



# Cost Reduction Strategies for a Gas Station

By

Mr. Prapot Thasamakorn

A Final Report of the Three - Credit Course  
CE 6998 Project

Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Master of Science  
in Computer and Engineering Management  
Assumption University

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The Graduate School of Assumption University has approved this final report of the three-credit course, CE6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

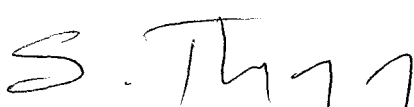
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## ABSTRACT

This project aims to change the working structure and prevent problems in order to reduce the cost of a gas station.

The project is developed to improve the existing system at Vichit gas station in Phatthalung Province. The old structure is not an efficient and effective tool in the changing business condition. The scope of the project will cover changing the working structure and reducing the cost of working and preventing problems, which have caused increased cost.

The outcome of the project can be utilized for decision making to reduce cost in the gas station.



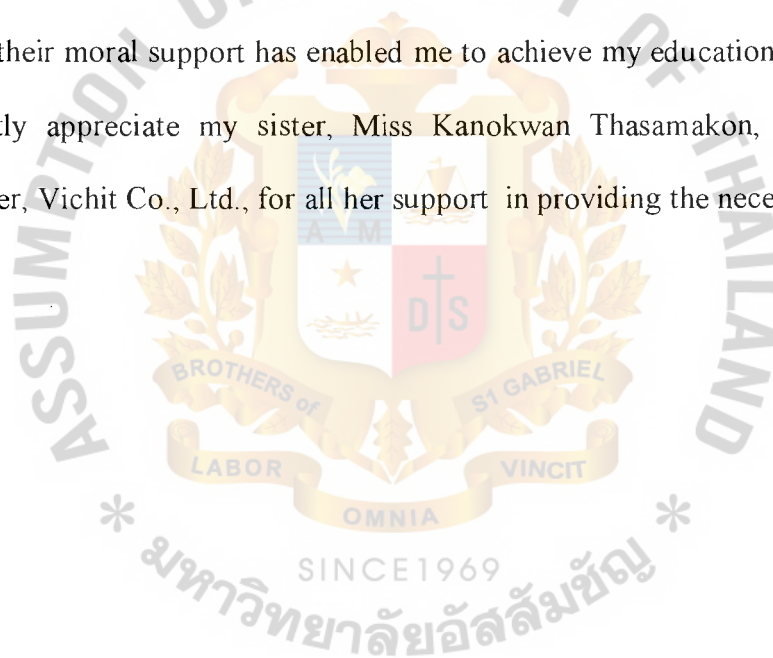
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## TABLE OF CONTENTS

<u>Chapter</u>	<u>Page</u>
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
LIST OF FIGURES	vii
LIST OF TABLES	viii
I. INTRODUCTION	1
1.1 The Cost Problems in the Gas Stations	1
1.2 The Cost Reduction Objectives	1
1.3 Scope of Work	2
II. LITERATURE REVIEW	3
2.1 Total Quality Management (TQM)	3
2.2 Gas Station Management Manual	6
2.3 Job Description & Job Specification	12
2.4 Maintenance Backlog File	15
III. COST REDUCTION STRATEGIES	17
3.1 The Costs from Excessive Expenses	17
3.2 Reducing Excessive Expenses	26
3.3 Costs from Losses, Damages, Contamination, and Theft	48
3.4 Reducing Losses, Damages, Contamination, and Theft	50
IV. IMPLEMENTATION OF COST REDUCTION STRATEGIES	63
4.1 Results of Excessive-expense Cost Reduction	63
4.2 Results of Cost Reduction on Losses, Damages, Contamination, and Theft	75

<u>Chapter</u>	<u>Page</u>
V. CONCLUSION	77
5.1 Research Summary	77
5.2 Achievements	77
BIBLIOGRAPHY	79



## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
2.1 The Petrol Truck	11
3.1 The First Shape of the Cover of Underground Petrol Drum	51
3.2 The Second Shape of the Cover of Underground Petrol Drum	52
3.3 A Water Pump	54
3.4 Tools for Testing Gasoline Density	56





