DOMESTIC DEMAND FOR PREMIUM GASOLINE IN INDONESIA:

THE CASE OF DOMESTIC QUANTITY DEMANDED

FOR PREMIUM GASOLINE IN PT PERTAMINA (PERSERO)

YEAR 1982-2002

A THESIS

Presented as Partial Fulfillment of the Requirements
To Obtain the Bachelor Degree in Economics Department

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YOGYAKARTA

2005

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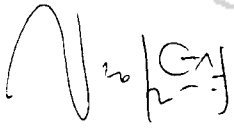

Noor Qomaria Agustina, S.Pd.

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The writer hopefully this thesis can give contributions and benefits for others.

Yogyakarta, August 2005

Andhika Setyawan

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ABSTRACT

Andhika Setyawan (2005), "Domestic Demand for Premium Gasoline in Indonesia: The Case of Domestic Quantity Demanded for Premium Gasoline in PT. Pertamina (Persero) year 1982-2002". Faculty of Economics, Economics Department, International Program, Islamic University of Indonesia, Yogyakarta.

This research was conducted in order to know the factors affecting the domestic quantity demanded of premium gasoline in Indonesia on the PT Pertamina (Persero) year 1982 – 2002, as well as to explore and measure factors that influence dominantly to the quantity demand of premium gasoline in Indonesia. The research is also to get the real condition of premium gasoline consumption in Indonesia and analyze the possibilities of the problems come from those conditions.

The research method used in this research is quantitative analysis. This research uses multiple regression model, in which involves the use of more than one independent variable to predict a dependent variable. This research also applies statistical test which include testing about individual partial regression coefficient by t-test and testing the overall significance of the sample regression by F test. Beside this statistical test, this research also analyzes the Goodness of Fit (R^2) and classical assumptions that cover: multicollinearity, autocorrelation, heterocedasticity, and specification error test.

Based on the research, the following results are presented as follows. First, The Indonesian Gross Domestic Product significantly has positive effect to the domestic quantity demanded for premium gasoline in PT Pertamina with the result of t-computed for GDP (3.014824) is bigger than the value of t-table (2.120). Second, the premium gasoline price has insignificantly effect to the domestic quantity demanded for premium gasoline in PT Pertamina with the result of t-computed for the price of premium gasoline (0.650518) is smaller than value of t-table (2.120). Three, the petroleum gas fuels price has insignificantly effect to the domestic quantity demanded for premium gasoline in PT Pertamina with the result of t-computed for the price of petroleum gas (0.628849) is smaller than value of t-table (2.120). Four, the motor vehicle amount in Indonesia has significantly effect to the domestic quantity demanded for premium gasoline in PT Pertamina with the result of t-computed for motor vehicles (2.304069) is bigger than the value of t-table (2.120). Five, the factors that influence dominantly to the domestic quantity demanded for premium gasoline in Indonesia that provided by PT Pertamina (Persero) is GDP.

ABSTRAKSI

Andhika Setyawan (2005), "Domestic Demand for Premium Gasoline in Indonesia: The Case of Domestic Quantity Demanded for Premium Gasoline in PT. Pertamina (Persero) year 1982-2002". Fakultas Economi, Jurusan Ilmu Ekonomi Studi Pembangunan, Program International, Universitas Islam Indonesia, Yogyakarta.

Penelitian ini bertujuan mengetahui faktor-faktor yang mempengaruhi kuantitas permintaan domestik bahan bakar premium di PT. Pertamina (Persero) tahun 1982-2002, mengulas dan menilai faktor-faktor dominan yang mempengaruhi kuantitas permintaan domestik bahan bakar premium di Indonesia. Penelitian ini juga bertujuan mengetahui kondisi sesungguhnya mengenai konsumsi premium di Indonesia serta menganalisis kemungkinan permasalahan yang muncul.

Metodologi penelitian yang dipilih adalah analisis kuantitatif dengan menggunakan model regresi ganda untuk mengetahui pengaruh antara beberapa variabel bebas terhadap variabel tergayutnya. Penelitian ini menggunakan uji statistik yang terdiri dari uji signifikansi terhadap taksiran parameter masing-masing variabel dengan menggunakan uji t, uji pengaruh bersama variabel-variabel bebas terhadap variabel tergayut dengan menggunakan uji F, dan uji pengaruh varibel bebas terhadap variasi variabel tergayutnya dengan menggunakan *Goodnes of Fit* (R^2). Selanjutnya untuk mengetahui adanya penyimpangan-penyimpangan asumsi penting dalam data penelitian dilakukan uji multikolinieritas, heterokedasticitas, autokorelitas, dan uji spesifikasi kesalahan.

Hasil penelitian menunjukkan bahwa: 1) GDP mempunyai pengaruh yang signifikan terhadap kuantitas permintaan domestik bahan bakar premium di Indonesia dengan t hitung (3.014824) lebih besar dari t tabel (2.120). 2) Harga premium tidak mempunyai pengaruh signifikan terhadap kuantitas permintaan domestik bahan bakar premium di Indonesia dengan t hitung (0.650518) lebih kecil dari t tabel (2.120). 3) Harga gas petroleum tidak mempunyai pengaruh signifikan terhadap kuantitas permintaan domestik bahan bakar premium di Indonesia dengan t hitung (0.628849) lebih kecil dari t tabel (2.120). 4) Jumlah kendaraan bermotor roda empat mempunyai pengaruh yang signifikan terhadap kuantitas permintaan domestik bahan bakar premium di Indonesia dengan t hitung (2.304069) lebih besar dari t tabel (2.120). 5) Faktor yang paling dominan dalam mempengaruhi kuantitas permintaan domestik bahan bakar premium di Indonesia adalah GDP.

CHAPTER I

INTRODUCTION

A. STUDY BACKGROUND

Fuel is one of the most important commodities that are needed in many sectors. Nowadays most of the people in every country in their daily activities use fuels from oil-based products as the energy resources both in the form of oil fuels as intermediary goods for other products or services and also oil fuels as final goods. In the form of economic goods, oil fuel is needed in the term of production, distribution and consumption activities. Moreover, oil fuels have very strategic functions to support the process of national development of the country, especially industrial and transportation sector and also other sectors.

Premium gasoline is one kind of the oil fuel made from the distillation process of fossils crude oil with certain standard qualification fraction needed to differentiate with other kind products of oil fuels, where the characteristics design of premium gasoline is suitable for the petrol engine. The more detail specification tables of premium gasoline are also available in this thesis.

Usually, people buy premium as the fuels for their transportation vehicles such as cars and motorcycles or mini boat with petrol engines. For the people which do not have their own motor vehicles, they use public transportation in their daily activities which also consume fuels.

Even though in general the public transportation vehicles such as buses, train or even boat/ship use diesel engine and consume diesel oil (solar), but there are also a lot amount of public transportation vehicles in Indonesia which use petrol engine such as taxi, *ojek* (motorcycle taxi), *angkutan kota* and *angkutan pedesaan* (mini-bus taxi with short route in town or village).

Based on the economic theory, if one commodity is useful, it means that this commodity has more value, and it would create more demand for this commodity. It can be seen by the increasing quantity of demand for this commodity from time to time. This similar condition also happened in the quantity demanded for premium gasoline in Indonesia. From the graph of oil consumption below, the oil consumption in Indonesia is relatively increasing positively from time to time.

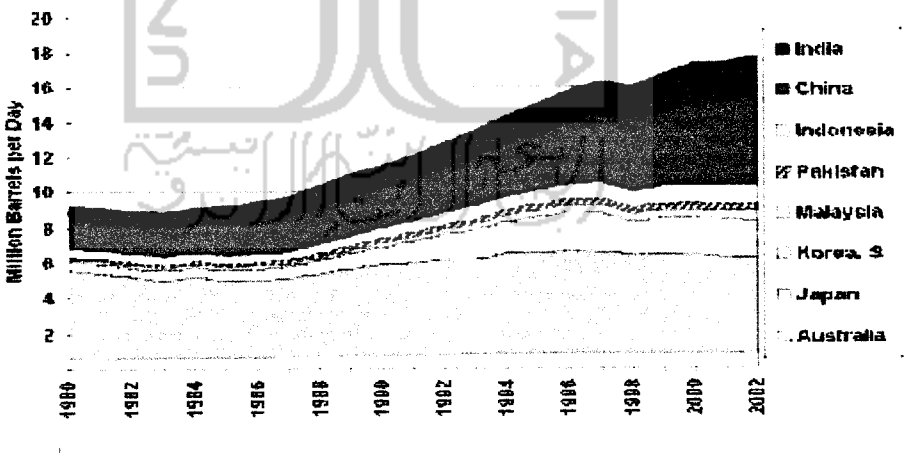

Figure 1.1, Graph of oil consumption on Far East and Oceania 1980-2002
(Source: International Energy Annual, edition of January 6, 2004)

Figure 1.1 above also can reflect the increasing consumption of fuels in Indonesia to support the problem identification of this thesis; the domestic demand for premium gasoline in Indonesia. This thesis will identify factors influenced the increasing of quantity demand for domestic consumption year 1982-2002 provided by PT Pertamina (Persero).

In more details, the number of change of the total million barrels of oil used in Indonesia above from year to year show various numbers and it does not always increase. If we look on 1997 to 1998, it shows a significant drop of the total consumption because in that time the Indonesia's economy faced the worsen condition of monetary crisis. Even though the monetary crisis in Indonesia happened since 1997-2000 and until now the condition is still on the period of recovering from the previous falls down, the increasing of fuels demand to PT Pertamina (Persero) on that periods still gives the indication that the fuels market especially premium gasoline in Indonesia is tremendously potential.

Another article from www.castleasia.com/indoatglance/industry/oilgas.html on December 26, 2002 described that more than 75% of refinery output is fuels. Before the economic crisis, the domestic fuels demand increased steadily. When economic recovery begins, it increases the domestic fuels demand more sharply, and present refineries will not be able to handle the extra volume. It will force Indonesia to become an importer of finished product. Cilacap and Balikpapan as the two largest oil refinery areas can support only 60% of total output for domestic demand.

Table 1.1: Refinery Input and Output (Mn Liter)

								Growth p.a (%)	
	1993	1994	1995	1996	1997	1998	1999	93-97	97-99
REFINERY INPUT									
Total input	**47,468**	**46,939**	**47,293**	**54,952**	**53,843**	**54,667**	**55,774**	**3.2**	**1.8**
Crude oil & condensate	n/a	46,733	46,818	54,317	52,877	54,014	53,822		
Others#	n/a	206	476	635	966	654	1,952		
REFINERY OUTPUT									
JP5	143	32	0	0	0	0	49	(100.0)	n/a
Avgas	0	16	14	3	9	5	10	(12.3)	2.0
Avtur	763	922	1,118	1,441	1,222	1,144	968	7.3	(11.0)
Gasoline	7,394	7,457	6,864	9,669	10,693	10,660	11,708	9.4	4.6
Kerosene	7,553	8,157	7,543	8,512	7,605	8,473	9,304	(1.7)	10.6
Automotive diesel oil (ADO)	11,655	11,178	11,955	14,212	13,718	14,553	14,575	5.3	3.1
Industrial Diesel Oil (IDO)	1,956	1,193	664	1,002	778	1,239	1,304	(10.1)	29.5
Fuel Oil (FO)	4,245	4,055	3,986	3,215	3,319	4,186	4,306	(4.9)	13.9
Subtotal fuel	**33,708**	**33,008**	**32,143**	**38,054**	**37,345**	**40,259**	**42,225**	**3.1**	**6.3**
LSWR	7,091	7,187	8,000	7,856	8,452	6,887	5,444	4.1	(19.7)
Naphta	2,528	1,876	2,057	2,324	1,290	962	1,647	(8.9)	13.0
LPG	615	560	634	1,056	1,168	1,041	928	20.2	(10.9)
Asphalt	511	513	477	526	374	303	267	(7.6)	(15.5)
Lube base oil	255	288	269	285	250	239	343	(3.5)	17.3
Others	289	1,072	802	1,335	1,406	909	1,915	7.0	16.7
Subtotal non-fuel	**11,289**	**11,496**	**12,239**	**13,381**	**12,940**	**10,341**	**10,546**	**3.0**	**(9.7)**
Intermediate/losses	2,433	2,274	2,911	3,516	3,558	3,405	2,775	11.8	(11.7)
TOTAL OUTPUT	**47,430**	**46,778**	**47,293**	**54,952**	**53,843**	**54,005**	**55,545**	**3.6**	**1.6**

Source:Petrominer Magazine num.12 Vol.XXXI December 15, 2004 page67
#) Other includes HOMC, field gas, feedstock

For the present condition in Indonesia, the demand for premium gasoline are very huge and PT Pertamina (Persero) as the producer of premium gasoline needs to work very hard in order to fulfill the demand from all over distribution area in Indonesia. Based on the data from PT Pertamina (Persero) Directorate of PPDN (Domestic Market Distribution) of UPMS, the percentage of premium consumption for the period of year 1982-2002 is around 15.09 percent (the lowest at 1997) to 16.23 percent (the highest at 2002) from the total consumption of PKS-oil fuels

(Premium-Kerosene-Solar Diesel, the three kinds of government's price-subsidize oil fuels), whether the percentage of kerosene consumption from year 1982-2002 is around 14.37 percent (the lowest at 1997) to 16.23 percent (the highest at 2000), and for the solar diesel consumption is around 67.76 percent (the lowest at 2002) to 70.53 percent (the highest at 1997) from the total domestic consumption of PKS-oil fuels.

In spite of the total volume amount of domestic demand of premium gasoline which continuously increases, Pertamina should cover all the demand and sell with the same price for every area in Indonesia based on the regulation issued by the government. On the other side, Indonesian government has decided to change the format of Pertamina become limited liability Company to increase the independency especially about the financial sector. Because the fuels monetary subsidy from the government is periodically decrease by time to time. Now, Pertamina should build the strategy and identify what factors influenced the demand of fuels so that PT Pertamina (Persero) can cover all the demand of fuels in Indonesia, and keep the company's financial sector balanced in profit.

