing difficulties, it is also difficult to gauge how perfect the system can be within the time frame.

CHAPTER 2

LITERATURE REVIEW

2.1 DECISION SUPPORT SYSTEMS

During the 1970s and 1980s, the concept of decision support systems (DSS) grew and evolved out of two previous types of computer support for decision making. One was management information systems (MIS), which provided (1) scheduled reports for well-defined information needs, (2) demand reports for ad hoc information requests, and (3) the ability to query a database for specific data. The second contributing discipline was operations research/management science (OR/MS), which used mathematical models to analyze and understand specific problems.

The definition of DSS, which has evolved since the 1970s and prevails today, was described in *Building Effective Decision Support Systems*, by Ralph Sprague and Eric Carlson [1]. They define DSS as:

- Computer-based systems
- That help decision makers
- Confront ill-structured problems
- Through direct interaction
- With data and analysis models.

This definition can be taken from the narrow or broad point of view. The narrow view shows the DSS as a system that essentially solve or give options for solving a given problem. The decision process is structured in a hierarchical manner, the user inputs various parameters, and the DSS essentially evaluates the relative impact of doing *x* instead of *y*. The broader definition incorporates the above narrow definition

but also includes other technologies that support decision making such as knowledge or information discovery systems, database systems, and geographic information systems (GIS).[2, 3, 4, 5]

2.2 BUSINESS INTELLIGENCE

2.2.1 Definition of Business Intelligence

Business intelligence is a new term in information technology. The meaning of business intelligence differs from context to context [9].

The term was first used by Gartner and popularized by analyst Howard Dresner. It describes the process of turning data into information and then into knowledge. The intelligence is claimed to be more useful to the user as it passes through each step. BI describes a set of concepts and methods to improve business decision making by using fact based support systems. Gartners's definition of business intelligence includes all the ways an enterprise can explore, access and analyze information in the data warehouse to develop insights that lead to improved, informed decisions. BI tools include ad hoc query, report writing, decision support systems, executive information systems (Key Performance Indicators) and techniques such as statistical analysis and online analytical processing (OLAP).

In 1989 Howard Dresner (later a Gartner Group analyst) proposed "business intelligence" as an umbrella term to describe "concepts and methods to improve business decision making by using fact-based support systems." It was not until the late 1990s that this usage was widespread [10].

While Safeer and Zafar was giving the definition of BI as Business Intelligence (BI) is a wide category of skills, processes, technologies, applications and practices to support enterprise users make better and efficient decision making[11].

Another definition is from Stackowiak et al. (2007) define Business Intelligence as the process of taking large amounts of data, analyzing that data, and presenting the

high-level set of reports that condense the essence of that data into the basis of business actions, enabling management to make fundamental daily business decisions.

Cui et al, (2007) views Business Intelligence as a way and a method of improving business performance by providing powerful assists for the executive decision maker to enable them to have actionable information at hand.

Zeng et al. (2006) define Business Intelligence as "the process of collection, treatment and diffusion of information that has an objective, the reduction of uncertainty in the making of all strategic decisions".

One of most complete definitions of the business intelligence can be found on the IBM' web-site:
"Business intelligence is the gathering, managing, analyzing and sharing of information in order to gain insights that can be used to make better decisions. Business intelligence turns information into intelligence, intelligence into knowledge, and knowledge into business wisdom. Combining advanced techniques such as data warehousing, data mining, and decision support, business intelligence systems offer the ability to transform information into powerful customer relationship management systems that can help create stronger, more profitable relationships, identify new business opportunities – even anticipate customer demands."

Business Intelligence (BI) can be seen as an umbrella that covers a whole range of concepts. BI can be approached roughly as being a Data Warehouse, with three layers on top of it: Queries & Reports, OnLine Analytical Processing and Data Mining (see the pyramid below). Authors and companies adopt this ordering widely. However, other orderings exist as well, with the result that some contradict each other. That is simply because the boundaries between the different components are very vague.

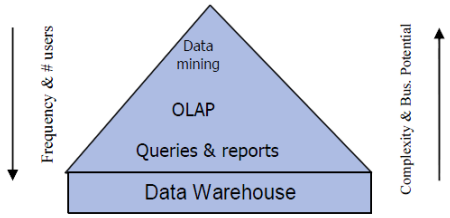


Figure 2.1: Components of business intelligence

The above ordering of components hanging under the umbrella of Business Intelligence is widely adopted. However, it must be said that there are authors who do not adopt these four components, or who name only some of them and add other components. Simon & Shaffer [12], for instance, include Executive information systems (EISs) as an easy-to-use 'extension' of OLAP. But then again, Turban & Aronson [13] state that the term Business Intelligence is used to describe the new role of EIS. In other words, they mean it as a replacement.

There are also different views that describe BI as successor of DSS. For example Jonathan Wu in the article Business Intelligence: What is Business Intelligence? [14] says: "The next generation of DSS applications evolved into business intelligence systems. These applications provide users with the ability to easily extract data from one or more different sources and subject matters. Formatting the data for a report or graphical representation is also easier. In addition, BI applications provide users with the capability of multidimensional analysis. For example, users can drill down on an income statement moving from net sales to sales by product to sales by product/region and, finally, to sales by product/region/customer. This capability provides users with the ability to answer questions such as: What was the sales mix of products sold? Which geographic regions did we sell the most and the least products? Who are our top customers by geographic region and by product?"