## LIST OF TABLES

<u>Table</u>	<u>Page</u>
3.1 A Daily Plan	44
4.1 Salary Comparison between the Previous Structure and the New Structure	64
4.2 Workers' Idle Time Comparison between 1998 & 1999	65
4.3 Total Costs in 1998	69
4.4 Total Costs in 1999	70
4.5 Automobile Maintenance Costs Comparison between the Automobile Dealers' Service Center and the Small Garage	71
4.6 Office and Shop Supplies Losses in 1998 and 1999	72
4.7 Miscellaneous Expenditure in 1998 and 1999	73
4.8 Results of Cost Reduction on Losses, Damages, Contamination, and Theft	74

## **I. INTRODUCTION**

### **1.1 The Cost Problems in the Gas Station**

At present, there are many gas stations selling gasoline. The total sale of gasoline in 1999 is reduced to 30%-50% compared with the previous total sale of gasoline in 1998, but the costs or expenses at present are still equal or increased when compared with the costs or expenses in the previous year.

The cost problems of the gas station consist of:

- (1) The problem of excessive attendants or the unbalance between the excessive attendants over the job assignment.
- (2) The problem of excessive cost from general expenses or miscellaneous expenses.
- (3) The problem of lost gasoline from damaged equipment.
- (4) The problem of lost gasoline from contaminated gasoline.
- (5) The problem of lost gasoline from theft.

### **1.2 The Reduction Cost Objectives**

It is necessary for the gas station to reduce cost when the total sale reduces or the current business is down. The reduction cost objectives are important to help the gas station to be stable in the current business condition that consist of:

- (1) The number of attendants has to balance the job assignment.
- (2) The general expenses or miscellaneous expenses are reduced.
- (3) The ways for checking damaged equipment must be found.
- (4) The ways for preventing contaminated gasoline must be established.
- (5) The ways for preventing theft must be considered.

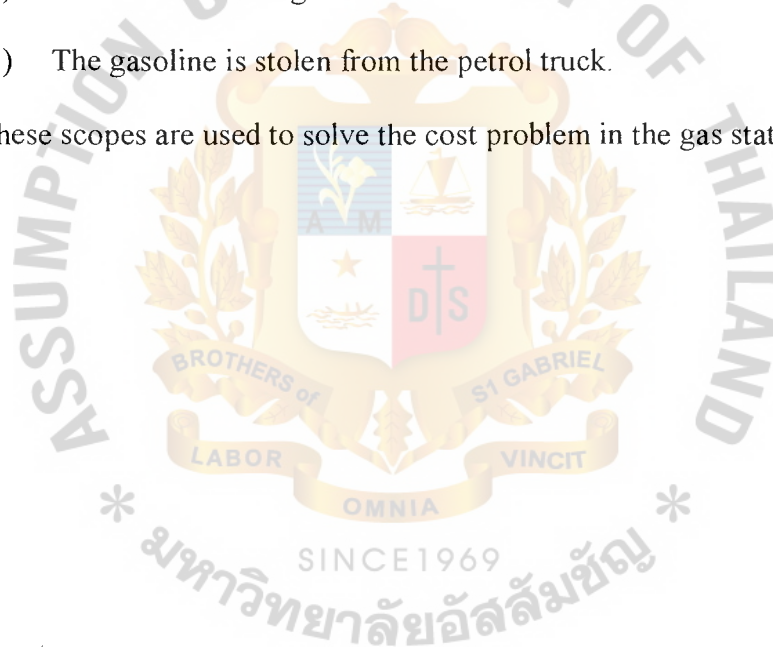
When these objectives are achieved, then can help the gas station to reduce cost.

### 1.3 Scope of Work

The project will cover major parts of activities that are relevant:

- (1) The cost of expense in the gas station that does not include the cost of expense in the cleaning and washing car department.
- (2) The number of attendants in the gas station that does not include the cost of expense in the car cleaning and car washing department.
- (3) The damaged equipment includes damaged underground petrol drums, damaged petrol pumps, damaged gasoline pipes.
- (4) The contaminated gasoline occurred from water or non-standard gasoline.
- (5) The gasoline is stolen from the petrol truck.

These scopes are used to solve the cost problem in the gas station.



## II. LITERATURE REVIEW

The serious competitive economic situation presently affects the quality product and service offered to satisfy consumer's needs. Therefore, cost reduction will increase the profit and efficient competition.