This thesis is also needed by Pertamina to face the possibility of new government's regulation, whether the government plans to give the opportunity for private companies to fulfill the domestic fuels demand by opening the private-oil fuels station for public consumption. From the general description above, it becomes interesting to analyze and find what factors that influence the domestic quantity demand for premium gasoline

in Indonesia that makes PT Pertamina (Persero) should have to work very hard to cover all the demand of fuels in Indonesia. The research only deals with the demand for premium gasoline in PT Pertamina (Persero). Even though PT Pertamina (Persero) products are not only the premium gasoline but it would be so complicated to analyze all of the available data for every kind of fuels because government set the price disparity for different fuels products and customers segmentations. The premium gasoline is chosen as the most suitable products to reflect the real condition that happen in Indonesia.

Hopefully from the analysis result of this thesis, we might know the most influenced factor of the domestic quantity demand for premium gasoline in Indonesia provided by PT Pertamina (Persero). The periods of this research will be limited to the year of 1982 to 2002.

B. PROBLEM FORMULATION

1. What are the effects of Indonesian Gross Domestic Product (GDP) to the domestic quantity demanded for premium gasoline in PT Pertamina (Persero) year 1982-2002?
2. What are the effects of premium gasoline price changes to the domestic quantity demanded for premium gasoline in PT Pertamina (Persero) year 1982-2002?

3. What are the effects of liquid petroleum gas (LPG) price changes as the one of substitutive fuels upon the quantity demanded for premium gasoline PT Pertamina (Persero) year 1982-2002?
4. What are the effects of the amount of motor vehicles in Indonesia toward the quantity demanded for premium gasoline per capita in PT Pertamina (Persero) year 1982-2002?
5. What are the factors that influence dominantly to the domestic quantity demanded for premium gasoline per capita in Indonesia provided by PT Pertamina (Persero) year 1982-2002?

C. LIMITATION OF RESEARCH

In order to provide a clear description and to be able to impart useful information, the limitations of the study are indicated below:

The studies will focus on the demand of premium in Indonesia provided by PT Pertamina (Persero). The reason is because PT Pertamina (Persero) until now is still the only provider of premium gasoline in Indonesia that had legal authority given by the Indonesia government to supply, distribute and sell it in all over area of Indonesia. Pertamina provide almost all of the total premium gasoline used in Indonesia and also controls a large portion of supplies from its exploration of crude oil until the stage of production-storage-distribution and marketing. But it does not imply that Pertamina has a pure monopoly over the industry. Specifically on the upstream activities where the crude oil explored, Pertamina also

make some contract and open the opportunities to other private company to join; both domestic and foreign. The Pertamina downstream activities is handling the fuels distribution, where the Distribution and Domestic Marketing Unit of Pertamina (UPPDN) control all the supplies mechanism from the tanker of oil fuels storage to the places (fuel station for public consumption/ SPBU). According to the description above, we only focuses on the demand for premium gasoline produced by PT Pertamina (Persero) and still get general picture of the real whole demand over the country.

D. RESEARCH OBJECTIVES

1. To examine the factors affecting the quantity demanded of premium gasoline in Indonesia on the PT Pertamina (Persero) in year 1982 – 2002.
2. To explore and measure factors that influence dominantly to the quantity demand of premium gasoline in Indonesia.
3. To get the real condition of premium gasoline consumption in Indonesia and analyze the possibilities of the problems comes from those conditions, in order to face the future plan of Indonesian government to spread the authorization of domestic fuel distribution into some other private companies.

E. RESEARCH CONTRIBUTION

1. Company

Hopefully the research can give useful benefits for PT Pertamina management, mainly concerning to the demand of premium gasoline in Indonesia which handled fully by the downstream operation of PT Pertamina (Persero). The research might also be able to give some supporting data for PT Pertamina (Persero) about the future prediction of quantity demand of premium gasoline in Indonesia so that Pertamina can fulfill the whole demand for premium gasoline in Indonesia by providing the better service and quality product.

Even though the Indonesian government not yet open the access authorization for the other private companies to distributes and sell fuel directly for the people consumption, but in fact now six private companies (PT Krida Petra Graha/Shell, PT Sigma Rancang Perdana, PT Pandu Selaras, PT Elnusa Petropine, PT Elnusa Harapan, PT Raven Sejahtera) have already owned the license to sell the fuel in the domestic area of Indonesia to faced the liberalization era of fuel domestic market. They just wait the government declared the PP Hilir (Government Regulation of Downstream Activities) to start their business *(Kompas, October 19, 2004: p13)*. This condition will make Pertamina faced fairer competition with those private companies in the term of quality, quantity and also price level to response the potential domestic demand of fuel in Indonesia.

2. Writer

The research can give so many positive contributions for the writer as the economic students to improve the capability to analyze which mainly concern to the demand theory that had been received along the studying period in the Faculty of Economy Islamic University of Indonesia specifically in the Department of Development Economic International Program. This thesis deals with the application case of demand theory that takes the problem of demand for premium in Indonesia provided by PT Pertamina (Persero). The research is also to practice writer's ability in systematical analytic thought.

3. Other Parties

The research might also give contribution for other parties who want to make similar report, thesis, or analysis. It can be used as the data reference, analysis result or similar main idea taken to support another hypothesis or theory based on needed.

F. DEFINITION OF TERMS

1. Domestic quantity demanded for premium gasoline in this thesis specifically means the amount of demand from Indonesia's citizens for premium gasoline in the term of kiloliter (kL) per year that come to PT Pertamina (Persero) as producer of premium gasoline in Indonesia. The data based resources from the PT Pertamina (Persero) UPMS VI Balikpapan covering household and transportation sector (people

consumption), where the demand for each individual assume to be unequal. The data of domestic quantity demanded for premium gasoline provided in this thesis is not include the demand from special institution such as military purpose and internal-use company purpose.

2. Premium gasoline used in this thesis based on the terminology of products result in PT Pertamina (Persero), which is categorized as the one of oil fuels products. There are two kinds of output from production process in PT Pertamina (Persero); oil fuels and non-oil fuels products. The more specific products of oil fuels named *PKS*: premium (gasoline), kerosene, and solar (diesel oil). For the specific products of non-oil fuels are lubricants (Mesran, Meditran, Fastron, etc), Liquid Petroleum Gas (LPG), Pertamax and Pertamax plus, aviation products (jet fuels for aero plane), and petrochemical products.
3. Price of Liquid Petroleum Gas in this thesis taken to compare with the price of the premium gasoline as the substitution goods especially for consumption the motor vehicles. Even though the consumption of LPG for transportation sector is not big as another foreign countries but the LPG is the most suitable substitution commodities for gasoline and both the premium gasoline and liquid natural gas produced by PT Pertamina (Persero). For the LPG in Pertamina is categorized as profitable commodities so Pertamina can decide the LPG price level

whether the premium gasoline price level fully decided by government.

4. Motor vehicle categorization in this thesis covers the amount of private-owned of motor cycles and cars (passenger cars, buses and trucks) in Indonesia which is legally registered and counted periodically year to year by the Central Statistics Bureau (Biro Pusat Statistik-BPS) of Indonesian Government. There is a little weakness because the more specific data which separate the motor vehicles with premium engine and solar (diesel) engine are not available in BPS; means vehicles with diesel engine which is consume solar diesel fuel are also included in this data. But based on the data from Pertamina the solar consumption is dominated by industrial sectors, not the transportation sectors. Until the early of year 2000 the portion of total amount motor vehicles also very dominated by the premium two-wheel and four-wheel vehicles with premium gasoline engine than the vehicles with diesel engines.

CHAPTER II

REVIEW OF RELATED LITERATURE

A. THEORETICAL LITERATURE REVIEW

1. Lowell Feld (2004)

The former analyzis about the trend of fuels consumption was done by Lowell Feld (2004) in his research about *The India Country Energy Analysis.* The objection of this analysis is to give the support data for the proccess of making the major plans of energy infrastructure investments, where The Republic of India is the world's sixth largest energy consumer. Feld (2004) also comparing the data of production of oil in India with the trend of domestic consumption in its country as shown on figure 2.1 below:

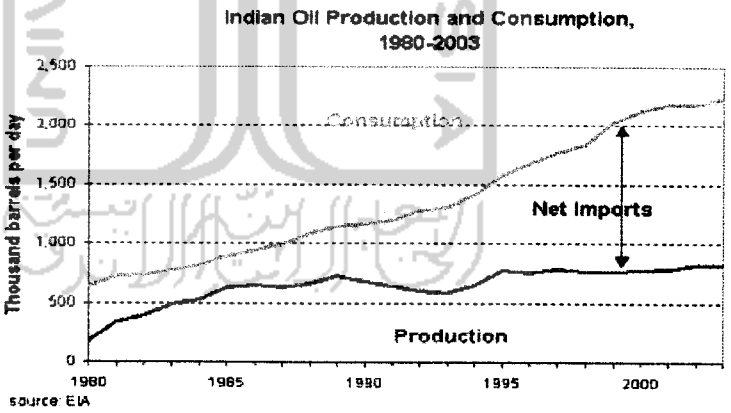

Figure 2.1, Graph of India's oil production and consumption 1980-2003

Oil consumption in India accounts for about 30% of India's total energy consumption. The majority of India's roughly 5.4 billion barrels in oil reserves are located in the Mumbai High, Upper Assam, Cambay, Krishna-Godavari, and Cauvery basins. India's average oil production level (total liquids) for 2003 was 819,000 bbl/d, of which 660,000 bbl/day was crude oil. India had net oil imports of over 1.4 million bbl/day in 2003. Future oil consumption in India is expected to grow rapidly, to 2.8 million bbl/day by 2010, from 2.2 million bbl/d in 2003. India is attempting to limit its dependence on oil imports somewhat by expanding domestic exploration and production.

For the consumption of natural gas, the condition in India has risen faster than any other fuel in recent years. From only 0.6 trillion cubic feet (Tcf) per year in 1995, natural gas use was nearly 0.9 Tcf in 2002 and is projected to reach 1.2 Tcf in 2010 and 1.6 Tcf in 2015. But on the other side, India's domestic natural gas supply is not likely to keep pace with demand, and the country will have to import much of its natural gas, either via pipeline or as liquefied natural gas (LNG).

The analysis above has some similarities with this thesis in variables taken and also the goals, in order to give the contribution and suggestion about the decision taken in related with the demand of fuels on the past periods.

2. Mark Zupan (2004)

Mark Zupan, as the dean of the Eller College of Business and Public Administration at the University of Arizona explain in his research with the title *Oil and Economics:Cutting through the spin*, explores about the oil fuels based on the economic multi-perspective. Zupan identified oil as a unique commodity in relation with the short run and long run on both supply and demand side. For the analysis from demand side for certain products like cigarettes, is relatively unresponsive to price increases, Zupan said. The government could impose a stringent "sin tax" on cigarettes, causing the price of a pack increase to double, but demand would remain relatively stable. Economists say demand for cigarettes is "inelastic." On a graph, a perfectly inelastic demand curve is vertical. On the other extreme, some products are hypersensitive to price changes. In this type of market, for example, raising the cost of a newspaper from 50 cents to 60 cents might anger people to cancel their subscription and get their news from the Internet. Economists call this type of market situation highly elastic. A perfectly elastic demand curve is horizontal – raise the price 1 cent, and all demand stops". This is a bad type of market to be in if you are a supplier. This is a perfectly competitive market.

Demand for oil, like cigarettes and to a lesser extent medical care, is inelastic in the short run. Consumers are slow to react to changes in energy costs. The price of gas at the pump could double, but people

would continue filling their tanks because they have to continue driving to work, taking their children to school, etc. "People are stuck in certain consumption patterns and cannot change much in the short run. When price does not sufficiently influence demand in times of shortage, the market system breaks down and the government might resort to rationing, such as selling gas to people only on certain days according to odd/even license plate numbers, etc. In the long run some people maybe would re-arrange their consumption. But Zupan also wrote that changing energy consumption habits is difficult and costly. Buying a new car, a smaller house, energy-efficient appliances or changing commuting patterns requires significant investment. Given more time, consumers and suppliers can adjust to upward movements in oil prices. Consumers can develop new strategies for adjusting personal lifestyle such as driving smaller cars, moving closer to work, etc., and suppliers have the opportunity to develop substitute sources of energy, such as fuel cells or solar power.

3. **Journal of Energy From Embassy United States of America : Indonesian Petroleum Statistics (2004)**

Domestic Fuel demand is estimated to surpass one million b/d in 2001 after growing sharply in 2000 to 967,500 b/d. Statistics from the Directorate General of Oil and Gas revealed that domestic fuels demand increased 10.4 percent to 56.1 billion liters in 2000 from 50.8 billion liters in 1999. Automotive diesel oil (ADO) demand rose 12.1

percent to 22.2 billion liters in 2000 from 19.8 billion liters in 1999. Officials admitted that heavy price subsidies and illegal exports supported the significant growth in domestic fuel demand. Most of the smuggling is in ADO, which comprises about 40 percent of total demand. Note: The FY 2001 budget included a domestic fuel subsidy bill of Rp 41.3 trillion (US $4.1 billion at Rp 10,000/US$). This assumed an average 20 percent increase in fuel prices on April 1, most or all of which has been postponed. The budget estimation was also based on an assumption of an average crude oil price of US $24/barrel and an exchange rate of Rp 7800/US$. In 2000, the Directorate General of Oil and Gas recommended that the Investment Coordinating Board (BKPM) issue foreign investment approvals to five oil refinery projects located in Aceh, West Nusa Tenggara, East Java, Riau and South Sulawesi, with total investment of US $10 billion. The Government expects the 1.1 million B/D capacity will help to meet the increasing domestic demand of oil in Indonesia. This journal analyzes the possibilities to find the solution in order to meet the demand of oil in Indonesia, as the similar topics of this thesis.

B. THEORETICAL BACKGROUND

1. Quantity Demand Theory

A demand is determined by quantity demanded of product. It is the total amount of any particular goods and services that an economy's consumers wish to purchase in some time period. It is important to notice three things about this concept (Lipsey, 1996: 63)

First, quantity demanded is a *desire* quantity. It is the amount that consumers wish to purchase that the price of the other product is assumed to be constant.

Second, *effective demands are* the amounts that people are willing to buy, given the price they must pay for the product.