Against Wu description, D. J. Power covers BI applications into groups of data driven DSS and to make it more complicated, there are BI solution providers involving text mining, web mining and statistical models into their applications.

Business Intelligence has long offered the promise of letting companies gather, store, access, and analyze huge amounts of data so that they can make better decisions regarding customers, suppliers, employees, logistics, and infrastructure. (Making business intelligence more useful, George Lawton)

Business Intelligence as it is understood today is said to have evolved from the decision support systems which begun in 1960s and developed throughout the mid-80s. Decision Support Systems (DSS) originated in the computer-aided models created to assist with decision making and planning. From DSS, data warehouses, Executive Information Systems, OLAP and business intelligence came into focus beginning in the late 80s.

While the term Business Intelligence is relatively new, computer-based business intelligence system appeared, in one guise or other, close to forty years ago. BI as a term replaced decision support, executive information systems, and management information systems [Thomsen,2003]. With each new iteration, capabilities increased as enterprise grew even-more sophisticated in their computational and analytical needs and as computer hardware and software matured.

Demand for Business Intelligence applications continues to grow even at a time when demand for most information technology (IT) products is soft [Soejarto, 2003; Whiting, 2003]

2.2.2 Business Intelligence and Data Warehouse

Often BI applications use data gathered from a data warehouse or a data mart. However, not all data warehouses are used for business intelligence, nor do all business intelligence applications require a data warehouse.

To distinguish between the concepts of business intelligence and data warehouses, Forrester Research often defines business intelligence in one of two ways:

Using a broad definition: "Business Intelligence is a set of methodologies, processes, architectures, and technologies that transform raw data into meaningful and useful information used to enable more effective strategic, tactical, and operational insights and decision-making."[6] When using this definition, business intelligence also includes technologies such as data integration, data quality, data warehousing, master data management, text and content analytics, and many others that the market sometimes lumps into the Information Management segment.

2.2.3 Why Business Intelligence?

In today's age of a shrinking global economy and increased competitiveness, traditional enterprise systems and solutions which increased the efficiency of the transactional systems are reaching a point of flat growth. This is primarily due to the following reasons:- 1) Matured technology and products making innovation challenging 2) Pre-packaged solutions and business processes across all industries, which standardizes growth and efficiency while diluting the "business edge" factor 3) Generation of extremely large amounts of transactional data, but inefficient and siloed reporting on the same.

Through a successful BI initiative, an organization can benefit in the following ways:

- Extract actionable data from the extensive volumes of business transactions.
- Identify profitable customers, reduce costs, and identify profitable products, services and trends.
- Provide an environment which helps in refining or building business processes, planning strategies by applying results from the BI system/solution which make an organization more competitive.

- Provide users with a platform to run customized reports on-the-fly (ad hoc analysis)
- Eliminate the reporting inertia which results from vast amounts of transactional data and reporting silos resulting from multiple systems within an enterprise.
- Provide a single decision support system for the disparate transaction systems that exist in organizations today. This also helps in standardizing the presentation of information.
- Track internal and operational performance within the organization. Evaluate performance on regional, local, departmental and individual basis.

However, before any organization can realize the benefits of a BI solution, they need to first understand the business questions that they are trying to answer and address the business challenges.

CHAPTER 3
METHODOLOGY

3.1 Introduction

The methodology that used in these systems was the waterfall model which includes all the System Development Life Cycle – SLDC. The reason for using the waterfall model was that this system would have to undergo one by one of the stage before it can proceed to the next stage. This is because this system might face the problems in which no one can maintain the system thus the system must run smoothly in order to avoid any problems in the future. The waterfall model built based on the below structure:

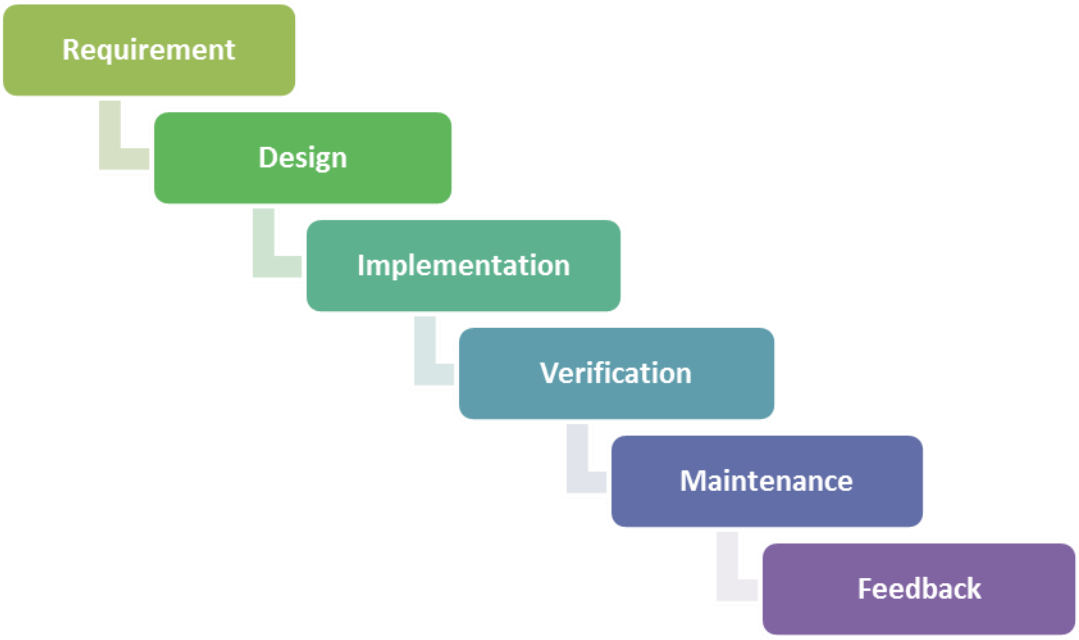


Figure 3.1 Waterfall Model

The waterfall model consists of:

i. Analysis about the system or the software.
ii. Designing the basic design for the to-be system.
iii. Designing the detail design.
iv. Implementation and testing stage.
v. Integration and maintenance of the system.
vi. Feedback from user.

3.2 Project Phases

3.2.1 Phase 1: Definition Study / Analysis

In this phase, research conducted in order to find out about the software, and the objectives of doing the project.

- Outcome

    i. Definition of the project scope.

    ii. Purpose of the project.

3.2.2 Phase 2: Basic Design

After the first phase has been successfully done, the developer will brainstorm about the basic design of the project. This will include all the basic and most important function of the project.

- Outcome

    i. Finalizing the functions of the system.

    ii. Collecting data from the user.

3.2.3 Phase 3: Technical Design / Detail Design

The next phase will only be implemented once the basic design phase approved and satisfied the project team. In this phase, the developer will elaborate and discuss more on detailed on every function in the system that are going to be implemented.

- Outcome

    i. Preliminary layout of the system.

    ii. Functions and technical design are finalized.

    iii. Data warehouse design for storing data.

3.2.4 Phase 4: Construction / Implementation

The construction or the coding will be generated in this phase and it will take quite a time in order to get a good output for all the designing phase.

- Outcome

    i. The design been finalized.

    ii. BI dashboard will be installed.

3.2.5 Phase 5: Testing

In this phase, the whole design and its construction will be tested on its functionality. The developer project teams will together test run the system and try to successfully connect the data warehouse and the system. Any error occurred will be discussed and the system will be under the construction phase one more time for any alteration.

- Outcome

    i. Project system test-run.

3.2.6 Phase 6: Integration

During this phase, the developer will work on integrating the system to the web world. The integration must be successful.

- Outcome

    i. Project implemented in the system.

3.2.7 Phase 7: Management and Maintenance

After the integration phase, maintenance by the developer needed in order to keep the system runningsmoothly and to update all the changes (if any) for the ease of the final user.

- Outcome

    i. System updated and error-free.

3.2.8 Phase 8: Feedback from user

After running the system within the department, the feedback will be given by the user. If the user is satisfied with the system, this system will be fully used for the department

- Outcome

    i. Fully used system within the department.

3.3 Project Timeline

Below are the timeline of the project. The first activity for FYP2 is to update the progress to our respective supervisor.

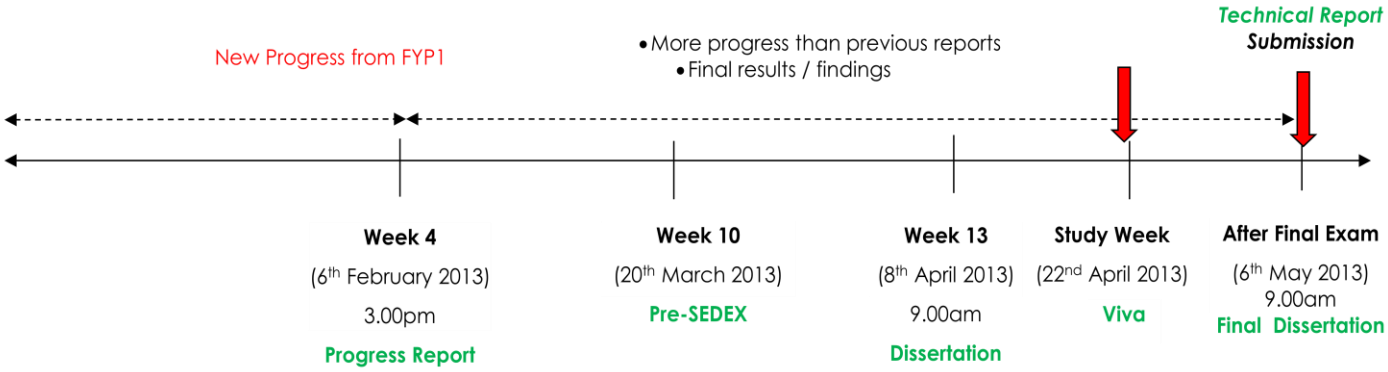


Figure 3.2: The timeline for FYP2

3.4 Gantt chart

To ensure that the project to- be will not run behind schedule, a Gantt chart had been proposed to mark the time and date lines for every step/methodology of the project.