The gas station business is one of the intensively competitive businesses that mostly aim at product and service qualities. Presently, the product and service qualities are generally similar but we can see the difference of the cost in each gas station, for example, unnecessary number of employees, the lost of gasoline because of defective maintenance equipment or theft of gasoline due to careless protection, etc. The study tells us the 4 main solutions to reduce the costs but remain effective.

- (1) Total quality management (TQM)
- (2) Gasoline station management manual
- (3) Job description & Job specification
- (4) Maintenance backlog file

### 2.1 Total Quality Management (TQM)

There are various definitions of TQM, but we would refer the definition of Achan Witoon as follows:

TQM means the quality management for the whole organization or quality management system or technical management, which concurrently improve the product or service quality by the participation of every level of human resource within the organization.

TQM's compositions

Dr. Kano has defined the composition as 6 critical items as follows:

- (1) Intrinsic Technology



- (2) Motivation for quality
- (3) Concept
- (4) Techniques
- (5) Vehicles
- (6) Quality Assurance (QA)

#### Intrinsic Technology

The company is firm and growing continuously relieing on basic technology that must be comparative or superior to that of the competitors.

#### Motivation for Quality

Every company staff readily changes attitudes, behavior and working style by holding quality concept.

#### Concept

The quality concept for improving the work performance consists of 7 items.

- (1) Products and service could satisfy customer's needs continuously and consistently with customer's orientation.
- (2) Take into consideration that the next process is "customers"
- (3) Emphasize on the job improvement
- (4) Set up the job standard and follow up its contents
- (5) Prevent the same problems from re-occurring instead of solving immediate problems
- (6) Follow up the basic concept of PDCA management cycle, which stands for Plan-Do-Check-Act.
- (7) Solve the problem and make a decision based on the facts and information

## Techniques

They are the tools for analyzing the problems in order to improve the job.

- (1) The seven QC tools, for examples, check sheets, cause and effect diagrams, pareto diagrams, graphs, histograms, scatter diagrams, control charts.
- (2) The seven new QC tools, for example, affinity diagrams, relation's diagrams, tree diagrams, matrix diagrams, arrow diagrams, process decision program charts, and matrix data analysis.
- (3) Statistics such as testing and estimation, design of experiments etc.

## Vehicles

They are the approach of employees' task improvement in the company.

- (1) Policy management is the method that the top management formulates company's missions and goals
- (2) Daily management is the routine day-to-day management
- (3) Cross functional management is the job improvement among different departments
- (4) Bottom up activities is the job improvement of employees in terms of implementing their own calibre.

## Quality Assurance (QA)

It is building up the customer's perception through the products and service.

## Organization in the Future

Each business unit of the organization is able to cooperate together by achieving customer satisfaction. Each employee performs various tasks and gains more authorization to do the job, gets a fair compensation according to the job value. Each one can have the opportunity to show ideas and accept about changes and to participate in the organization.

## Work Improvement

Focusing on the step of working system to build efficacy:

- (1) Step reduction or changing the step such as decreasing unnecessary steps, changing the level of work step etc.
- (2) Combine one step with other steps
- (3) Changing the complicated step to become convenient and smooth step

## TQM Benefits

TQM has more benefits for the organization

- (1) Cost reduction
- (2) Employee's participation
- (3) High quality products and service
- (4) Continuous process development
- (5) Better management and policy formulation

## 2.2 Gas Station Management Manual

From the history of petrol companies, they provide gas station management manual to help the gas station owner understand the gas station business and know the significant operation so that the owner can achieve the highest profit and cost reduction, including with customer good impression.

The following heading represents the building of the standard for the gas station which influences the operation costs, contaminated gasoline protection, lost gasoline prevention from the damaged equipment, and gasoline theft prevention etc.

Regulation for unloading gasoline from the petrol truck.

The means of the process of unloading the gasoline from the petrol truck to underground petrol drum consists of the following steps.

- (1) When the petrol truck arrives.
  - (a) Let the driver drive on the plain level to maintain the level of gasoline in the tank without leaning to any side which is difficult to check the gasoline level from the measure in the tank.
  - (b) Check the driver ID Card, his name and surname must be accurate with the specified invoice.
  - (c) Check the invoice with its description such as category, gasoline volume, accounting, customers, shipping destination, and truck's license number.
- (2) Check the underground petrol drum.