Third, quantity demand refers to a continuous *flow* of purchase. The amount of some product that all costumers wish to buy in a given time period is influence by the following important variable:

a. Product's own price

A basic economic hypothesis is that the price of a product and the quantity that will demanded are related negatively, other thing being equal. That is, the lower the price, the higher the quantity demanded, and the higher the price, the lower the quantity demanded (Marshall, 1842-1924). This fundamental concept is called "Law of Demand." On the case of demand for premium gasoline related to the prices of premium gasoline is when the

premium gasoline price is increasing; the quantity demand for premium gasoline will decrease.

b. Average Consumer Income

If consumers receive more income on average, they can be expected to purchase more of most products even though product prices remain the same. In the case of demand for premium gasoline related to the income is; when the National Income or GDP is increasing, the quantity demand for oil premium gasoline would also increase.

c. Price of Related Products

It means the price of other product with similar function or so called as substitutes goods. A rise in the prices of substitute for a product will make the quantity demanded for the product increase. It will make the demand curve shift to the right. In this case of the price of petroleum gas as the substitution product for the oil fuels, when the price of natural gas is increasing then the quantity demand for premium gasoline is increasing or otherwise.

d. Taste

Tastes have an effect on people's desire to purchase. A change in the taste maybe long-lasting or short- lasting, a change in the tastes in favor of a product shift the demand curve to the right. In the case of demand for premium gasoline, we do not talk about the taste because every person has different taste and on the other

side premium gasoline is a primary commodity that almost needed by every individual in general.

e. Population Size

An increase in population will shift the demand curves for most products to the right, indicating that more will be bought at each level of price. It means that the increase of the population will increase the quantity demand for premium gasoline because more people amount growth need more premium gasoline in their daily lives.

Another economist, Mankiw (2001: 67) determines that quantity demand is *the amount of good that buyers are willing and able to purchase*. According to him the quantity of every individual demand are determined by:

a. Price, if the price of good is increasing the quantity of demand will decreasing.

b. Income, if the income is increasing, the quantity demand is also increasing. This theory is usually happen on the normal goods, and for the inferior goods increasing to the income will lead to the decreasing to the quantity demand for that goods.

c. Prices of related goods. It means if there are substitution and complement goods. The substitution means two goods for which an increasing in the price of one leads to an increasing in the demand for the other, and complement means two goods for which an

increasing in the prices of one leads to a decreasing in the demand for the other. In the case of oil fuels and natural gas, if the price of natural gas is increasing the demand for oil fuels is also increasing. So, oil fuels and natural gas are related to the substitution goods.

d. Taste, economists normally do not try to explain people's taste because tastes are based on historical and psychological forces that are beyond the realm of economists.

e. Expectation, the expectation of every individual will affect to the quantity of demand in the future.

2. Elasticity of Demand

The laws of demand and supply predict the direction of changes in price and quantity in response to various shifts in demand and supply. However, it is usually not enough to know merely whether the demand rise or fall; it is also important to know how responsive the quantity demanded is to change, when another related variables as mention above changed. Salvatore (1992: 47) describes that there are several concept of elasticity:

a. *Price elasticity of demand*, measures how much the quantity demand of a good change when its price is changed. The precise definition of the price elasticity is the percentage change in quantity demanded divided by the percentage change in price.

$$\text{Prices elasticity of demand} = \frac{\%\text{ change in quantity of demanded}}{\%\text{ change in price}}$$

Samuelson (1995:58) describes that goods are very enormously in their price elasticity or sensitivity to price changes. When the price elasticity of a good is low, it is inelastic and its quantity responses little to price changes. For necessities goods like foods or fuels, demands tend to be inelastic. Such items are staff of life and cannot easily be forgone when their prices rise. The length of time that people have to respond to prices changes also plays a role. A good example of that is gasoline. Suppose someone is driving across the country when the prices of gasoline suddenly increase. The driver will not be consider to selling the car directly and abandon the trips on that time. So in the short run, the demand for gasoline may be very inelastic. But in the long run, people can adjust the behavior as response to the higher prices of gasoline. They can buy the smaller vehicle with more fuel-efficient engine, ride a bicycle, take the train, move closer to the work place, or carpool with other people. It means the ability to adjust consumption pattern implies that demand elasticity are higher in the long-run than in the short-run.

b. *Income elasticity of demand*, measure how much the quantity demanded of a good responds to a change in costumers income, computed as the percentage change in quantity demanded divided by the percentage change in income.

$$\text{Income elasticity of demand} = \frac{\%\text{ change in quantity of demanded}}{\%\text{ change in income}}$$

For most goods, increasing in income can lead to increasing in the demand. This can happen on the *normal goods*. Goods for which consumption decreasing in response to a rise in income has negative income elastic ties and is called *inferior goods*. Even among normal goods, income elastic ties vary substantially in size. Necessities such as food and clothing, tend to have small elastic ties because consumer regardless of how low their incomes, choose to buy some of these goods. Luxuries, such as caviar and furs, tend to have large income elastic ties because consumer feels that they can do without these goods altogether if their income is too low (Mankiw, 2001: 104). In the case of demand for oil fuels, the oil fuels is the normal goods because if people income is increasing, the usage of instruments or commodities which use oil fuels such as gasoline vehicles or household instruments would also increase that caused increase demand of oil fuels.

c. *Cross-price elasticity of demand*, measure of how much the quantity demanded of one goods responds to a change in the price of another good, computed as the percentage change in quantity demanded of the first good divided by the percentage change in the price of the second good.

$$\text{Cross-prices Elasticity of demand} = \frac{\%\text{ change in quantity of demanded of good 1}}{\%\text{ change in price of good 2}}$$

Whether the cross prices elasticity is a positive or negative number depends on whether the two goods are substitute or complements. Substitution goods if increasing in one prices makes the demand for another prices is increasing it had positive cross price elasticity and complement goods if prices of one good increasing the demand for another goods is decreasing it had negative cross price elasticity.

If the result are higher (>) than 1 means that elastic

Less (<) than 1 means that inelastic

Equal (=) than 1 means that unitary

3. The Theory of Consumer Choice

Examine the trade off that people face in their role as costumer. When a costumer buys more of one goods, he can afford less of other goods. When he spends more time enjoying leisure and less time working, he has lower income and can afford less consumption. So these theories examine how consumer facing these tradeoffs makes decision and they respond to change in their environment.

The Consumer Budget Constraint, the budget constraint shows the various bundles of goods that the consumer can afford for a given income. *Indifference Curve is* a curve that shows consumption

bundles that give the consumer the same level of satisfaction. Four properties of indifference curve:

a. Higher indifference curve are preferred to lower ones.
b. Indifference curve are downward sloping.
c. Indifference curve do not cross.
d. Indifference curve are bowed inward, means the slope are marginal rate of substitution.

Marginal rate of substitution; is the rate at which a consumer is willing to trade one good for another.

The Consumer Optimal Choices, The consumer choose the point on his budget constraint that lies on the highest indifferent curve. At this point which called optimum; the marginal rate of substitution equals the relative prices of two goods.

a. The effect of income on the Consumer's Choices

An increase on the consumer income raises the budget constraint shift to the right. If both goods are *normal goods*, the consumer responds to increasing in income by buying more of both of them. In this case, for example oil fuels and natural gas shows on the graphical example below. The consumer buys more oil fuels and more natural gas when their income is increasing.

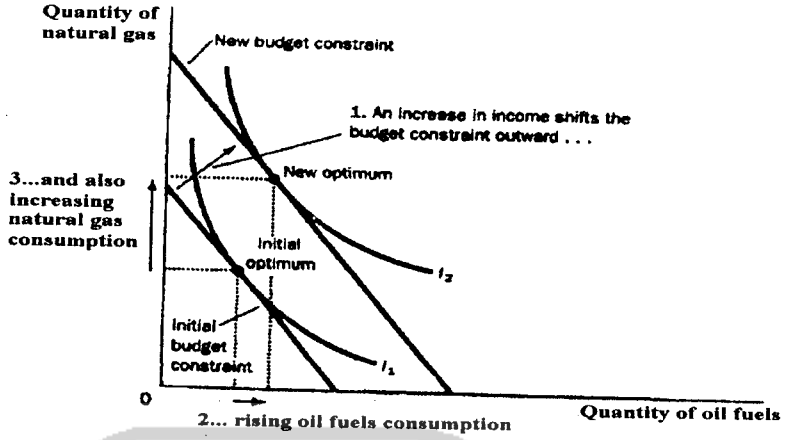

Figure 2.2, Graph of the effect of income on the consumer's choice towards normal goods

Normal good, a good for which an increasing in income raises the quantity demanded. If the good are *Inferior good*, a good for which an increasing in income reduces the quantity demanded. The graph is like in the below:

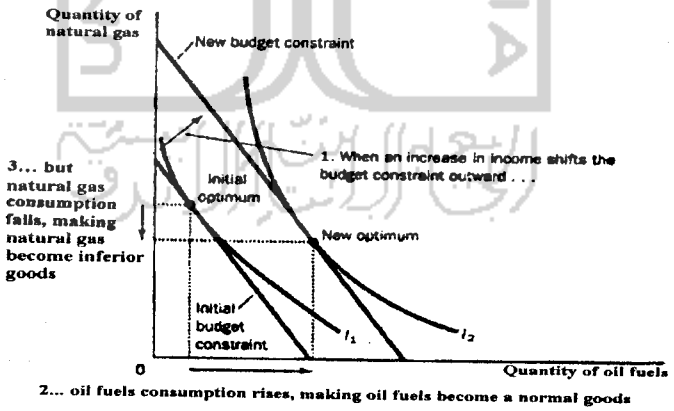

Figure 2.3, Graph of the effect of income on the consumer's choice towards inferior goods

In this graph natural gas is the inferior good, when the consumer's income increases and the budget constraint shift outward; the consumer buys more oil fuels but less natural gas.

b. The effect of price on Consumer's Choices

When the prices of one good falls in this case the prices of natural gas, the consumer's budget constraint shift outward and change the slope. The consumer moves from initial optimum to the new optimum, which changes his purchase of both natural gas and oil fuels. In this case, the quantity of gasoline consumed rises, and the quantity of oil fuels consumed falls.

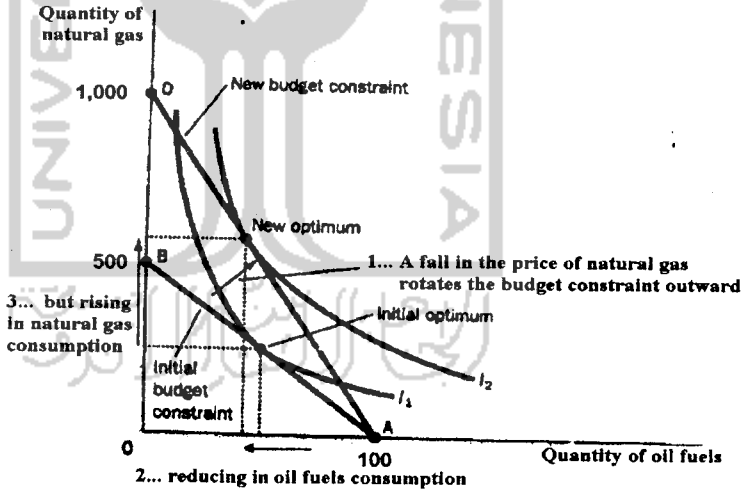

Figure 2.4, Graph of the effect of price on the consumer's choice

c. Income and Substitution Effect

The impact of a change in the price of a good on consumption can be decomposed into two effects: an income affect and substitution effect. We use the example of oil fuels and natural gas. The situation maybe like this:

1) "Bad news! Now that price of natural gas is rising become more expensive, my income has lower purchasing power. I am in effect, poorer than I was. Because of that, I just consume both less natural gas and oil fuels (this is the income effect).
2) "Now that the price of natural gas has become higher, I get more pints of oil fuel is now relatively cheaper, I should buy more oil fuels and less natural gas (this is the substitution effect).

Income effect is the change in the consumption that result when a price is change moves the consumer to a higher or lower indifferent curve.

Substitution effect is the change in consumption that results when a price change moves the consumer along a given indifference curve to a point with a new marginal rate of substitution.

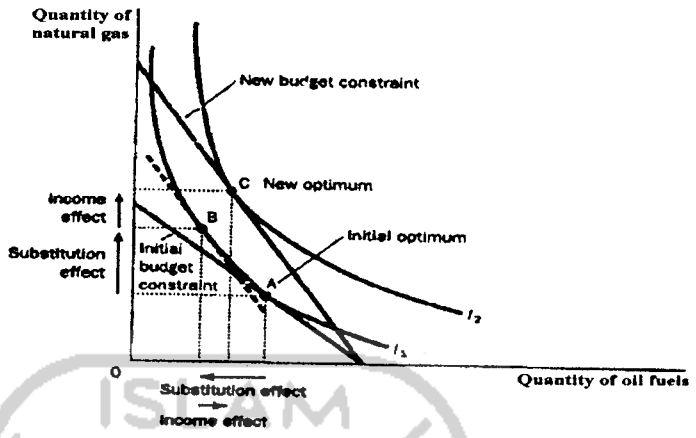

Figure 2.5, Graph of the substitution effect

The effect of a change in price can be broken down into an income effect and substitution effect. The substitution *effect* is the movement along an indifferent curve to a point with in different marginal rate of substitution, is show here as the change from point A to point B along indifferent curve I_1. The income *effect* the shift to a higher indifference curve, is show here as the change from point B indifference curve I_1 to point C on indifference curve I_2.

C. HYPOTHESES FORMULATION

This hypothesis defined as a right and temporarily argument to the behavior of model that it used and tested with the statistical test and econometric test. This hypothesis will be tested with the variable independent regression analysis that affects the demand of oil fuels in

Indonesia on PT Pertamina (Persero). The hypotheses which will be tested are:

1. The GDP of Indonesia itself has positive effect to the quantity of demand for premium gasoline in Indonesia.
2. Price of premium gasoline in Indonesia it self has negative effects to the quantity of demand for premium gasoline in Indonesia
3. Price of petroleum gas in Indonesia itself has positive effect to the quantity of demand for premium gasoline in Indonesia.
4. The increasing number of motor vehicles amount in Indonesia itself has positive effect on the quantity of demand for premium gasoline in Indonesia.
5. The entire factor GDP, prices of premium gasoline, prices of petroleum gas, and amount of motor vehicles are assumed to be affecting the quantity demanded for premium gasoline in Indonesia.

