

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**EVALUATION OF THE RELATIVE
EFFICIENCY OF GAS STATIONS BY
DATA ENVELOPMENT ANALYSIS**

**NOR AMIDATUL NADIA BINTI BAKERI
2014815912 K15/41**

**NOOR SHAHIERA BINTI RUSLAN
2014257248 K15/41**

**NOOR AIMI ASYIKIN BINTI MOHAMAD ZAINI
2014850386 K15/41**

**Report submitted in partial fulfillment of the requirement
for the degree of
Bachelor of Science (Hons.) Mathematics
Center of Mathematics Studies
Faculty of Computer and Mathematical Sciences**

JULY 2016

ACKNOWLEDGEMENTS

IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

Firstly, we are very grateful to Allah SWT for giving us the strength and opportunity to finish up this final year project successfully. Beforehand, we would like to appreciate the help from our beloved lecturer, Madam Wan Khairiyah Hulaini Binti Wan Ramli and also our supervisor Sir Mohd Faiez Suhaimin for the course of Final Year Project (MSP 660) because of their willingness to spare their time, information and thoughts in order for us to complete this final year project.

Apart from that, our appreciation goes to our classmates, whom have helped a lot during the processes of making this project complete. They also gave an opinion about our work and advise us on how to improve. We share ideas to make the final year project complete.

In addition, special appreciation also extended to our families. This final year project is quite hard for us. So, our family have given us continuous support financially and mentally to make us strong.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	iv
LIST OF FIGURES	iv
ABSTRACT	v
1. INTRODUCTION	1
1.1 Problem Statement	3
1.2 Objectives of the Project	3
1.3 Significant of the Project	4
1.4 Scope of the Project	4
1.5 Definition of Terms and Concepts	4
1.6 Literature Review	5
1.6.1 Performance Measurement	5
1.6.2 Efficiency	6
1.6.3 Efficiency Measurement	7
1.6.4 Data Envelopment Analysis (DEA)	7
1.6.5 Application of Data Envelopment Analysis (DEA)	8
1.6.5.1 DEA in Banking Sector	8
1.6.5.2 DEA in Hospitals	9
1.6.5.3 DEA in Educations	11
1.6.5.4 DEA in Hotel Industry	12
1.6.5.5 DEA in Gas Station	14
1.6.6 DEA's criterion	15
1.6.6.1 Decision Making Unit (DMU)	15
1.6.6.2 Inputs and Outputs	16
2. IMPLEMENTATION	17
2.1 Data Collection	17
2.2 Selection of DMUs, Inputs and Outputs	17
2.2.1 Decision Making Unit (DMU)	17
2.2.2 Inputs and Outputs	18
2.3 Relative Efficiency Measurement Method	18
2.4 Data Envelopment Analysis (DEA) Model	19
2.4.1 Input Orientation	20
3. RESULTS AND DISCUSSION	23
3.1 Descriptive Analysis	23
3.2 Data Envelopment Analysis	24
3.3 Peer Group Analysis in DEA	27
3.4 Projection Determination	29
3.5 Summary	33
4. CONCLUSIONS AND RECOMMENDATIONS	34
4.1 The Summary of the Project	34
4.2 Implications of the Project	35
4.3 Limitations of the Project	36
4.4 Future Work	36
REFERENCES	37
APPENDIX A	45
APPENDIX B	46
APPENDIX C	55

ABSTRACT

This research study is conducted on evaluating the relative efficiency of 36 gas stations in Kedah. In this project, the efficiency was determined by using Data Envelopment Analysis (DEA) which transforming multiple inputs into multiple outputs. Based on the result we get, it shows that there are only four efficient gas station with efficiency score of 1 (GS 1, GS 2, GS 6, and GS 28), whereas another 32 gas stations are not efficient with the efficiency score in range between 0.0398 to 0.8884. So, the efficient gas stations will become the benchmark or the reference set to the inefficient gas stations in order to improve their efficiency using project determination. This means that, management should minimize the inputs so that it could be balanced with the outputs production in order to improve or increase the gas station's efficiency.

Keyword: Data Envelopment Analysis (DEA), Efficiency, Performance

1. INTRODUCTION

Nowadays, energy and fuel are prominent elements in the development of the industrialized countries. The history of the beginning of the drive-in filling station era is a bit gray. According to Jones (2003), a station is referred to by various popular names including filling station, gasoline or gas station or service station, which is a place where a variety of automobile services are provided, in 1920 to post World War II.

Pees (2004) stated that early dispensing was done in various ways. Filling and measuring depended on the capacity of cans, buckets, drums which were used at first, then on to portable rotary pumps and on to actual gauges, graduated columns and meters. Also early sales of gasoline were carried out as sidelines by hardware merchandisers, drug stores, general stores, liveries (Zolli & Summer, 1994), and by curbside vendors and even by salesmen pushing the gasoline around in carts equipped with hoses. As the demand grew, brand names began to be highly visible and oil companies built fancy accommodations (the spic and span gasoline station) to serve their trademark gasoline to the motorists. The new pumps were modern-looking devices in their day and by having the oil company logo on the crown they were attractions in themselves.

In Malaysia, because of having a lot of oil sources, oil and petroleum products play important and strategic role in the economy of the country. The gas station are directly involved in distributing petroleum products and operated by dealers who are appointed by oil companies such as PETRONAS, Shell, Caltex, BH Petrol, and Petron. In August 2013, there were 3291 gas stations and 332 mini stations. Most stations supply grade RON95 and RON97 petrol at varying prices. It also supply diesel and Natural Gas Vehicles (NGV) for transport vehicles such as lorries, trailers and busses (Malaysian Productivity Corporation, 2014)

Moreover, gas stations in Malaysia also provide motoring oils and other lubricants for motorists. Fuel and petrol or diesel is not the only commodities which gas station provides service to the Malaysian. Service stations supply motor or vehicles other motoring needs such as battery water, engine or lubricating oils of all sorts and