Before unloading, make sure that the underground petrol drum can load the gasoline volume from the petrol truck to prevent gasoline spilling.
- (3) Check the seals.
  - (a) The number of the upper seals and bottom seals must be consistent with the invoice.
  - (b) Make sure that the seals and wires have previously been cut or removed.
  - (c) Use the pliers to hold the wires and the seal as evidence, do not wrest them away or raise with a lever.

Note: Seal checking is one of gasoline theft prevention.



- (4) Checking the gasoline volume.
- (a) Turning on the bottom value and checking the type and the gasoline level accordingly with the category and specified order by observing the gasoline level at the tip of the arrowhead.
  - (b) If the gasoline level is below the arrow head, fill up the same type of gasoline by using the standard tin which has been filled up from the petrol pump and pour the gasoline into the shoutatage gap in order to realize exactly the number of litres of gasoline which is short. When the gasoline level fits matches the arrow head, let the petrol truck driver see the gasoline pouring and write the lacking quantity in the invoice and sign his name.
  - (c) Checking the seal's condition and the wire connection with the measurement pad.
- (5) Lading the gasoline sample and quality inspection.

Lading the gasoline from the petrol truck compartments and putting them in the sample tin and test the density according to the main company recommendation.

Note: Gasoline lading is the protection process concerning contaminated gasoline or non-standard gasoline.

- (6) Examining the mixed substances.

Open the gasoline distribution pipe carefully and pour the gasoline into a clean vessel in order to inspect whether there is some water or mixed substances or not. If there is something unusual, contact the closest gasoline warehouse as fast as possible.

- (7) Connecting a hose and underground petrol drum.

Check whether the driver connects the hose correctly or not with the different types of gasoline in the underground petrol drum and notify the driver to release the gasoline.

(8) Directing the gasoline release.

Carefully take care of gasoline release and the petrol truck driver must control everything by himself.

(9) Removing the car when the oil runs out.

(a) Let the driver take the hose out from the petrol truck and turn off the valve and move the petrol truck backward and forward in order to make the gasoline flow through the pipe.

(b) Turn on the bottom valve and distribute the valve to release the remaining gasoline, which is poured into the vessel.

(10) Checking the vacant petrol truck

Check whether it has no gasoline in the petrol truck.

(11) Signing name for receiving gasoline.

The station manager signs the name for receiving gasoline and writes the date, and the time in the invoice. This invoice is sent back to the petrol truck driver. (ธีระพนธ์ 2538)

### Taking Care of Gasoline

Gasoline is dangerous and expensive. It easily evaporates in normal temperature and it must be kept in the vessel all the time. Taking care of gasoline well results in good health, safety and reduced the cost of losing gasoline from the non-standard vessel.

### Standard of the underground petrol drum

- (a) The down pipe gasoline must have a number card, gasoline type name and it must be locked when it is not used.
- (b) The big cover of underground petrol drum must have a number and it must be locked when it is not used.
- (c) The big cover of petrol drum must be shut tight.
- (d) There must not be water in the area of the petrol drum cover.
- (e) The scale must have a number and display the number of volume of gasoline in the underground petrol drum.
- (f) The bottom petrol drum must not be mixed with water and mud dregs.
- (g) The air pipes of the underground petrol drum must have the number which matches the number of the petrol drum underground.
- (h) The gasoline and engine oil (which have been used) must not leak onto the ground or drift in to the river.

#### How to keep Standard of the underground petrol drum

- (a) To close the gasoline pipe down after it releases gasoline into the underground petrol drum.
- (b) To check the released gasoline from the down pipe with the right type of gasoline and the right number of the underground petrol drum every time.
- (c) To check the big cover of the underground petrol drum every 6 months.
- (d) To check that the big cover does not have any water and dirt on it.

#### The Petrol Truck

The picture of petrol truck is shown in Figure 2.1.



Figure 2.1. The Petrol Truck.