CHAPTER III

GENERAL DESCRIPTION OF PERTAMINA

A. OVERVIEW

This research is based on PT Pertamina (Persero) because as on the brief history of oil in Indonesia below, it can be assumed that most of the oil exploration and main production system of oil fuel in Indonesia has been done and conducted by PT Pertamina (Persero).

The Article 33 of National Act 1945 emphasizes that "Land, water and their containing natural resources are possessed by the state and are used for almost people's well being". It means that, the privilege to manage oil industry is in the government's hand. In 1960, the Congress stated a policy that oil and ground gases mining are only permitted for the state, through a state company. The involvement of foreign party was bonded by contract since then. Afterward, an agreement between the state and foreign companies was affirmed that gradually, oil refinement manufactures and other assets in marketing and distribution are vended to Indonesia throughout 5 - 15 years. To accommodate the agreement, two national companies were established at that time. PERMINA was responsible for the administration, management and controlling of the exploration and production. Meanwhile, PERTAMIN conducted the oil distribution's process for the entire nation. PERMINA founded Apprentice Technique School (Sekolah Kader Teknik) in Brandan, North Sumatra to

fulfill the needs of experts on oil's area. PERTAMIN also established Oil Academy in Bandung at 1962. Oil Academy's curriculum consists of several aspects in oil industry, and the graduates turned into the main forces in PERTAMIN (which later transformed to PERTAMINA). In 1968, to consolidate oil and gas industry for its management, exploration, marketing and distribution, PERMINA and PERTAMIN merged and became PN PERTAMINA.

Pertamina has legally transformed to be PT PERTAMINA (Persero) since September 17, 2003 by the enactment of Government Regulation No.31/2003. Pertamina is now under the coordinator of the State Minister of State-owned Enterprises. Like other contractors, as a business player Pertamina also holds Cooperation Contract to Oil and Gas Regulatory Body. Due to the transformation to be a Limited Liability Company, Pertamina becomes a pure business entity which is more profit oriented.

The Law also gives opportunities and challenges for PT Pertamina (Persero) as the oil and gas industry becomes more competitive. Under the Ministry of State-owned Enterprise, PT Pertamina (Persero) commits to deliver high quality products and services from oil and gas-based to the stakeholders as well as increase its contribution to the nation's wealth. PT Pertamina (Persero) also has 14 subsidiaries companies, such as Pertamina Energy Trading Limited (Petra) for oil and gas trading, PT Elnusa Harapan

for marketing and trading, PT Pelita Air Service for airline service, PT Perta Medika hospital, etc.

In carrying out activities, PT Pertamina (Persero) implements an integrated system from upstream to downstream. Upstream activities cover exploration and production of oil, gas, and geothermal. The aim of exploration activities is to discover new oil and gas reserves as a replacement of hydrocarbon that has been produced. This effort is intended to maintain the production continuity. The exploration and production activities are performed through its own operation and joint operation arrangements. The business partnership forms are: JOB-EOR (Joint Operating Body for Enhance Oil Recovery), JOB-PSC (Joint Operating Body for Production Sharing Contract), TAC (Technical Assistance Contract), Consortium Cooperation System, IP (Indonesian Participation), PPI (Pertamina Participating Interest), and project loan. While for the geothermal sector, the business partnership is JOC (Joint Operating Contract) arrangement.

The company has concession block operated as own operation arrangement covering 7 (seven) oil and gas Operation Area, i.e. Nangroe Aceh Darussalam (NAD), Central Sumatra (Jambi), Southern Sumatra (Prabumulih), Western Java (Cirebon), Eastern Java (Cepu), Kalimantan (Balikpapan), and Papua Operation Area (Sorong). To develop its exploration and production business, Pertamina Upstream has prospective

business in oil and gas drilling services called Pertamina Drilling Service (PDS), which owns 28 drilling-rig units.

Downstream activities directorate engages in the activities of oil and gas refining, and managing the distribution and marketing of the refined products. The main objective of its activities is to meet the domestic market fuel demand, also non-fuel and petrochemical demand in the domestic and international markets. There are some sub-directories in downstream operations:

1. Processing
2. Shipping
3. Marketing and Trading
4. Distribution and Marketing Network
5. Other Businesses

The downstream sub-directories operations have responsibilities starting from the tanker of crude oil storage. The usage of oil fuel in Indonesia was needed in many sectors based on the data of PT Pertamina.

B. VISION AND MISION OF PERTAMINA

1. Vision of Pertamina

   To be respected leading company

2. Mission of Pertamina

   a. To carry out business in oil gas, LNG, energy and petrochemical industries as well as other businesses that support Pertamina.

b. To become a business entity that is professionally managed, competitive and based on excellent core values.

c. To provide added value to shareholders, customers, employees and community as well as to support the national economic growth.

C. ACHIEVEMENTS

PT Pertamina (Persero) has made several great achievements, as follows:

1. **IMAC** (Indonesian Most Admired Company)
2. **ICSA** (Indonesian Customer Satisfaction Award) 2003 Received by Pertamina's lubricant.
3. **IBBA** (Indonesian Best Brand Award) 2003 Received by Pertamina's lubricant.
4. **Commemorative Plaque**, Received by Pertamina's RCC (Residual Catalytic Cracker) Unit.
5. **ISO 14001**, received by Pertamina's operation units
6. **ISO/IEC 17025 : 2000,** received by Pertamina's Laboratory in Jakarta and Surabaya.

D. BUSINESS ACTIVITIES

1. Upstream Activities

Upstream activities cover exploration and production of oil, gas, and geothermal. The aim of exploration activities is to discover

new oil and gas reserves as a replacement of hydrocarbon that has been produced. This effort is intended to maintain the production continuity. The exploration and production activities are performed through its own operation and joint operation arrangements.

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North Sumatra, Kamojang (140 MW) located in West Java and Lahendong (20 MW) located in North Sulawesi.

2. Downstream Activities

Directorate engages in the activities of oil and gas refining, and managing the distribution and marketing of the refined products. The main objective of its activities is to meet the domestic market fuel demand, also non-fuel and petrochemical demand in the domestic and international markets.

a. Processing

Pertamina operates 7 fuel refineries, 2 LPG plants, and 2 LNG and LPG plants. Some fuel refineries also process non-fuel and petrochemical products.

b. Shipping

Pertamina has sea transportation fleet to carry oil and gas, and to distribute fuel, non-fuel, and petrochemical products for domestic and export market. It is conducted using owned and chartered tankers. The other activities are brokerage, ship agency, crewing, etc. In 2002, the activities are conducted by 130 units of tankers which consist of 32 units owned by Pertamina, 96 units of chartered tankers, and 2 units of floating storage. The tanker fleet is capable to offer transportation with 48.9 million Long Ton capacities.

c. Marketing and Trading

Main Marketing activities cover business activities in marketing fuel, lube oil, LPG, LNG, aviation, petrochemical, and other non-fuel products for domestic market. Export and import is conducted by Trading.

1) **Fuel Business**: Pertamina market fuel products for the needs of industry, land transportation, household (retail), and bunker.
2) **Lubricant Oil Business**: Pertamina has Lubricant Oil Blending Plant (LOBP) in Jakarta, Surabaya, and Cilacap with 573,000 kilo liter annual total capacity (2 shifts/day). The product is used for industrial machinery, automotive machine, marine engine, etc. Pertamina is currently the market leader in Indonesia lube oil business.
3) **LPG Business**: LPG business has good prospect in the future because the market growth and demand are relatively high. It has not given profit contribution because the market price has not reach the economical level.
4) **LNG Business**: Pertamina has long experience in LNG business and has an excellent reputation in international market.
5) **Aviation Business**: The rapid development of air transportation will stimulate the aviation business growth. Pertamina has the resources and infrastructure for aviation

business in all airports in Indonesia. The products has meet the international standard requirements.

6) **Petrochemical and Non-Fuels Business**: Pertamina has refineries which produce various non-fuels and petrochemical products for domestic and international markets. This is a profitable business for Pertamina.

d. Distribution and Marketing Network

In distribution fuel, non-fuel, gas, and petrochemical products for domestic market, Pertamina operates 8 Marketing Units located throughout Indonesia.

Pertamina storage facilities comprise of 24 units of in-land depo, 97 units of sea-fed depo, 53 units of aviation depo with 1,308 units of tanks and 1,051 kilometers pipeline. Maximum storage capacity reaches 13.6 million kiloliters.

The distribution channels include over-land, by sea and by air. To expand its distribution network for its products, Pertamina and partners have developed a range of supporting facilities for its distribution activities.

Downstream Business Products

In general, the Downstream products consist of fuel, special fuel, non fuel and petrochemical, gas, and another products.

a. **Fuel products**, comprise of Premium, Kerosene, Autogas, Automotive Diesel Oil (ADO), and Industrial Fuel Oil (IFO).

b. **Special Fuel products**, comprise of Aviation Gasoline (Avigas), Aviation Turbin Fuel (Avtur), Super TT, Premix 94, Pertamax, and Pertamax Plus.

c. **Non-Fuel and Petrochemical products**, comprise of Green Cokes, SBP/LAWS/SGO, Polytam, Pure Terephithalic Acid (PTA), Asphalt, Paraxylene, Benzene, Minarex, Lube Base Oil, Lube Oil, Minasol, Waxes, Pertasol, Propylene, Paraffinic 60 & 95, Raffinate, Toluena, and Heavy Aromat. Some well-known lube oil brands are Mesran, Mesrania, Meditran, Rored, Translik HD, Prima XP, Martron, Medripal, Salyx, Turalik, Grease Pertamina, etc.

d. **Gas products**, comprise of Liquid Petroleum Gas (LPG) and Liquid Natural Gas (LNG).

e. **Other products**, comprise of Low Oil Mogas Component (LOMC), Naphta, Residue, LSWR, HVGO, Decant Oil, Sulfur, and Lean Gas.

3. Other Business

Pertamina has 13 Subsidiaries and 16 Joint Ventures operating in various industries such as hotel, Upstream & Downstream business support service, shipping, airlines, dockyard, marketing service, hospital, oil drilling service, management service, contractor, supplier, insurance, manufacturing, and others.

Subsidiaries Joint Ventures as Portfolio Investment are expected to increase company's value such in the form of either dividend or through their support to Pertamina activities.

E. HUMAN RESOURCES

The development of human resources focuses on the creation of proficient, professional, committed, dedicated, and business-oriented employees.

To achieve this, Company has determined the following corporate strategies for the development of its human resources:

1. Implement an organized and consistent development of employees such that employees have the competency, skills, dedication, high performance and productivity.
2. Appreciate in the form of welfare and competitive remuneration and also giving protection to employees according to the standard of oil and gas companies in Indonesia as well as the existing regulation.
3. Establish and develop a broad and a secure industrial relationship in order to create a harmonious and comfortable atmosphere to support high productivity.

This corporate strategy will be the basis for the implementation of human resources development program. The Company convinces that human resource development is a long-term investment and therefore is

committed to a continuous and systematic development program in anticipation of changing business needs.

The Company has implemented transparent selection and recruitment process in recruiting experts and fresh graduates for regeneration. The preliminary selection and recruitment processes are conducted through independent third parties such as University of Indonesia, University of Gadjah Mada, and University of Padjadjaran.

Continuing 2001 policy, Company has developed a career management program and system that is based on ability and performance (merit system). The program and system are expected to improve effectiveness and transparency in developing the career of Pertamina's employees in the future.

To create a corporate culture that supports the Company's transformation process, Company has established and undertaken a socialization program on the new leading values known as the FIVE-M (Focus, Integrity, Visionary, Excellence and Mutual Respect).

The crucial matter had been done related to Law No. 22 of 2001:

1. Preparations of future Pertamina organization gradually until 2005;
2. Organization restructuring that had been done during 2002 is termination of Production Sharing Management Directorate from Pertamina Organization in order to activities take over to Executive Board of Oil and Gas according to Government Regulations No. 42/2002

For performance measurement, the Company uses Key Performance for Indicators (KPI or UKT) and Productivity Index. These measurements enhance continuous improvement, which accelerates the Company to an international status.

CHAPTER IV

RESEARCH METHOD

A. RESEARCH METHOD

The research method used in this research was quantitative analysis. The quantitative analysis is a characteristic of variables where the mark stated on the numerical form. The characteristics of the measurement variable make the mark being placed in an interval.

The writer also used literature study. Literature study is meant to get theory to help in solving the problem in the research by learning the literatures, books and journals related to the analysis and problems of research.

B. RESEARCH SUBJECT

This research concentrates on the domestic quantity demand for premium gasoline in Indonesia. The case study of domestic quantity demand for premium gasoline in PT Pertamina (Persero) became the subject in this thesis.

C. RESEARCH SETTING

The study of this thesis takes places on Economics Faculty of Islamic University of Indonesia and PT Pertamina (Persero) UPMS VI Balikpapan-East Kalimantan. The writer does the research through

literatures and data analysis that available on the library and reference-information room which is available in both places. The writer also collects the data on the internet from the websites to collect data from Central Statistics Bureau of Indonesia and Department of Energy and Mineral Resources of Indonesia.

D. RESEARCH VARIABLES

Based on the data used in this research, the variables in this thesis are categorized into two variables; dependent variable and independent variables. Both variables are described as follows:

1. Dependent variable

   The dependent variable in this research is the Quantity demand for premium gasoline in Indonesia (Q) means the consumption level of premium gasoline in Indonesia yearly.

2. Independent variable

   The independent variables in this research consist of four variables, they are:

   a. Indonesian Gross Domestic Product (GDP)

   b. The price of premium gasoline (Po)

   c. The price of petroleum gas in Indonesia (Pi)

   d. The number of motor vehicles amount (Vehicles)

E. TYPES AND SOURCES OF DATA

1. Data Source

   a. Primary Data

      Data that obtain straightly from the authorization that comes from direct interview with the officers of PT Pertamina (Persero) UPMS VI Balikpapan-East Kalimantan which whom it may concern and asking file database under legal permission.

   b. Secondary Data

      Secondary data is the data taken from the literatures, journals, articles and archive files from internet which related to support the research topic.