		Week													
No.	**Project Activities**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1	**Data Collection**														
	Collect the raw data														
	Gather and Consolidate the raw data														
2	**Progress Report Submission**														
3	**Building the Data Warehouse**														
	Design a Data Warehouse														
	Building a Data Warehouse														
4	**Creating data input platform**														
5	**Designing and Building Dashboard platform**														
6	**Pre-EDX Presentation**														
7	**Submission of Dissertation**														

Process

Suggested Milestone

Table 3.2 Gantt Chart

3.5 Tools required

To develop this project, there are several tools and softwares need to be filling to run the system. Tools that going to be used are as follows;

• PHP	
• HTML	
• MySQL	
• BI Dashboard	

3.5 Use Case Diagram

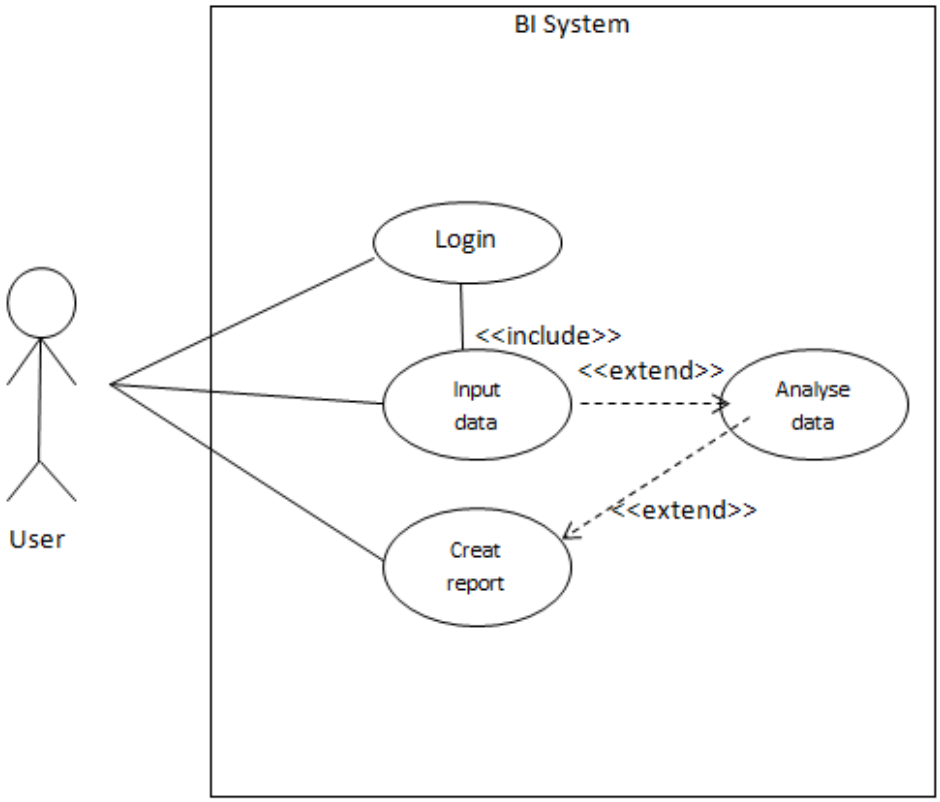


Figure 3.2 : Use case diagram

CHAPTER 4

RESULT AND DISCUSSION

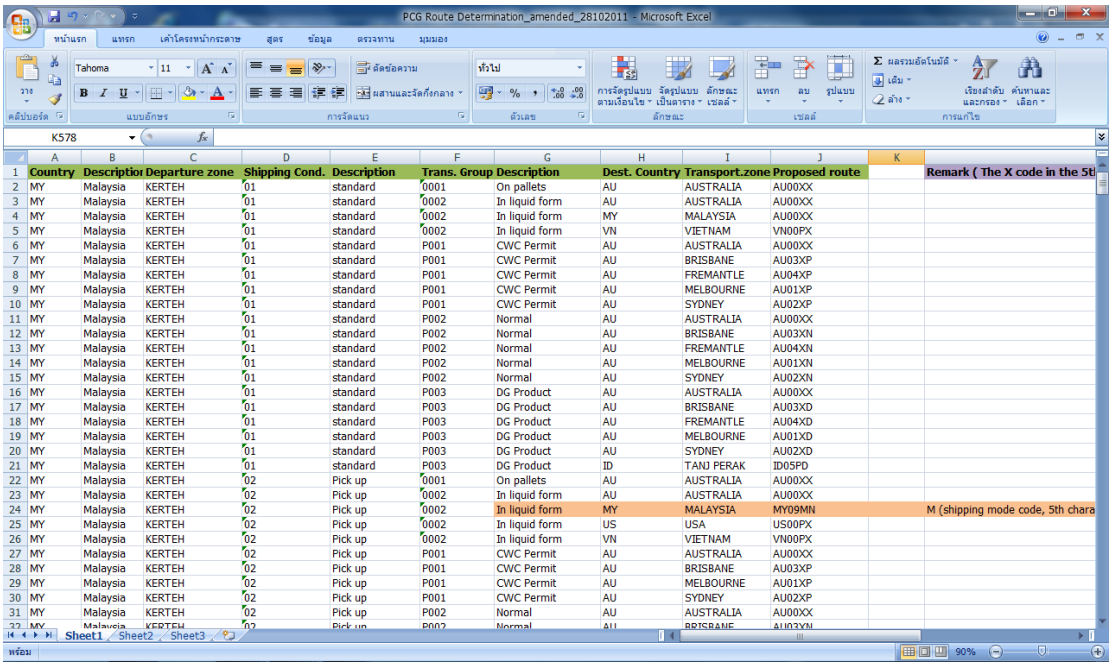
4.1 DATA COLLECTION

The first phase of this project for FYP2 is to collect the raw data from the department. The data that have been collected are raw data which later need to consolidate and modify in one file. The data need to more collect from the department as it is inadequate.