#### Standard of the petrol truck

- (a) The big five channels on the petrol truck's tank are put into each of the different gasoline types and each of the channels has a scale for showing gasoline volume.
- (b) The five pipes have outlets at the side of the tank.
- (c) The two rubber pipes are at the side of the tank.
- (d) There are stairs and paths to check gasoline in the tank.

#### How to provide a standard petrol truck

- (a) Check the engine and the outside of the truck before the truck is driven.
- (b) Clean the truck every time, when it has been used.
- (c) Repair the rubber pipes, when they leak.
- (d) Check the covers and the lockers all the time.



- (e) Check air wheels every time before the truck is driven.

## Testing the Density of Gasoline in a Petrol Truck

Testing is used to inspect whether gasoline has standard or not. It is used for preventing the contaminated gasoline or non-standard gasoline that is caused from the gasoline warehouse or theft. This detail of testing will be seen in section 3.4 of Chapter 3.

## Testing the Density of Gasoline in an Underground Petrol Drum

It has the same advantage as testing the density of gasoline in a petrol truck but it is used for preventing the contaminated gasoline or non-standard gasoline that is caused from water such as flood, and ground water. The detail of the test will be seen in section 3.4 of Chapter 3.

## Testing whether Water has mixed with Gasoline in the Underground Petrol Drum

This is to inspect whether gasoline has water mixed with it or not, and we can know the volume of water in the underground petrol drum from using the chemical solution for testing water. This detail of the test will be shown in section 3.4 of Chapter 3.

## 2.3 Job Description & Job Specification

Job description and job specification are important for displaying characteristic duties and responsibility of work of each officer for efficiency, clearance, and reducing complicated work. Job description and job specification can help link some work with other work in order to form teamwork, which will reduce idle time in each work. The teamwork uses the cross-functional team that helps increase efficient work with opportune officers.

## Writing the Job Description

The job description should indicate the necessary contents of an adequate description:

### (1) Function

The job description summarizes the general functions of the position by stating briefly and succinctly its basic objectives and responsibilities.

### (2) Responsibilities and Authority

This section lists the major specific responsibilities assigned to the position. Minor responsibilities and duties, which are of a routine nature, are usually briefed or covered in general language applicable to many positions. The major responsibilities will constitute the objectives of the position referencing to factors or other standards against which performance can be measured and appraised.

### (3) Relationships

This section describes the major relationships that are vital, both up and down within the line of authority and at all levels outside of the line of authority.

### (4) Accountability

After objectives have been made clear and the responsibilities and authority defined, the subordinate is accountable to his superior for success or failure in accomplishing these objectives.

## Job Specifications

The job descriptions must contain job specifications. Job specifications are different from the actual job description in that they describe “the mental and physical

qualifications of a job, such as experience and skill, which are required of a person to fill it.

Job specifications may take the form of a routine listing of college degrees and company experience, or these items may be coupled with the reasons a person with experience would be suited for the particular job.

#### Position Specifications

##### (1) Education

The degree of his or her education are as follows:

- (a) Primary school
- (b) Lower secondary education
- (c) Upper secondary education
- (d) Bachelor's degree
- (e) Master's degree
- (f) Doctorate degree

##### (2) Experience

Work experiences are obtained from the past job, including the period of work.

##### (3) Other qualifications

Examples of qualifications are:

- (a) Good health
- (b) Cleanliness
- (c) Friendly neatness and politeness
- (d) Leadership
- (e) Energetic

## 2.4 Maintenance Backlog File

Maintenance backlog is the approved maintenance repair workload. It has two basic classes of work to be included in the development of a maintenance backlog file.

- (1) Unscheduled work is the work plan that cannot fix the time in the work plan
  - (a) Checklist hours is known work but it cannot fix the time in the work plan
  - (b) Emergencies are occurring work immediately so it cannot fix the time in the work plan
- (2) Scheduled work is the work plan that can fix the time
  - (a) A routine repair is the routine work for repairing and this work can fix the time in the work plan.
  - (b) Preventive maintenance scheduled job is the future work repairing or maintenance that can fix the time in the work plan.

### The Advantages of Maintenance Backlog File

- (1) The work system has more efficiency.
- (2) Knowing the work, what to do and knows the work time to do so in the scheduled work.
- (3) Able to check the past work plan.
- (4) Reducing idle time because the officers can know their work from the work schedule.
- (5) Able to do the plan for expenditure and time which is used in the work.