2. Data Needed

   General Data

   a. The Quantity demand for premium gasoline in Indonesia
   b. The GDP of Indonesia
   c. The price of premium gasoline in Indonesia
   d. The price of petroleum gas in Indonesia
   e. The amount number of motor vehicles in Indonesia

3. Population

   Population is the whole or individual unit becoming the suggestion or the research subject, which the characteristics will be supposed. In this research, population is all kind of the motor vehicles in Indonesia.

4. Sampling method

In this research, the researcher prefers to use selected sampling method, which means the researcher will choose several units from the population independently. The sample will be the total amount number of motor vehicles owned by Indonesian citizens that assumed consumes fuels produced of PT Pertamina (Persero). The method of sample collection for this research uses the accurate data available from the websites of Central Statistics Bureau of Indonesia (Biro Pusat Statistik Indonesia).

F. METHOD OF DATA COMPILATION

Based on some research before (mention in chapter II), the prices of premium gasoline and prices of petroleum gas get multicorrelation, it means those prices of premium gasoline and prices of petroleum gas has strong correlations. As mentioned before, we assume that premium gasoline and petroleum gas are substitution goods, whenever the prices of petroleum gas is changes, there is a probability people would change the quantity of buying petroleum gas and premium gasoline. From this analysis we can see that prices of oil fuels and prices of natural gas have a strong relationship.

For the price of oil and natural gas because there are various kinds of premium gasoline and premium gas usage categories, so the price is also different. The price of both commodities it self in general can be divided

into household and industrial category. The writer will use the prices of premium gasoline and petroleum gas for household (retail) category to get the closest relation between the topic of this thesis and the problem raised in common citizen daily life. On the other side, the price of premium gasoline and also petroleum gas for industrial is not always in the same level price for each institutions category based on the government regulation, it would be more suitable to choose the household (retail) price category.

G. TECHNIQUE OF DATA ANALYSIS

This research uses multiple regression model, in which involves the use of more than one independent variable to predict a dependent variable (Hanke and Rietsch, 1995:255). Meanwhile, in determining the parameter of α, the method being used is Ordinary Least Square (OLS). By using this method, it is expected that the Best Linear Unbiased Estimator (BLUE) will be get by the writer. Basically, the content of this method is normal determination through minimization of error square.

Function of Quantity demand for oil fuels per capita in Indonesia can be formed as follows:

$$Q = f\{GDP, Po, Pi, Vehicles\} \ldots\ldots (1)$$

Where:

Q	: Quantity Demand for premium gasoline in Indonesia (kiloliter/kilo)
GDP	: The Value of Indonesia's Gross Domestic Products (rupiah).
Po	: The Price of premium gasoline in Indonesia (rupiah/liter)
Pi	: The Price of petroleum gas in Indonesia (rupiah/kg).
Vehicles	: The Number of motor vehicles amount Indonesia (unit)

Based on the result of regression linearity test (detailed result available on appendix 3) which is show the data in this research accepted the linearity hypothesis, writer chooses to use the linear regression model in this research. The linear regression model in this research in the form of the following econometric model is:

$$Q = \beta_0 + \beta_1 GDP + \beta_2 Po + \beta_3 Pi + \beta_4 vehicles + u \ldots\ldots\ldots (2)$$

Where:

β_0	: Constant
$\beta_{1,\ldots,}\beta_5$	: Regression coefficient of each variable.
Q	: The Quantity demanded for premium gasoline in Indonesia (kiloliter/kilo)
GDP	: The Indonesia's Gross Domestic Products (rupiah)
Po	: Price of premium gasoline (rupiah/liter)
Pi	: Prices of petroleum gas (rupiah/kg)
Vehicles	: The Number of motor vehicles amount Indonesia (unit)
u	: disturbance error

The writer also applies statistical test which include testing about individual partial regression coefficient by t-test and testing the overall significance of the sample regression by F-test. Beside this statistical test, writer also analyzes the R^2, classical assumptions that cover:

multicollinearity, autocorrelation, heterocedasticity, and specification error test.

1. T – test

This test is used to detect the correlation between dependent variable and independent variables individually. In this research, the writer uses one tail test since this research has a strong theoretical expectation.

The following hypothesis will be examined individually:

H_0: $\beta_i = 0$: means that the independent variable individually does not impact on dependent variables.

H_i: $\beta_i > 0$: means that the independent variable individually has positive impacts on dependent variables.

The decision will be made with the parameter (α) 5% based on the following rules:

a. When the value of computed t < t table value, the decision is accept H0. In this case the independent variable individually does not impact the dependent variable significantly.

b. When the value of computed t > t table value, the decision is reject H0. In this case the independent variable individually impacts the dependent variable significantly.

2. F-Test

This test is used to detect the correlation between dependent variable and independent variables jointly. The testing of F test is the same as the testing for t test. Hypothesis is formulated as follows:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$: hence the independent variables do not affect the dependent variable jointly.

H_i: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$: hence the independent variables affect the dependent variable together.

The decision will be made with the parameter (α) 5% based on the following rules:

a. When the value of F computed < F table, the decision is accept H_0. In this case the independent variables jointly do not impact on dependent variable significantly.

b. When the value of F computed > F table, the decision is reject H_0. In this case the independent variables jointly impacts on dependent variable significantly.

3. Goodness of Fit (R^2)

It is an important property of R^2 that a non decreasing function of the number of explanatory variables or independent variables presents in the model; as the number of independent variables increase. R^2 almost invariably increases and never decreases. R^2 is used to detect how far

the independent variable influences the dependent variable in the model (Gujarati, 1995: 207). R^2 is being a measure of the goodness of fit of a sample least squares linear regression in a body of data. The number of R^2 is between 0 – 1. The closer the number of R^2 to 1 the better the model explain about relationship between dependent variable and independent variables.

4. Classical Assumption

Basically this test is used to know whether the model in this research is a valid model or not. We can say the model is a valid model if there is no correlation, autocorrelation, and heterocedasticity in the model.

a. **Multicollinearity**

Multicollinearity means the existence of a perfect or exact linear relationship among some or all explanatory variables of a regression model (Gujarati, 1995: 320). The consequences of multicollinearity are as follows: if there is perfect collinearity between the X's, their regressions coefficients are in determine and their standard errors are not defined. If collinearity is high but not perfect, estimation of regression coefficients is possible but their standard errors tend to be large. As a result, the population values of coefficients cannot be estimated precisely. However, if the objective is to estimate linear combination of these coefficients, the *estimable function,* this can be done even in the presence of perfect multicollinearity (Gujarati, 1995: 345).

To detect multicollinearity, we can use the correlation method as the best one. The multicollinearity is predicted happens when R^2 is high, say in excess of 0.8. If R^2 is high, the F test in most cases will reject the hypothesis that the partial slope coefficients are simultaneously equal to zero.

b. **Autocorrelation**

The term autocorrelation may be defined as correlation between members of series of observations ordered in time (as in time series data) or space (as in cross-sectional data) (Gujarati, 1995: 400). If there is autocorrelation in the model, it will raise the value of residual and the impact is the number of t-test, f-test and R^2 will decline.

The tool of analysis is used to detect autocorrelation is using LM test (Lagrange Multiplier Test). This test uses the level of degree (χ^2) in which the expressing that there is no autocorrelation, with the guidance if χ^2 statistic bigger than the value of χ^2 table, hence H_0 denied and also on the contrary.

c. **Heteroscedasticity**

An important assumption of heteroscedasticity shows the conditional of X increasing as Y increasing. Here the variances of X are not the same. The writer used White Test that provided by the Eviews 3.0 software to detect heterocedasticity. The White Model is:

$$E^2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \delta_1 X_1^2 + \delta_2 X_2^2 + \delta_3 X_3^2 + \delta_4 X_1 X_2 + \varepsilon \quad \text{.....(3)}$$

That is, the squared residual from the original regression are regressed on the original X variable, there squared values, and the cross product of the regressors.

Under the null hypothesis that there is no heteroscedasticity, it ca be shown that sample size (n) times the R^2 obtained from the auxiliary regression asymptotically follows the chi-square distribution with df equal to the number of independent variables (excluding the constant term) in the auxiliary regression. That is,

$$n.R^2 \underset{asy}{\sim} X^2 \text{ df} \quad \text{.....} (4)$$

If the chi-square value obtained in (4) exceeds the critical chi-squared value at the chosen level of significance, the conclusion is that there is heteroscedasticity. If it does not exceed the critical chi-square value, there is no heteroscedasticity, which is to say that in the auxiliary regression, $\alpha_2 = \alpha_3 = \alpha_4 = 0$

d. Specification error test

A commonly used general set of tests for mis-specification, which are not based directly on an examination of residual, are the RESET tests (regression error specification test) based on the work of Ramsey (1969).

In the RESET test such proxies are based on the predicted value of Y, obtained from the OLS estimation. We first estimate.

$$Y = \beta + \beta_2 X_2 \quad \ldots\ldots (5)$$

Ramsey suggests the use of various powers of the Ys retained from (5) as proxies for X_3, that is Y^2, Y^3 etc. Thus to carry out the RESET test, we next estimate equation such as.

$$Y = \beta_1 + \beta_2 X_2 + \delta_1 Y^2 + \delta_2 Y^3 + \varepsilon \ldots\ldots (6)$$

The significant of the δ coefficient on the proxy variable can then be tested using standard F test for additional explanatory variables. If only one proxy, Y^2, is included then the significance of its coefficient may be assessed by the normal t-test.

If one or more of the δ coefficient in (6) prove to be significantly different from zero then this is evidence of omitted variable error. Note, though, that, since the Y variables could be acting as proxies for more than one omitted variable, the test can be regarded as a general one for the omission of one or more relevant variable.

The RESET test of this subsection can be regarded as a test of general mis-specification. When we apply it, the null hypothesis is that of a correct specification but we have no definite alternative hypothesis in mind. Rejection of the null hypothesis merely indicates that the equation has been mis-specification in some way or other.

CHAPTER V

RESEARCH FINDINGS, DISCUSSION, AND IMPLICATIONS

A. RESEARCH DESCRIPTION

The research goals are to analyzed and identify the factors affecting the quantity demanded for premium gasoline in PT Pertamina (Persero). The factors that affect the quantity demand for premium gasoline in PT Pertamina (Persero) that are examined in this research consist of Indonesian gross domestic product (GDP), prices of premium gasoline, prices of petroleum gas, and number of motor vehicle population.

The type of data being observed and examined in this research is time series data. The data used in this research annually are the data from 1982 until 2002. It covers the total value of quantity demand for premium gasoline in PT Pertamina (Persero) or (Q) measure in kiloliter, Indonesian gross domestic product (GDP) measure in million rupiah, prices of premium gasoline (P_premium) measure in rupiah/liter, prices of petroleum gas (P_LPG) measure in rupiah/kilogram, and the number of motor vehicles (Vehicles) measure in unit. The data used in this research can be seen in the table 5.1 below:

Table 5.1, Research Data

obs	Q PREMIUM (kiloliter)	GDP (billion)	P PREMIUM (Rp/l)	P LPG (Rp/kg)	VEHICLE (unit)
1982	2115933	12325.5	240	285.71	4437528
1983	2429315	73698.2	320	285.71	5463882
1984	2805214	78114.6	350	285.71	6098263
1985	3213304	85082.4	385	300	6682204
1986	3753860	90081.2	385	300	7220963
1987	4344746	94518.8	385	502.26	7981480
1988	5011241	99936.6	385	502.26	7771019
1989	4372811	107321.3	385	502.26	8291838
1990	5150544	123225.5	450	546.12	8889022
1991	6146234	131184.8	550	546.12	9582138
1992	7213890	307474.1	550	631.86	10197955
1993	7606766	329775.8	550	631.86	10784597
1994	7541764	354640.8	700	631.86	11928837
1995	8462698	383792.3	700	850	13208832
1996	9079754	414418.9	700	850	14530095
1997	10010755	433245.9	1000	1330	16535119
1998	10695251	376051.6	1000	1330	17611767
1999	11301588	379352.5	1000	1900	18224149
2000	12541895	398016.9	1150	1900	18975344
2001	13478097	411619.0	1450	2100	21201272
2002	14553626	426740.50	1750	2349	22985193

Source: Archives of Marketing Administration Unit UMPS VI Balikpapan
PT Pertamina (Persero).

Note

Q : Demand for premium gasoline (kiloliter)
GDP : Indonesian GDP per capita (million rupiah)
P_premium : Price of premium gasoline (rupiah/liter)
P_LPG : Price of petroleum gas (rupiah/kilogram)
Vehicle : Amount of motor vehicles (unit)

B. RESEARCH FINDINGS

1. Regression Result Analysis

The first step to analyze the data is by regressing the data with the assistance of the supported computer package that competent and

representative with the research. The writer uses Eviews 3.0 computer program in order to make the data estimation is easier. Beside that, Eviews 3.0 computer program helped the writer in avoiding the computation error. The result of regression using linear model computed with Eviews 3.0 program is shown in appendix 2.

Based on the result of regression, the regression models for quantity demand for premium gasoline (Q), Indonesian GDP (GDP), prices of premium gasoline (P_premium), prices of petroleum gas (P_LPG), and number of motor vehicles (Vehicles), the writer gets the estimation equation for the quantity demand for premium gasoline in PT Pertamina (Persero), that is:

$$\mathbf{Q = -385340.6 + 7.759937\ GDP + 870.9418\ P\_Premium + 409.5841\ P\_LPG + 0.396265\ Vehicles + } u$$

Where:

Q	: Demand for premium gasoline (Kl)
GDP	: Indonesian GDP (million rupiah)
P_Premium	: Prices of Premium Gasoline (rupiah/liter)
P_Lpg	: Prices of Petroleum Gas (rupiah/kg)
Vehicles	: The amount of motor vehicles (unit)

2. Statistical Result Analysis

a. Constant or Intercept

Based on the above mathematics model, the following interpretation can be made:

1) The constant value is -385340.6. It indicates the average level number of demand for premium gasoline in Indonesia for PT Pertamina (Persero) when other variable is zero. The sign is

negative, means that the demand for premium in Indonesia tends to decrease, keep other variables constant.