The data that have been collected are:

1. **Route**

   This data has shown the detail of the destination route that the company has. In this data included country, destination zone, shipping condition, destination country, charged fee.



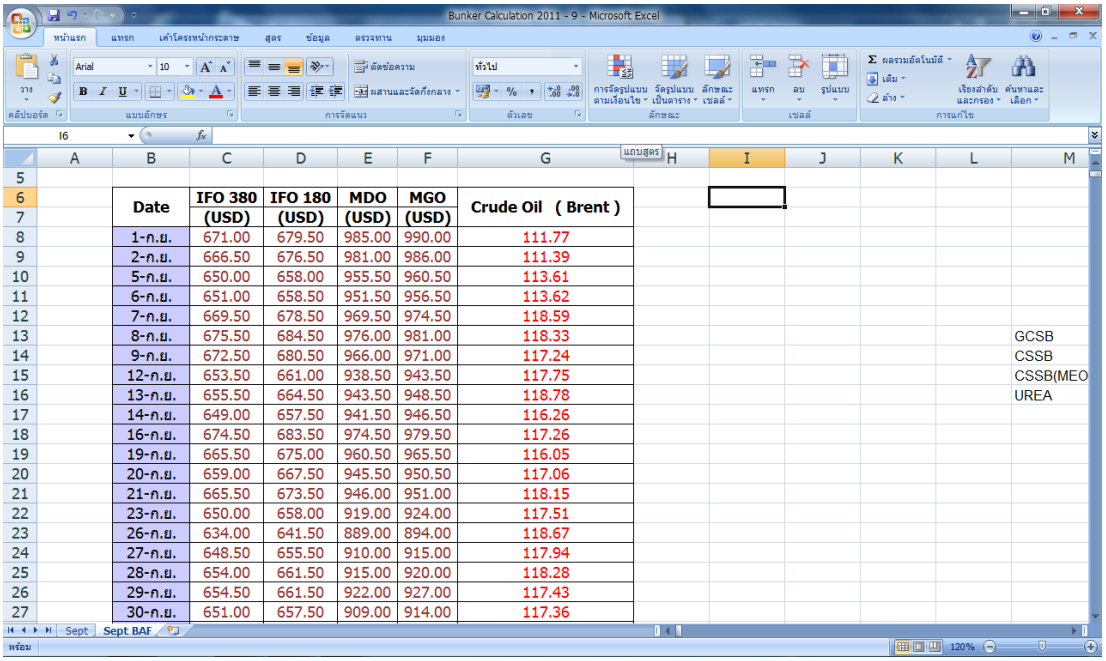
PCG Route Determination_amended_28102011 - Microsoft Excel

Country	Description	Departure zone	Shipping Cond.	Description	Trans. Group	Description	Dest. Country	Transport.zone	Proposed route	Remark (The X code in the St
MY	Malaysia	KERTEH	01	standard	0001	On pallets	AU	AUSTRALIA	AU00XX	
MY	Malaysia	KERTEH	01	standard	0002	In liquid form	AU	AUSTRALIA	AU00XX	
MY	Malaysia	KERTEH	01	standard	0002	In liquid form	MY	MALAYSIA	AU00XX	
MY	Malaysia	KERTEH	01	standard	0002	In liquid form	VN	VIETNAM	VN00PX	
MY	Malaysia	KERTEH	01	standard	P001	CWC Permit	AU	AUSTRALIA	AU00XX	
MY	Malaysia	KERTEH	01	standard	P001	CWC Permit	AU	BRISBANE	AU03XP	
MY	Malaysia	KERTEH	01	standard	P001	CWC Permit	AU	FREMANTLE	AU04XP	
MY	Malaysia	KERTEH	01	standard	P001	CWC Permit	AU	MELBOURNE	AU01XP	
MY	Malaysia	KERTEH	01	standard	P001	CWC Permit	AU	SYDNEY	AU02XP	
MY	Malaysia	KERTEH	01	standard	P002	Normal	AU	AUSTRALIA	AU00XX	
MY	Malaysia	KERTEH	01	standard	P002	Normal	AU	BRISBANE	AU03XN	
MY	Malaysia	KERTEH	01	standard	P002	Normal	AU	FREMANTLE	AU04XN	
MY	Malaysia	KERTEH	01	standard	P002	Normal	AU	MELBOURNE	AU01XN	
MY	Malaysia	KERTEH	01	standard	P002	Normal	AU	SYDNEY	AU02XN	
MY	Malaysia	KERTEH	01	standard	P003	DG Product	AU	AUSTRALIA	AU00XX	
MY	Malaysia	KERTEH	01	standard	P003	DG Product	AU	BRISBANE	AU03XD	
MY	Malaysia	KERTEH	01	standard	P003	DG Product	AU	FREMANTLE	AU04XD	
MY	Malaysia	KERTEH	01	standard	P003	DG Product	AU	MELBOURNE	AU01XD	
MY	Malaysia	KERTEH	01	standard	P003	DG Product	AU	SYDNEY	AU02XD	
MY	Malaysia	KERTEH	01	standard	P003	DG Product	ID	TANJ PERAK	ID05PD	
MY	Malaysia	KERTEH	02	Pick up	0001	On pallets	AU	AUSTRALIA	AU00XX	
MY	Malaysia	KERTEH	02	Pick up	0002	In liquid form	AU	AUSTRALIA	AU00XX	
MY	Malaysia	KERTEH	02	Pick up	0002	In liquid form	MY	MALAYSIA	MY09MN	M (shipping mode code, 5th chara
MY	Malaysia	KERTEH	02	Pick up	0002	In liquid form	US	USA	US00PX	
MY	Malaysia	KERTEH	02	Pick up	0002	In liquid form	VN	VIETNAM	VN00PX	
MY	Malaysia	KERTEH	02	Pick up	P001	CWC Permit	AU	AUSTRALIA	AU00XX	
MY	Malaysia	KERTEH	02	Pick up	P001	CWC Permit	AU	BRISBANE	AU03XP	
MY	Malaysia	KERTEH	02	Pick up	P001	CWC Permit	AU	MELBOURNE	AU01XP	
MY	Malaysia	KERTEH	02	Pick up	P001	CWC Permit	AU	SYDNEY	AU02XP	
MY	Malaysia	KERTEH	02	Pick up	P002	Normal	AU	AUSTRALIA	AU00XX	