The study of TQM, gas station management manual, Job description & Job specification and Maintenance backlog file have advantages for reducing cost, taking care of maintenance equipment, increasing efficiency of work, and satisfying customers' need.



This knowledge information can solve the problems occurring in the gas station including applying the information from the study to the highest number of advantages. This knowledge is used in the cost reduction strategies.



### III. COST REDUCTION STRATEGIES

From the study and problem analysis of the gas station business, we have found that the cost is the major problem influencing the profit and loss of the business. If we can reduce or adjust the operation cost, we can generate more profit and complete with others.

The gas station's cost problems are caused from 2 important aspects.

- (1) Costs from excessive expenses
- (2) Costs from Losses, Damages, Contamination, and Theft

Each aspect mentioned above still has some minor problems which we will apply the study of literature review to solve the problem as follows:

#### 3.1 Costs from Excessive Expenses

The gas station's excessive expenses happen from these 2 problems.

- (1) Problem of excessive attendants or the imbalance between the excessive attendants over the job assignment.
- (2) Problem of excessive expenses from general expenses or miscellaneous expense.

Problem occurs because of excessive attendants or the imbalance between the excessive attendants over the job assignment.

The cause of this problem happens due to the decreasing client's car, which reduces the actual job responsibilities of the workers. The cause of decreasing client's car comes from:

- (a) Greater gas station newcomer, particularly, in the close area.
- (b) Reducing car consumption due to economic recession.
- (c) Serious competition in terms of promotion and price reduction.

Problems of imbalance between excessive attendants over the job assignment influences the follow problems:

- (a) Job vacancy of the workers
- (b) Constant employment costs but less selling profit.
- (c) Problems of job rotation due to inexperienced and impractical workers who cannot do the job jointly.

The following procedures represent the job duties and responsibilities, worker qualification before restructuring by applying the knowledge from job description and job specification into an understandable form in each job responsibilities.

#### The previous job description

##### Station assistant manager

##### Position of Station Assistant Manager

Sex : Male or Female

Age : More than 25 years old.

Education : Higher than Bachelor's Degree and has experiences in administration

##### Applicant Quality

He or she should have experiences in administration and marketing.

He or she should have leadership ability, high responsibility and very good knowledge about gas station.

He or she can give suggestions to his or her subordinates as to how to solve problems, and can use authority to solve the problems properly and correctly.

##### Duty and Responsibility

- (a) Ensuring that toilets, gardens, drains and wells are cleaned by supervising the workers to do the jobs regularly.

- (b) Planning sales promotions in order to increase sales volume.
- (c) Training officers and attendants to use the fire apparatus.
- (d) Training forecourt attendants to give good service.
- (e) Over seeing the subordinate's conduct.
- (f) Replacing other persons to any jobs whose officers are absent.
- (g) Supervising accounts, total sales and controlling the money deposited by the accountant.
- (h) Issuing cheque and purchase order of the main company.
- (i) Providing and buying accessories and equipment for use in the station.
- (j) Controlling workers who work at the caring well and keeping them perform their duties according to the company's standards.
- (k) Training new forecourt attendants and other workers.
- (l) Considering good persons to be trained when the main company provides training programs.
- (m) Taking care of the cleaning of all the station areas every day.
- (n) Supervising forecourt attendants to dress up and act properly.
- (o) Taking very good care of all equipment.
- (p) Giving consultations to forecourt attendants when they have problems.
- (q) When any accidents, such as fire or robbery take place, he or she must take action according to what he or she is trained.
- (r) Depositing money to the bank.

#### Chain of Organization

Report directly to station manager.

Forecourt attendant

Position of forecourt attendant

- Sex : Male or Female, who is not crippled
- Age : More than 16 years old.
- Education : Higher than primary school.

#### Applicant Quality

Clean, smiling, neat and polite.

#### Duty and Responsibility

- (a) Responsible for serving engine oil, gasoline, distilled water or radiator coolant at clients' requests.
- (b) Taking care of customers when they are being served and any problems of customers must be reported, such as flat tire or radiator coolant problems.
- (c) Regarding the safety factor, giving customers' notice for no smoking, stopping the car engine, getting off motorcycles when filling the gasoline.
- (d) Knowledge of how to use fire extinguisher.
- (e) While a sales clerk is selling, she or he must provide careful service.
- (f) Receiving or giving changes honestly.