2) In the case of other variables are in constant, each increasing of decreasing score of GDP variable (X_1) will have impacts on the increase or decrease of demand for premium gasoline (Q) score of 3.565723. It shows the value of change on quantity demand for premium gasoline for every performance on GDP variable, when other variable constant.

3) In the case of other variables are in constant, each increasing of decreasing score of Prices of Premium Gasoline variable (X_2) will have impacts on the increase or decrease of demand for premium gasoline (Q) score of 272.1755. It shows the value of change on quantity demand for premium gasoline for every performance on Prices of Premium variable, when other variable is constant. This model shows the real condition in this case; that the change of Price of Premium Gasoline variable has the same direction with the quantity demand for premium gasoline. It means the increasing price of premium gasoline individually does not make people reduce their demand for premium gasoline.

4) In the case of other variables are in constant, each increasing of decreasing score of Prices of Petroleum Gas variable (X_3) will have impacts on the increase or decrease of quantity demand

for premium gasoline (Q) score of -163.7746. It shows the value of change on quantity demand for premium gasoline for every performance on Prices of Petroleum Gas variable, when other variable is constant. The negative sign means the Prices of Petroleum Gas has the opposite direction with the quantity demand for premium gasoline.

5) In the case of other variables are in constant, each increasing of decreasing score of Vehicles variable (X_4) will have impacts on the increase or decrease of quantity demand for premium gasoline (Q) score of 0.591723. It shows the value of change on quantity demand for premium gasoline for every performance on Vehicles variable, when other variable is constant.

b. T-Test

The t-test is done to test the independent variables individually by t statistic. From the regression result gathered the value of computed t value for each independent variable in which will be compared to the value of t table. The way to find the value of t table is:

t table = t α df (n-k)

α : the level of significance
df : degree of freedom
n : the number of data
k : the number of parameter

This research estimates the t table with α 0.05 and df (21-5) that is 16. From the t-table, it is found that the value of t-table is 2.120. If the value of t-statistic or computed t value > t table value; the independent variables impact the dependent variable significantly. Likewise, if the computed t value < t table value; means that the independent variables are not significant impact on the dependent variable.

From the regression result, the computed t value for each independent variables found and shown in the following table 5.2:

Table 5.2, The Comparison Value of t-statistic and t-table

Variable	t-statistic	α	t-table	Result
GDP	3.014824	5%	2.120	significant
P_Premium	0.650518	5%	2.120	Insignificant
P_Lpg	0.628849	5%	2.120	Insignificant
Vehicles	2.304069	5%	2.120	Significant

1) T – Test of Indonesian Gross Domestic Product (GDP)

The value of t-computed is 3.014824. The value of t table with α 5% and df 21 is 2.120. Since the value of t-computed is bigger than the t table, so the H_0 is rejected and H_1 is accepted statistically. It means that the Indonesian GDP effect the quantity demanded for premium gasoline in Indonesia significantly.

2) T – Test of Prices of Premium Gasoline (P_Premium)

The value of t-computed is 0.650518. The value of t table with α 5% and df 21 is 2.120. Since the value of t-computed is smaller than the t table, so the H_0 is accepted and H_1 is rejected statistically. It means that the price of premium gasoline insignificantly impact on the quantity demanded for premium gasoline in Indonesia.

3) T – Test of Prices of Petroleum Gas (P_LPG)

The value of t-computed is 0.628849. The value of t table with α 5% and df 21 is 2.120. Since the value of t-computed is smaller than the t-table, so the H_0 is accepted and H_1 is rejected statistically. It means that the price of petroleum gasoline insignificantly impact on the quantity demanded for premium gasoline in Indonesia.

4) T-test of the Number of Motor Vehicles (Vehicles)

The value of t-computed is 2.304069. The value of t table with α 5% and df 21 is 2.120. Since the value of t-computed is higher than the t table, so the H_0 is rejected and H_1 is accepted statistically. It means that the number of motor vehicles in Indonesia effect the quantity demanded for premium gasoline in Indonesia significantly.

c. F-test

This test is used to detect the correlation between dependent variable and independent variables jointly. The testing of F-test is the same as the testing for t-test. The first step to do is looking for the value of F table in the statistical table. The way to find the F table is by getting the degree of freedom for numerator (k-1) and degree of freedom for denominator (n-k) With the level of α 5%, the degree of freedom for numerator is 4 (5-1=4) and the degree of freedom for denominator is 16 (21-5=16), found that the value of F table for $F_{(4:16)}$, is 3.01. Meanwhile the value of F computed from the regression result is 318.6131. Since the value of F computed > value of F table, it can be concluded that the independent variables has impact on the dependent variable jointly. In other words, Indonesian Gross Domestic Product, prices of premium gasoline, prices of petroleum gas, and number of motor vehicles were impacts jointly and significantly on the demand for premium gasoline on PT Pertamina (Persero) in Indonesia.

d. Goodness of Fit (R^2)

From the regression run by writer, resulted the value of coefficient determination (R^2) 0.987601. This value shows a high measure for independent variables to explain its impact on dependent variable in the model. It means that the variation of the dependent variable can be explained by the independent variables

about 98.7601 %, while the rest 1.2399 % are explained by factors outside the model.

e. Classical-Assumption Test

1) Multicollinearity

In this research, the detection of multicollinearity is done by watching and comparing the correlation among independent variables shown in the following table 5.3.

Table 5.3, Multicollinearity test

	GDP	P_Lpg	P_Premium	Vehicles
GDP	1.000000	0.814885	0.771912	0.900603
P_Lpg	0.814885	1.00000	0.949064	0.970859
P_Premium	0.771912	0.949064	1.000000	0.951219
Vehicles	0.900603	0.970859	0.951219	1.000000

The correlation method states that when the correlation is $r < R^2$ (0.99) it can be said that there is no multicollinearity in the model. So based on the correlation matrix writer conclude that the model of this research does not involve multicollinearity.

2) Autocorrelation

The tool of analysis is used to detect autocorrelation in this research is using LM (Lagrange Multiplier) test. The result of LM test shown on table 5.4 below:

Table 5.4, The Comparison Value of χ^2 computed and χ^2 table

χ^2 computed	χ^2 table	Decision
0.151148	5.99	no autocorrelation

The guidance of decision which shows whether there is an autocorrelation or not in the model is by watching and comparing the value of χ^2 computed (Obs*R-square) and χ^2 table. When the value of χ^2 computed is greater than χ^2 table with α 5%, so H_0 rejected and H_1 accepted, means the hypothesis that stated there is autocorrelation in the model is accepted, and the contrary.

From the LM test found that the value of χ^2 computed (Obs*R-square) is 0.151148 in which smaller than the value of χ^2 Table 5.99. In other words, there is no autocorrelation happened in the model because the value of χ^2 computed is smaller than the value of χ^2 table

3) Heterocedasticity

An important assumption of heterocedasticity shows the conditional of X increasing as Y increasing. Here the variances of X are not the same. The writer using white test that provide by the eviews 3.0 program to detect heterocedasticity.

Table 5.5, The Comparison Value of χ^2 computed and χ^2 table

X^2 computed	χ^2 table	Decision
1.759533	15.5	no heterocedasticity

The guidance of decision which shows whether there is heterocedasticity or not in the model is by watching and comparing the value of χ^2 computed (Obs*R-square) or by

times $n.R^2$ and the chi-square distribution with 8 df. The 5% critical chi-square value for 8 df is 15.5. When the value of χ^2 computed is greater than critical chi-square with α 5%, so the hypothesis that stated there is no heterocedasticity in the model is rejected, and the contrary.

From the White test found that the value of χ^2 computed (Obs*R-square) is 4.683500 or $n.R^2$ = 21 x 0.223024 = 4.683500 in which smaller than the value of χ^2 table (critical chi-square) with df = 9 and α= 5% is 15.5; in other words; there is no heterocedasticity in the model because the value of χ^2 computed is smaller than the value of χ^2 table.

4) **Specification error test**

The writer using RESET (regression error specification test) based on the work of Ramsey (1969). This test is general set of test for miss-specification, which are not based directly on an examination of residuals. In this test we have to make assumption that the null hypothesis is the correct specification that is linear model. The result that provide by the Eviews 3.0 computer program is shows in appendix 7.

The guidance of decision which shows whether there is a misspecification or not in the model is by watching and comparing the value of computed F-statistic and the F-table. When the computed F value is less than the F table means we

accept the null hypothesis that there is no misspecification in this model.

With the level of α 5%, degree of freedom for numerator 4 (5-1) and the degree of freedom for denominator 16 (21-5), found that the value of F table for $F_{(4:16)}$, is 3.01. The computed F value is 1.436037 in which smaller than F-table 3.01; its means that the null hypothesis is accepted and there is no misspecification in this model.

Table 5.6, The Comparison computed F value and F-table

F computed	F table	Decision
1.555145	3.01	no misspecification

C. IMPLICATIONS

1. Gross Domestic Product

GDP or gross domestic product is the total value of a country's output. It is the market value of all final goods and services produces within a given period of time by factors of production located within a country (Case, 2002). Previously, the writer made hypothesis of relationship between GDP and domestic demand for premium gasoline on PT Pertamina (Persero) in Indonesia is positive. It means that an increase of GDP will stimulate the increasing demand for premium gasoline significantly.

According to statistical test, the writer get the result of t-computed for GDP is 3.014824 while the t-table is 2.120. From the

comparison between t-computed and t-table, it is shown that t-computed is bigger than t-table. It represents that the impact of GDP changes affect significantly to the quantity demand for premium gasoline. For the normal condition (ceteris paribus) the higher the GDP level means the better monetary level of that country's citizens and also present the country production based on its definition where increasing a production can increase the GDP.

The real conditions found by the writers to explain this condition in relation with the problem limitation of this thesis is, the trend-analysis of quantity demanded for premium gasoline in this case is also influenced by the GDP variables. The economic level of Indonesia in macro-perspective shows the positive increasing except on the period on the monetary crisis, the better economic conditions for Indonesian citizens in micro-perspective (for example: purchasing power and budget expenses orientations of house-hold) also happened in general. So in this case it is more possible for the GDP to affect the quantity demanded for premium gasoline is significantly on house hold category.

2. Prices of Premium Gasoline

The other variable based on the theory of demand which can affect the quantity is the prices of commodity itself, in this case the price of premium gasoline. The hypothesis for this variable is prices of premium gasoline give negative impact on the quantity demand for

premium gasoline. It means that an increase on the prices of premium gasoline will reduce the quantity demand for premium gasoline.

The result of statistical test shows that the t-computed for the price of premium gasoline is 0.650518 and the t-table is 2.120. From the comparison between t-computed and t-table, shows that t-computed is smaller than t-table. It represents that the changes of premium gasoline prices do not affect significantly to the quantity demand for premium gasoline.

Even though based on the theory of demand the higher the price reduces the quantity of demand ceteris paribus, but there are some "special" conditions for the price for premium gasoline. Firstly, the price is set not by the market mechanism but based on the government policy, to give the subsidy for the selling price of premium gasoline. Secondly, the government makes the price disparity for the house hold and industrial sector. It means that we found the different price level for house hold and industries. Even in industrial sector based on the government regulation the price is still different for several industrial categories. And the third, house-hold customers still have no choice in the term of same kind products. Until the periods of data taken in this thesis, the government has not yet let the private sectors to open the direct sales business of premium gasoline for house-hold sectors.

3. Prices of Petroleum Gas

The substitution commodity for premium gasoline possible to use for vehicle with gasoline engine vehicles and also available in Indonesia is p gas or LPG. LPG for transportation use trade mark "BBG" (gas-fuel). With installing additional fuel-conversion kit on the vehicle, people can use both premium gasoline or petroleum gas easily.

The hypothesis for this variable is prices of petroleum gas give positive impact on the quantity demand for premium gasoline. It means that an increase on the prices of petroleum gas will increase the quantity demand for premium gasoline.

The result of statistical test shows that the t-computed for the price of petroleum gas is 0.628849 and the t-table is 2.120. From the comparison between t-computed and t-table, it is shown that t-computed is smaller than t-table. It represents that the changes of petroleum gas prices do not affect significantly to the quantity demand for premium gasoline.

Actually based on the information given by the officers of PT Pertamina (Persero) UPMS VI-East Kalimantan, the sales data of petroleum gasoline shows the positive trends. But the portion for transportation usage is relatively small compared with the total sales of petroleum gas itself or with the total sales of premium gasoline. It means that the amount of petroleum gas uses as the substitution

commodity is not big enough to significantly affect the quantity demanded for premium gasoline.

4. Amount Number of Motor Vehicle

Motor vehicle is one of the variables that most definitely affecting the quantity demand for premium gasoline. In this case the motor vehicles are the total unit of 2-wheels and more motor vehicles periodically counted by the BPS (Central Statistics Bureau) of Indonesia. The special category vehicles such as heavy-duty tractors, bulldozers, back-hoe and military owned (tank, panzer, etc) are not included.

The hypothesis for customer made by writer is a positive relationship between number of motor vehicle and the quantity demand for premium gasoline in PT Pertamina (Persero). It means that when the amount number of motor vehicles increases, the quantity demand for premium gasoline in PT Pertamina (Persero) also increases.

Actually the statistical test clearly reflects the logical thinking behind the hypothesis. The value of t-computed for motor vehicles variable is 2.304069, bigger than the t-table which is 2.120. It means that the more the numbers of motor vehicles which consume the premium gasoline affect the higher of the quantity demand for premium gasoline in PT Pertamina (Persero).

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

This chapter presents some conclusions and suggestions relevant to the finding and data analysis result of this research. The entire conclusion here focuses on the test result of the research hypothesis. Several conclusions and recommendations are outlined as follow:

A. CONCLUSIONS

The result of data analysis gives the information that Gross Domestic Products (GDP) of Indonesia is the most dominant variable influenced the domestic demand for premium gasoline in Indonesia, as the case of domestic quantity demanded in PT Pertamina (Persero) year 1982-2002. Another variable which is also influenced the demand for premium gasoline is the amount of motor vehicles in Indonesia, while the variables price of premium and price of natural gas influenced the demand insignificantly.