Figure 4.1: The table shown the raw data of destination route

2. Bunker oil price

This data has shown the price of different kinds of oil which is used in a vessel transportation operation. The four types of oil are IFO380, IFO180, MDO, and MGO.

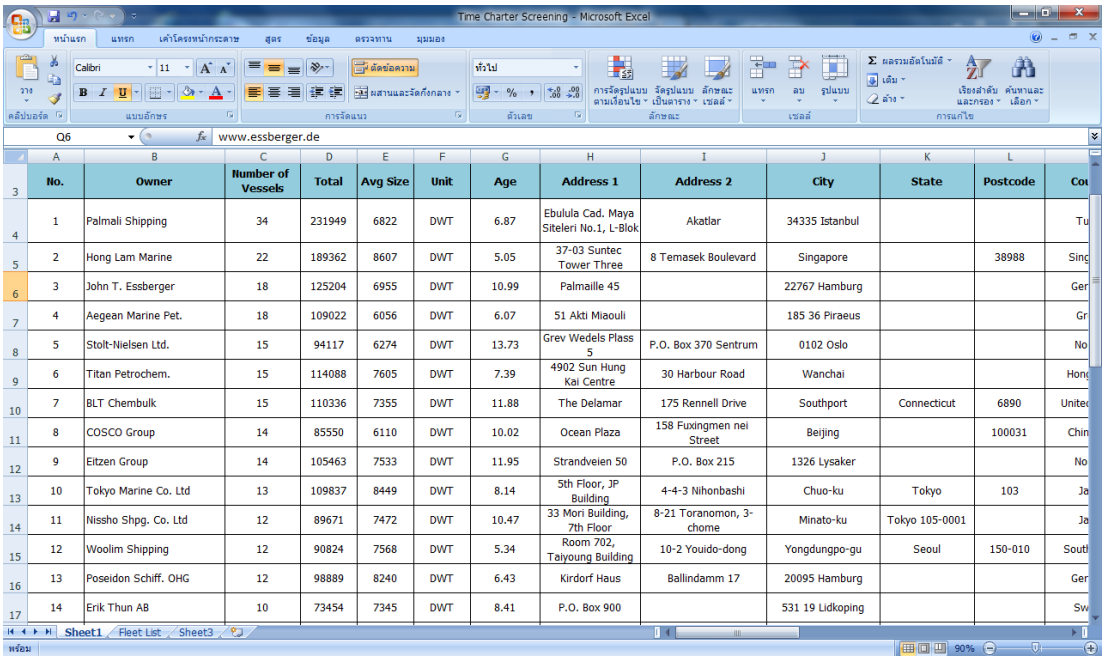


Date	IFO 380 (USD)	IFO 180 (USD)	MDO (USD)	MGO (USD)	Crude Oil (Brent)
1-ก.ย.	671.00	679.50	985.00	990.00	111.77
2-ก.ย.	666.50	676.50	981.00	986.00	111.39
5-ก.ย.	650.00	658.00	955.50	960.50	113.61
6-ก.ย.	651.00	658.50	951.50	956.50	113.62
7-ก.ย.	669.50	678.50	969.50	974.50	118.59
8-ก.ย.	675.50	684.50	976.00	981.00	118.33
9-ก.ย.	672.50	680.50	966.00	971.00	117.24
12-ก.ย.	653.50	661.00	938.50	943.50	117.75
13-ก.ย.	655.50	664.50	943.50	948.50	118.78
14-ก.ย.	649.00	657.50	941.50	946.50	116.26
16-ก.ย.	674.50	683.50	974.50	979.50	117.26
19-ก.ย.	665.50	675.00	960.50	965.50	116.05
20-ก.ย.	659.00	667.50	945.50	950.50	117.06
21-ก.ย.	665.50	673.50	946.00	951.00	118.15
23-ก.ย.	650.00	658.00	919.00	924.00	117.51
26-ก.ย.	634.00	641.50	889.00	894.00	118.67
27-ก.ย.	648.50	655.50	910.00	915.00	117.94
28-ก.ย.	654.00	661.50	915.00	920.00	118.28
29-ก.ย.	654.50	661.50	922.00	927.00	117.43
30-ก.ย.	651.00	657.50	909.00	914.00	117.36