#### Chain of Organization

Report directly to the station assistant manager or accountant.

#### Engine Oil- Changing Attendant

##### Position of engine oil- changing attendant

- Sex : Male
- Age : More than 18 years old.
- Education : Higher than primary school (a technical school qualification, will be considered first).



## Applicant Quality

He likes to be an engine worker. He has a good manner. He has to know about any engines and be honest because he has to take care of customers' car for long life use and he can be trained about any new technology from the station.

## Duty and Responsibility

- (a) Changing engine oil, gear oil, power steering oil and lubricating the grease for the joints according to the job order.
- (b) Checking any car problems and then making records of parts such as problems of driving belt, lights tube, air tire, and coolant, braking oil and clutch oil.
- (c) Checking any leakage under a car's body.
- (d) Keeping all the tools, equipment and accessories clean.
- (e) Caring well area must be clean.
- (f) Taking care of any oil tanks, such as gear oil, and keeping them in proper places.
- (g) Checking any loose screws under a car including screw at the wheels.
- (h) No joking at work; it will show a lack of responsibility or disrespect.
- (i) Doing the work according to the technical field, by controlling the quality, such as oil, battery water, and gear oil. Any oil must be filled up to the proper level before releasing cars to customers; otherwise it will damage the customers' cars.
- (j) When the engine oil, gear oil are being released from cars, they must be kept in a proper tank. Air cleaner products and oil cleaner products must be in the proper garbage.

Notes: (a) Driving customers' cars are prohibited.

- (b) Reporting any problems according to the job order

#### Chain of Organization

Report directly to the station assistant manager or accountant.

#### Accountant

##### Position of accountant

Sex : Female

Age : More than 18 years old.

Education : High vocational school in accounting.

##### Applicant Quality

She must be neat and polite, is interested in accounting, has knowledge about computer, and is diligent. Also, she must close the account every day.

##### Duty and Responsibility

- (a) Taking care of station budget every day.
- (b) Checking at least one type of stocks a week, in case, any problem happens, it must be found out.
- (c) Keeping the office clean.
- (d) Issuing the correct bill.

#### Chain of Organization

Report directly to the station assistant manager.

#### Cleaning Staff

##### Position of cleaning staff

Sex : Female

Age : More than 30 years old.

Education : No education but she must be diligent, neat, polite, hard working, and love trees.

### Applicant Quality

Clean, smiling neat and polite.

### Duty and Responsibility

- (a) Keeping the sales office clean.
- (b) Keeping the front and back of the station clean.
- (c) Responsible for the continuous flow of the drainage system
- (d) Responsible for the well and any garbage
- (e) Taking care of the water supply and electric supply in toilets.
- (f) Taking care of gardening and watering trees.

### Chain of Organization

Report directly to the station assistant manager or the accountant.

### Petrol Truck Driver

#### Position of Petrol Truck Driver

Sex : Male

Age : More than 30 Years old

Education : Higher than high school (technical school qualification holder will be first considered)

### Applicants Quality

He should have a leadership personality, calm and have knowledge about engine. He should have experiences about truck driving and be able to solve truck problems.

### Duty and Responsibilities

- (a) Receiving cheque and purchase order from the station manager.
- (b) Driving truck from the station to the gasoline warehouse.
- (c) Sending check and purchase order to the seller.

- (d) Receiving gasoline from the seller.
- (e) Driving trucks back to the station.

#### Chain of Organization

Report directly to the station assistance manager or the station manager.

#### Glass Cleaning Attendants

##### Position of Glass Cleaning Attendants

- Sex : Female
- Age : More than 18 years old.
- Education : Higher than primary school

##### Applicant Quality

Clean, smiling, neat and polite.

##### Duty and responsibility

- (a) Responsibility for cleaning car's glass.
- (b) Responsibility for tipping rubbish from customers' cars.

#### Chain of Organization

Report directly to the station assistant manager or accountant.