This condition describes the general condition of fuel consumption in Indonesia, where the price of premium gasoline does not influence the quantity demand of premium. It means that the premium gasoline is inelastic goods. For the long term period, some economist as mentioned before said that there is some possibility for the costumer to change their habit or consumption pattern in as the impact of increasing fuel price. This thesis has not proved that long-term habit changes possibilities for the case in Indonesia; it can be proved by the increasing amount of motor vehicles periodically and

also the price petroleum gas as the most possible goods to substitute premium gasoline cannot change the demand of premium significantly. Some logical assumptions that can be made are; the purchasing power of Indonesian citizen in cumulative to buy the premium gasoline is still higher than the increasing price of premium gasoline, the substitution goods for premium gasoline fuel which has already available in the market is not easy to applied that make some people are not enthusiastic to buy it, or the public transportation service did not give enough utility value that makes people choose to use their own vehicles to mobile.

B. RECOMMENDATION

As mentioned before, this thesis analyzed the domestic demand for premium gasoline in Indonesia year 1982-2002 is based on PT Pertamina (Persero) as the company which has responsibility to fulfill all that demand based on Indonesian government policy. So, the recommendations here more focuses on the Pertamina in related to improve the company's performance:

1. For the present condition, the consumption of premium gasoline significantly influenced by the vehicle population and GDP. It means the market for premium gasoline in Indonesia is potentially high, where the growth trend of GDP and vehicle amount based on the data available is generally always increased from year to year. In other word, the demand for premium gasoline fuel will be a very good prospect for Pertamina as the producer of fuel.

2. In order to face the new competitor of domestic oil fuel distributor from other private companies as mentioned in the previous chapter, Pertamina will have to share the total domestic costumer of oil fuel. It means the domestic quantity demand for oil fuel will not go to Pertamina at all will be shared between Pertamina and other companies. So, in the future Pertamina should give more attention for other factors such as the quality improvement of products, quantity of stock availability, and the price competition that will become more sensitive.
3. Liquid Petroleum Gas as the substitution goods for premium gasoline based on the analysis result is not yet optimal to substitute the usage of premium gasoline. Pertamina as the producer of both commodities premium gasoline and petroleum gas should improve more strategy to increase the domestic demand of petroleum gas. It means that, Pertamina should develop the marketing strategy to make people have more interest to use the petroleum gas as the substitute for premium gasoline.
4. For the further research related with this topics, another researcher can develop the equation with another variables depend on the problem perspective in order to discover another interest problem topic of fuel demand activities. Because there are a lot of type of oil fuel available in Indonesia's domestic market such as diesel petrol fuel ('solar'), kerosene, avtur, etc. Each kind of those fuels has different demand characteristics.

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APPENDIX

Appendix 1, Research data

YEAR	Q PREMIUM (kilolitre)	GDP (billion)	P PREMIUM (Rp/l)	P LPG (Rp/Kg)	VEHICLE POPULATION (unit)
1982	2,115,933	59,632.6	240	285.71	4,437,528
1983	2,429,315	73,697.6	320	285.71	5,463,882
1984	2,805,214	87,054.8	350	285.71	6,098,263
1985	3,213,304	94,491.5	385	300	6,682,204
1986	3,753,860	96,489.3	385	300	7,220,963
1987	4,344,746	114,518.5	385	502.26	7,981,480
1988	5,011,241	142,020.3	385	502.26	7,771,019
1989	4,372,811	167,184.7	385	502.26	8,291,838
1990	5,150,544	196,919.2	450	546.12	8,889,022
1991	6,146,234	227,162.8	550	546.12	9,582,138
1992	7,213,890	307,474.1	550	631.86	10,197,955
1993	7,606,766	329,775.8	550	631.86	10,784,597
1994	7,541,764	354,640.8	700	631.86	11,928,837
1995	9,462,698	383,792.3	700	850	13,208,832
1996	9,079,754	414,418.9	700	850	14,530,095
1997	10,010,755	433,245.9	1,000	1,330	16,535,119
1998	10,695,251	376,051.6	1,000	1,330	17,611,767
1999	11,301,588	379,352.5	1,000	1,900	18,224,149
2000	12,541,895	398,016.9	1,150	1,900	18,975,344
2001	13,478,097	411,619.0	1,450	2,100	21,201,272
2002	14,553,626	426,740.50	1,750	2,349	22,985,193

Appendix 2, Result of regression analysis

Q=f(GDP,pLPG,pPEMIUM,Vehicle Population)

Dependent Variable: Q_PREMIUM
Method: Least Squares
Date: 04/28/05 Time: 10:28
Sample: 1982 2002
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-385340.6	494928.8	-0.778578	0.4476
GDP	7.759937	2.573927	3.014824	0.0082
P_PREMIUM	870.9418	1338.843	0.650518	0.5246
P_LPG	409.5841	651.3230	0.628849	0.5383
VEHICLE_POPULATION	0.396265	0.171985	2.304069	0.0350

R-squared	0.987601	Mean dependent var	7277585.
Adjusted R-squared	0.984502	S.D. dependent var	3806004.
S.E. of regression	473819.9	Akaike info criteri	29.17930
Sum squared resid	3.59E+12	Schwarz criterion	29.42799
Log likelihood	-301.3826	F-statistic	318.6131
Durbin-Watson stat	1.817693	Prob(F-statistic)	0.000000

Table of Varian Analysis for Linearity Test

Source of Variation	dk	JK	KT	F computed	F table
Total	21	1.40194E+15			
Regression	1	2.85893E+14	5.71787E+13		
Reside	19	3.44305E+12	2.29536E+11		
Suitable *Tuna*	3	1.4904E+11	49679865271	0.221285938	3.24
Error	16	3.59208E+12	2.24505E+11		

Note: in this case, if F computed ≤ F table, it means that the linier regression model is accepted and if F computed ≥ F table, it means that the linier regression model is rejected (Sudjana, 1996: 332).

F computed	F table	Decision
0.221285938	3.24	Linier model

Result: F computed ≤ F table, it means that **the linier regression model is accepted** in this research.

Table of Linearity Test Analysis (1)

n	Y	X1	X2	X3	X4	yi	x1i	x2i	x3i	x4i	Y^i
1	2,115,933	59,632.6	240	285.71	4,437,528	5,161,652.0	201,048.3	445.0	598.1	7,400,638.5	2,161,890.0
2	2,429,315	73,697.6	320	285.71	5,463,882	4,848,270.0	186,983.3	365.0	598.1	6,374,284.5	2,747,417.0
3	2,805,214	87,054.8	350	285.71	6,098,263	4,472,371.0	173,626.1	335.0	598.1	5,739,903.5	3,128,579.3
4	3,213,304	94,491.5	385	300	6,682,204	4,064,281.0	166,189.4	300.0	583.8	5,155,962.5	3,454,018.9
5	3,753,860	96,489.3	385	300	7,220,963	3,523,725.0	164,191.6	300.0	583.8	4,617,203.5	3,683,013.0
6	4,344,746	114,518.5	385	502.26	7,981,480	2,932,839.0	146,162.4	300.0	381.6	3,856,686.5	4,207,127.2
7	5,011,241	142,020.3	385	502.26	7,771,019	2,266,344.0	118,660.6	300.0	381.6	4,067,147.5	4,337,141.1
8	4,372,811	167,184.7	385	502.26	8,291,838	2,904,774.0	93,496.2	300.0	381.6	3,546,328.5	4,738,797.6
9	5,150,544	196,919.2	450	546.12	8,889,022	2,127,041.0	63,761.7	235.0	337.7	2,949,144.5	5,280,754.2
10	6,146,234	227,162.8	550	546.12	9,582,138	1,131,351.0	33,518.1	135.0	337.7	2,256,028.5	5,877,194.4
11	7,213,890	307,474.1	550	631.86	10,197,955	63,695.0	46,793.2	135.0	252.0	1,640,211.5	6,779,549.5
12	7,606,766	329,775.8	550	631.86	10,784,597	329,181.0	69,094.9	135.0	252.0	1,053,569.5	7,185,075.0
13	7,541,764	354,640.8	700	631.86	11,928,837	264,179.0	93,959.9	15.0	252.0	90,670.5	7,962,089.3
14	9,462,698	383,792.3	700	850	13,208,832	2,185,113.0	123,111.4	15.0	33.8	1,370,665.5	8,784,867.0
15	9,079,754	414,418.9	700	850	14,530,095	1,802,169.0	153,738.0	15.0	33.8	2,691,928.5	9,546,097.8
16	10,010,755	433,245.9	1,000	1,330	16,535,119	2,733,170.0	172,565.0	315.0	446.2	4,696,952.5	10,944,597.9
17	10,695,251	376,051.6	1,000	1,330	17,611,767	3,417,666.0	115,370.7	315.0	446.2	5,773,600.5	10,927,411.6
18	11,301,588	379,352.5	1,000	1,900	18,224,149	4,024,003.0	118,671.6	315.0	1,016.2	6,385,982.5	11,429,154.9
19	12,541,895	398,016.9	1,150	1,900	18,975,344	5,264,310.0	137,336.0	465.0	1,016.2	7,137,177.5	12,002,303.0
20	13,478,097	411,619.0	1,450	2,100	21,201,272	6,200,512.0	150,938.1	765.0	1,216.2	9,363,105.5	13,333,111.2
21	14,553,626	426,740.50	1,750	2,349	22,985,193	7,276,041.0	166,059.6	1,065.0	1,465.2	11,147,026.5	14,520,627.5
sum	152,829,286	5,474,300	14,385	18,561	248,601,497						
avrg	7277585.048	260680.9333	685	883.84	11838166.52						

Regression Coefficient:

C	-385340.6
GDP	7.759937
Pprem	870.9418
Plpg	409.5841
Vehicl	0.396265

Table of Linearity Test Analysis (2)

x1iyi	x2iyi	x3iyi	x4iyi	Yi-Y^i	(Yi-Y^i)2
1,037,741,541,420.4	2,296,935,161.2	3,087,361,060.6	38,199,520,990,109.8	-45,957	2,112,041,922.2
906,545,694,404.0	1,769,618,567.4	2,899,916,541.9	30,904,252,731,787.4	-318,102	101,188,871,583.6
776,520,491,830.0	1,498,244,301.0	2,675,078,462.0	25,670,978,336,012.3	-323,365	104,565,087,787.8
675,440,564,211.2	1,219,284,314.3	2,372,907,265.2	20,955,280,767,753.1	-240,715	57,943,652,536.5
578,566,170,986.1	1,057,117,514.3	2,057,306,733.5	16,269,755,706,802.6	70,847	5,019,295,231.3
428,670,891,775.0	879,851,714.3	1,119,125,293.1	11,311,040,831,454.7	137,619	18,938,928,443.4
268,925,820,041.7	679,903,214.3	864,801,274.6	9,217,555,581,374.3	674,100	454,410,637,670.3
271,585,432,136.8	871,432,214.3	1,108,416,130.1	10,301,283,060,293.1	-365,987	133,946,211,508.8
135,623,824,067.3	499,854,646.2	718,353,418.5	6,272,951,457,503.8	-130,210	16,954,687,749.6
37,920,775,260.9	152,732,391.4	382,084,724.4	2,552,360,233,870.4	269,040	72,382,311,745.9
2,980,492,979.1	8,598,831.4	16,050,151.1	104,473,351,114.4	434,341	188,651,685,026.9
22,744,714,014.0	44,439,428.6	82,948,427.2	346,815,019,247.2	421,691	177,823,331,735.6
24,822,219,141.9	3,962,684.3	66,568,944.6	23,953,231,411.9	-420,325	176,673,382,081.8
269,012,241,888.7	32,776,694.3	73,953,587.1	2,995,058,885,405.2	677,831	459,454,828,547.7
277,061,790,328.8	27,032,534.3	60,993,120.9	4,851,309,921,820.6	-466,344	217,476,535,866.5
471,649,381,727.0	860,948,535.0	1,219,419,392.4	12,837,569,375,685.1	-933,843	872,062,511,533.8
394,298,399,370.2	1,076,564,775.0	1,524,811,194.2	19,732,237,770,126.6	-232,161	53,898,557,195.3
477,534,734,630.3	1,267,560,930.0	4,089,013,594.4	25,697,212,338,043.5	-127,567	16,273,312,515.6
722,979,096,143.2	2,447,904,127.9	5,349,358,639.9	37,572,314,419,818.7	539,592	291,159,505,856.7
935,893,286,435.9	4,743,391,643.6	7,540,788,042.4	58,056,047,416,522.6	144,986	21,020,888,846.9
1,208,256,207,601.3	7,748,983,614.3	10,660,532,978.8	81,106,221,138,036.6	32,998	1,088,900,976.3
9,918,812,784,435.7	29,098,258,980.0	47,400,860,817.2	414,284,562,525,699.0	201,531.3	3,443,045,166,362.5
76,969,362,322,015.3	25,342,890,052,907.4	19,414,638,917,024.1	164,166,472,169,246.0		

Jkreg	**285,893,363,461,193.0**
JKres	**3,443,045,166,362.5**
JK(E)	**3.59E+12**
JK(ST)	**149,034,833,637.5**
KT(ST)	**49678277879**
KT(E)	**2.24505E+11**
F computed	**0.221278867**

Appendix 4 Result of multicollinearity analysis

Multicollinearity

Correlation Matrix

	GDP	P_PREMIUM	P_LPG	VEHICLE_POPULATION
GDP	1.000000	0.814885	0.771912	0.900603
P_PREMIUM	0.814885	1.000000	0.949064	0.970859
P_LPG	0.771912	0.949064	1.000000	0.951219
VEHICLE_POPUL	0.900603	0.970859	0.951219	1.000000

Appendix 5 Result of autocorrelation analysis

Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.151148	Probability	0.861105
Obs*R-squared	0.443859	Probability	0.800972

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/28/05 Time: 10:32
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	100044.5	650629.7	0.153766	0.8800
GDP	0.713445	3.943969	0.180895	0.8590
P_PREMIUM	432.3045	1966.808	0.219800	0.8292
P_LPG	47.43448	742.8665	0.063853	0.9500
VEHICLE_POPULATION	-0.052727	0.266009	-0.198214	0.8457
RESID(-1)	0.078520	0.289481	0.271243	0.7902
RESID(-2)	-0.158498	0.387087	-0.409463	0.6884