Figure 4.2: The oil price table in different type of oil.

3. Supplier Database

This data has shown the detail of supplier that interesting in participating with the company. This database is included name of the company, number of vessels provided, year of building, age of the vessel and so on.



No.	Owner	Number of Vessels	Total	Avg Size	Unit	Age	Address 1	Address 2	City	State	Postcode	Co
1	Palmali Shipping	34	231949	6822	DWT	6.87	Ebulula Cad. Maya Siteleri No.1, L-Blok	Akatlar	34335 Istanbul			Tu
2	Hong Lam Marine	22	189362	8607	DWT	5.05	37-03 Suntec Tower Three	8 Temasek Boulevard	Singapore		38988	Sing
3	John T. Essberger	18	125204	6955	DWT	10.99	Palmaille 45		22767 Hamburg			Ger
4	Aegean Marine Pet.	18	109022	6056	DWT	6.07	51 Akti Miaouli		185 36 Piraeus			Gr
5	Stolt-Nielsen Ltd.	15	94117	6274	DWT	13.73	Grev Wedels Plass 5	P.O. Box 370 Sentrum	0102 Oslo			No
6	Titan Petrochem.	15	114088	7605	DWT	7.39	4902 Sun Hung Kai Centre	30 Harbour Road	Wanchai			Hon
7	BLT Chembulk	15	110336	7355	DWT	11.88	The Delamar	175 Rennell Drive	Southport	Connecticut	6890	Unite
8	COSCO Group	14	85550	6110	DWT	10.02	Ocean Plaza	158 Fuxingmen nei Street	Beijing		100031	Chin
9	Eitzen Group	14	105463	7533	DWT	11.95	Strandveien 50	P.O. Box 215	1326 Lysaker			No
10	Tokyo Marine Co. Ltd	13	109837	8449	DWT	8.14	5th Floor, JP Building	4-4-3 Nihonbashi	Chuo-ku	Tokyo	103	Ja
11	Nissho Shpg. Co. Ltd	12	89671	7472	DWT	10.47	33 Mori Building, 7th Floor	8-21 Toranomon, 3-chome	Minato-ku	Tokyo 105-0001		Ja
12	Woolim Shipping	12	90824	7568	DWT	5.34	Room 702, Taiyoung Building	10-2 Youido-dong	Yongdungpo-gu	Seoul	150-010	Soul
13	Poseidon Schiff. OHG	12	98889	8240	DWT	6.43	Kirdorf Haus	Ballindamm 17	20095 Hamburg			Ger
14	Erik Thun AB	10	73454	7345	DWT	8.41	P.O. Box 900		531 19 Lidkoping			Sw