R-squared	0.021136	Mean dependent var	-9.62E-10
Adjusted R-squared	-0.398377	S.D. dependent var	423797.4
S.E. of regression	501153.1	Akaike info criteri	29.34841
Sum squared resid	3.52E+12	Schwarz criterion	29.69659
Log likelihood	-301.1583	F-statistic	0.050383
Durbin-Watson stat	2.026036	Prob(F-statistic)	0.999279

Appendix 6 Result of heteroscedasticity analysis

White Heteroskedasticity Test:

F-statistic	1.759533	Probability	0.182041
Obs*R-squared	11.33604	Probability	0.183376

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/28/05 Time: 10:30
Sample: 1982 2002
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.50E+11	6.11E+11	-1.227340	0.2432
GDP	-5573335.	3809173.	-1.463135	0.1691
GDP^2	12.00532	6.632987	1.809942	0.0954
P_PREMIUM	1.82E+09	1.85E+09	0.980871	0.3460
P_PREMIUM^2	-74100.87	670428.1	-0.110528	0.9138
P_LPG	3.09E+08	5.15E+08	0.599578	0.5599
P_LPG^2	736.9124	252210.2	0.002922	0.9977
VEHICLE_POPULATION	165462.4	201219.0	0.822300	0.4269
VEHICLE_POPULATION^2	-0.012357	0.007981	-1.548270	0.1475

R-squared	0.539811	Mean dependent var	1.71E+11
Adjusted R-squared	0.233019	S.D. dependent var	2.11E+11
S.E. of regression	1.85E+11	Akaike info criteri	55.01981
Sum squared resid	4.10E+23	Schwarz criterion	55.46746
Log likelihood	-568.7080	F-statistic	1.759533
Durbin-Watson stat	2.168161	Prob(F-statistic)	0.182041

Appendix 7 Result of RESET analysis

Linearity

Ramsey RESET Test:

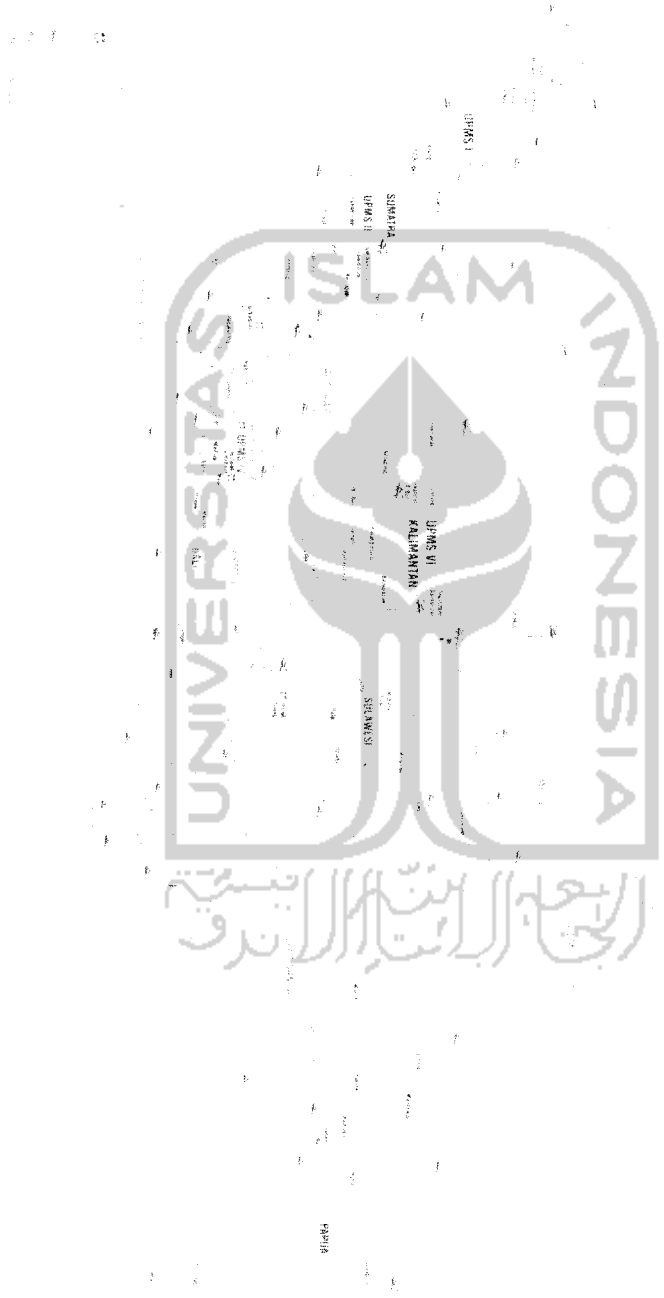
F-statistic	1.555145	Probability	0.231499
Log likelihood ratio	2.071581	Probability	0.150066

Test Equation:
Dependent Variable: Q_PREMIUM
Method: Least Squares
Date: 04/28/05 Time: 10:30
Sample: 1982 2002
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1756921.	1202674.	-1.460846	0.1647
GDP	9.405436	2.853777	3.295786	0.0049
P_PREMIUM	3357.590	2389.247	1.405292	0.1803
P_LPG	1112.052	852.8217	1.303968	0.2119
VEHICLE_POPULATION	0.468000	0.178594	2.620465	0.0193
FITTED^2	-3.33E-08	2.67E-08	-1.247054	0.2315

R-squared	0.988766	Mean dependent var	7277585.
Adjusted R-squared	0.985021	S.D. dependent var	3806004.
S.E. of regression	465807.8	Akaike info criteri	29.17589
Sum squared resid	3.25E+12	Schwarz criterion	29.47433
Log likelihood	-300.3468	F-statistic	264.0453
Durbin-Watson stat	2.166736	Prob(F-statistic)	0.000000

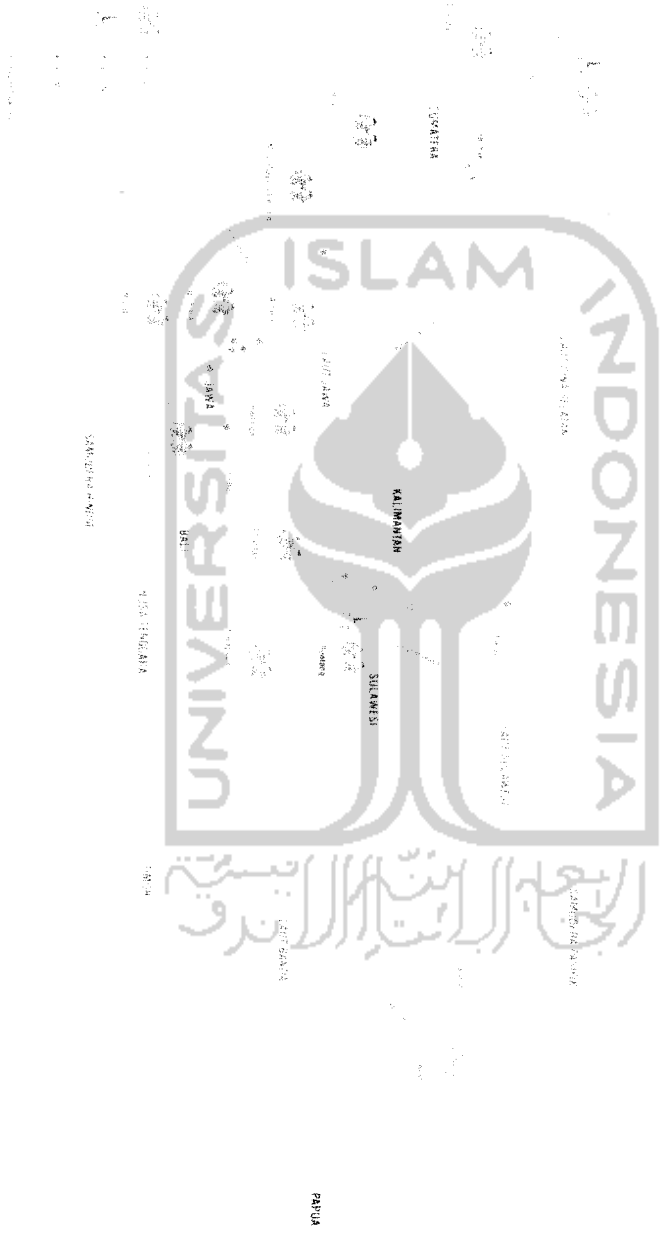
Appendix 8, map of stock supplies infrastructure of fuels in Indonesia



PEMBEKALAN BBM

PT PERTAMINA (PERSERO)

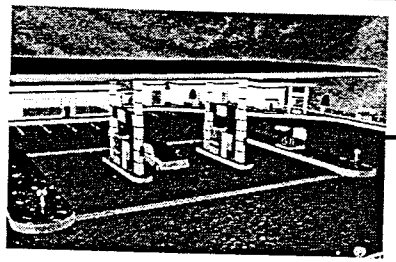
Appendix 9, The map of refineries of oil fuels, natural gas and petrochemicals in Indonesia



MINYAK BUMI,
GAS DAN PETROKIMIA

PT PERTAMINA (PERSERO)

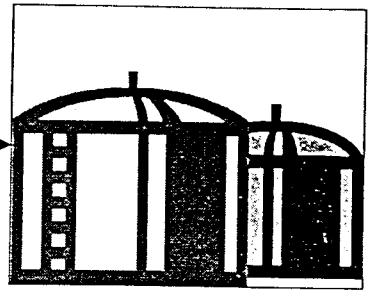
TATA KERJA PENEBUSAN BBM TRANSPORTASI



SPBU

SETORAN
BBM (OPBS)

SALES
ORDER



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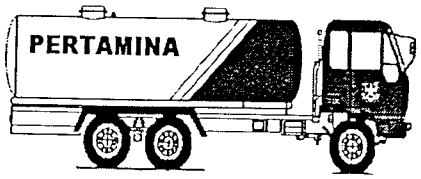
PERTAMINA

PNBP

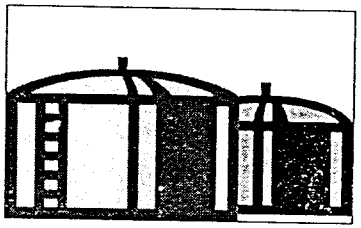


TRANSPORTIR

BBM
(Premium/Solar)

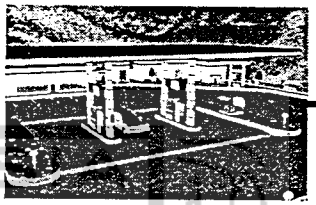
Appendix 10 The purchasing order system of fuels for transportation sector

POLA DISTRIBUSI PREMIUM



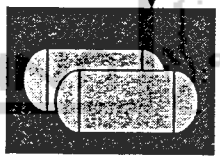
INSTALASI / DEPOT
PERTAMINA

KONTRAKTOR
ANGKUTAN

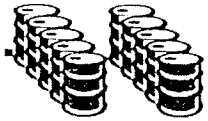


S P B U

KENDARAAN
BERMOTOR



PENIMBUNAN BBM
ILEGAL/OPLOSAN



PENGKALAN MT /KOPERASI
/YAYASAN

KETERANGAN :

: POTENSI PENYIMPANGAN

Appendix 11 The distribution system of premium

Appendix 12, The chemicals specification of premium

Tabel : IV.9
SPESIFIKASI
PREMIUM

No	PROPERTIES		LIMITS		TEST METHODS	
			MIN	MAKS	ASTM	Lain
1	Knock Rating					
	Research Octane Number	RON	88	-	D - 2699	
2	T.E.L Content	gr/lt	-	0,3	D - 3341	
					D - 5059	
3	DISTILLATION					
	- 10% vol. evap. to	°C	-	74		
	- 50% vol. evap. to	°C	88	125 *)		
	- 90% vol. evap. to	°C	-	180		
	- End point	°C	-	205		
	- Residue	% vol		2,0		
4	R.V.P. at 100°F	psi	-	9,0 *)	D - 232	
5.	Existent Gum	mg/100ml	-	4	D - 381	
6.	Induction Period	min	240		D - 525	
7.	Sulphur Content	% wt	-	0,2	D - 1266	
8.	Copper Strip Corrosion 3 hrs/122°F			No. 1	D - 130	
9	Doctor Test or			Negative		
	Alternatively Mercaptan sulphur	% wt	-	0,002		D-38
10.	Color		Yellow		D - 1219	
11.	Dye Content Yellow	gr/100 AG	0,5			
12.	Odour		Marketable			

*) Penyesuaian diberlakan dengan menambahkan Volatility Adjusment Table
Keterangan (remark) "Ditambah aditive untuk konservasi energi"

Spesifikasi tersebut sesuai Surat Keputusan Dirjen Migas No. 188 K/72/DDJM/1997 tanggal 28 Agustus1997

Appendix 13, The chemicals specification of petroleum gas

Tabel : IV.12
SPESIFIKASI
BAHAN BAKAR GAS

No	URAIAN		BATASAN		METODE TEST	
			MIN	MAKS	ASTM	Lain
1.	Komponen					IP
	$C_3 + C_4$	% vol	62.0	-	D - 1945	-
	C_3	% vol	-	8.0	D - 1945	-
	C_2	% vol	-	4.0	D - 1945	-
	C_1	% vol	-	1.0	D - 1945	-
	N_2	% vol	-	2.0	D - 1945	visual
	H_2S	ppm vol	-	14.0	D - 2385	
	Hg (Mercury)	ppb vol	-	6.0	-	AAS
	O_2	% vol	-	0.2	D - 1945	-
	H_2O	% vol	-	0.035	-	Gravimetri
	CO_2	% vol	-	5.0	D - 1945	-
2.	Relative density pada suhu 28°C		0.56	0.89	-	-
3.	Nilai Kalori pada suhu 15°C dan tekanan 1 atmosfir	kj/kg	44,000	-	-	-

Spesifikasi tersebut sesuai Surat Keputusan Dirjen Migas No. 10 K/34/DDJM/1993
Tanggal 01 Februari 1993