Figure 4.3: The table of supplier database

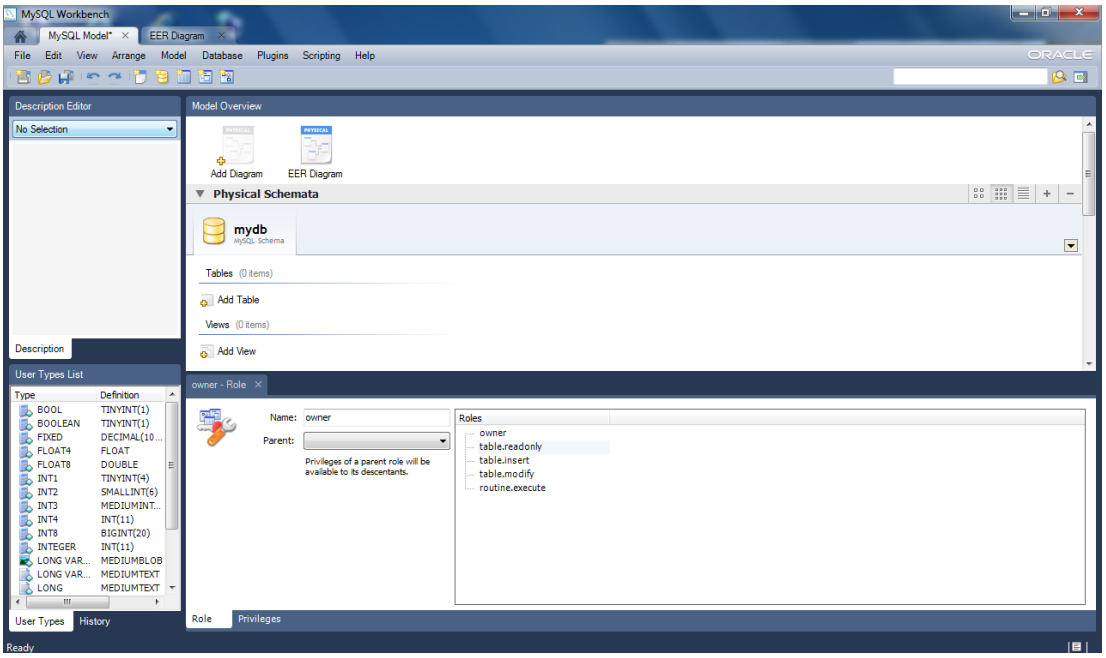


Figure 4.4: The MySQL program to build the data warehouse

There are few more data that need to be collected for example the actual market price, the volume deliver, the distance of destination. These data will be soon delivered by the end of this week.

Building a Data Warehouse

A **data warehouse** is a database used for reporting and data analysis. It is a central repository of data which is created by integrating data from one or more disparate sources. Data warehouses store current as well as historical data and are used for creating trending reports for senior management reporting such as annual and quarterly comparisons.

To build a data warehouse, the first step that involved is creating a star schema. The star schema (also called star-join schema, data cube, or multi-dimensional schema) is the simplest style of data warehouse schema. The star schema consists of one or more fact tables referencing any number of dimension tables.

This phase is now during a designing phase which will be updated later on.

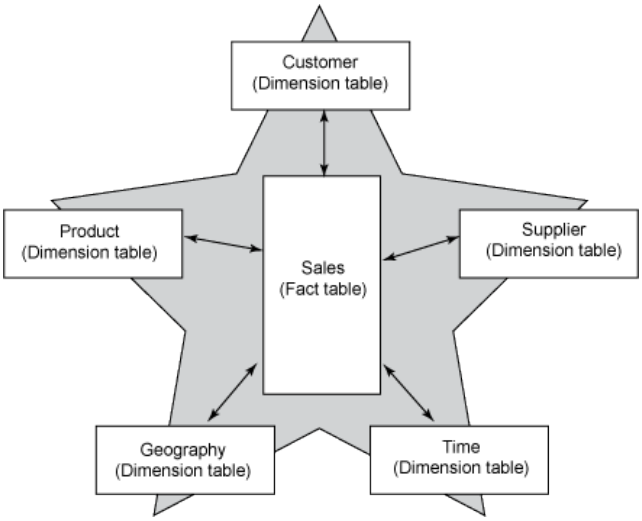


Figure 4.5: The example of star schema

REFERENCES

[1] (Rud, Olivia (2009). *Business Intelligence Success Factors: Tools for Aligning Your Business in the Global Economy*. Hoboken, N.J: Wiley & Sons. ISBN 978-0-470-39240-9.)

[2] D. J. Power (10 March 2007). "A Brief History of Decision Support Systems, version 4.0". DSSResources.COM. Retrieved 10 July 2008.

[3] Kobielus, James (30 April 2010). "What's Not BI? Oh, Don't Get Me Started....Oops Too Late...Here Goes....". "'Business" intelligence is a non-domain-specific catchall for all the types of analytic data that can be delivered to users in reports, dashboards, and the like. When you specify the subject domain for this intelligence, then you can refer to "competitive intelligence," "market intelligence," "social intelligence," "financial intelligence," "HR intelligence," "supply chain intelligence," and the like."

[4] Sprague, R.H et al (1982); *Building effective decision support systems*; Englewood Cliffs, New Jersey; Prentice Hall

[5] Alter, S. (1980) *Decision support systems: Current practices and continuing challenges.* Reading, MA: Addison-Wesley

[6] Shim, J.P., Warkentin, M., Courtney, J.F., Power, D.J., Sharda, R. & Carlsson, C. (2002) Past, present, and future of decision support technology. *Decision Support Systems, 33,* 111-126

[7] Federowicz, J. (1989) Evolving technology for document-based DSS. In: R.H. Sprague & H.J. Watson (Eds.) *Decision support systems: Putting theory into practice* (2nd ed.) (p.145-155). Englewood Cliffs, New Jersey: Prentice Hall

[8] Holsapple, C.W. & Whinston, A.B. (1996) *Decision support systems: A knowledge-based approach.* Minneapolis/St. Paul: West Publishing Company

[9] H. Kopáčková, M. Škrobáčková, Decision Support Systems or Business Intelligence: What can help in Decision Making? University of Pardubice.

[10] Cebotarean Elena, Business intelligence. Journal of Knowledge Management, Economics and Information Technology.[online] URL : http://www.scientificpapaers.org

[11] Muhammad Safeer, Salman Zafar. Impact of Business Intelligence Competency Center in Success/ Failure of B.I. Applications. IEEE 2011

[12] Simon, Alan R. & Shaffer, Steven L. *Data Warehousing and Business Intelligence for e-Commerce,* Morgan Kaufmann, 2001

[13] Turban, Efrahim & Aronson, Jay E. *Decision Support Systems and Intelligent Systems*, Prentice Hall, 2001

[14] Wu, J. Business Intelligence: What is Business Intelligence? DMReview.com, 2000. [online] URL: <http://www.dmreview.com/article_sub.cfm?articleId=1924>