The previous job description has the quantity of workers in each duty as follows:

#### Previous structure

(1)	Station assistant manager	1	person
(2)	Forecourt attendants	8	persons
(3)	Engine oil- changing attendants	2	persons
(4)	Accountant	1	person
(5)	Cleaning staff	1	person
(6)	Petrol truck driver	1	person
(7)	Glass cleaning attendants	2	persons

As previous structure generates the inefficiency of the job, unable to do the job rotation or excessive workers, these factors influence the payroll costs. Consequently, we need to reorganize the structure of work and the number of worker resources. We will discuss about the new structure in the matter of the cost reduction from the excessive expenses.

Problem of excessive costs from general expenses or miscellaneous expenses

The miscellaneous expenditures have two items.

- (1) The fixed cost of miscellaneous expenditures.
- (2) The variable cost of miscellaneous expenditures.

The problem of excessive cost is a variable cost of miscellaneous expenditures, but we will discuss two as follows:

The fixed cost of miscellaneous expenditures.

It is the cost that we cannot decrease due to two reasons.

- (1) The cost is fixed from the contract, which is the agreement between the owner's gas station (sublessor), with the cleaning & washing car person (sublessee). The sublessor has paid the electric and tap water at 3,000 bahts per month and the sublessee has paid the remaining electric and tap water expenditures.
- (2) The cost is fixed from the tax of the government such as business tax, signboard tax, and municipal tax, cleaning drain and garbage charge.

The variable cost of miscellaneous expenditures

This cost was the excessive costs of the gas station, which has four items as follows:

- (1) Gardening cost

This cost was the excessive costs because we hired outsiders to take care of the gas station's garden every month. The gas station paid 2,000 Baht per month to them.

(2) Car maintenance cost

This cost was excessive cost because the cars in the gas station had been installed and repaired in the big garage. The big garage's car maintenance cost is expensive.

(3) Accessories and equipment cost

In the past, workers usually lost the accessories and equipment such as the worker has lost his pen per week and the equipment is a lost of one piece per month. The problems occurred because they were not checked and the gas station had not a controller.

(4) Printing document cost

The printing document was ordered about 2 times per year and it had not been discounted from the printing shop because of the small volumes of order per time, or not more than 1,000 Baht per time. (see table 4.3).

From these problems, we can solve them using "the cost reduction from excessive expense" method.

### 3.2 Reducing Excessive Expenses

It has two items for reducing cost as follows:

- (1) The reducing cost from employees' restructuring.
- (2) The reducing cost from adjusting general expenditures or miscellaneous expenditures with the new approach.

The reducing cost from employees' restructuring.



From the previous problems, we will apply TQM for solving the gas station structure as follows:

- (1) We use the work improvement to include one steps with other step for increasing efficiency of the workers.
- (2) We use the cross-functional management, for increasing more duties or responsibilities. We use these for reducing idle time and saving costs, and the workers can help together using teamwork.

The TQM can change the previous job description to be the new job description as follows:

The new job description

Station assistant manager

Position of Station Assistant Manager

Sex : Male or Female

Age : More than 25 years old.

Education : Higher than Bachelor's Degree and has experiences in administration

Applicant Quality

He or she should have experiences about administration and marketing.

He or she should have leadership, high responsibility and very good knowledge about gas station.

He or she can give suggestions to his or her subordinates as to how to solve problems, and can use the authority to solve the problems properly and correctly.

Duty and Responsibility

Primary responsibilities: The main duties:

- (a) Taking care of toilets, gardens, drains and wells by controlling workers to do the jobs regularly.
- (b) Planning the sales promotion in order to increase sales volume.
- (c) Training officers and attendants to use fire apparatus.
- (d) Training forecourt attendants to give good service.
- (e) Taking care of the subordinate's conduct.
- (f) Replacing other persons to any jobs whose officers are absent.
- (g) Taking care of the accounts, total sales and controlling the deposit money done by the accountant.
- (h) Issuing cheque and purchase order to the main company.
- (i) Providing and buying accessories and equipment used in the station.
- (j) Controlling workers who work at the caring well and keeping them perform their duties according to the company's standards.
- (k) Training new forecourts and other workers.
- (l) Considering the good persons to be trained when the main company provides training programs.
- (m) Taking care of the cleaning of all the station areas every day.
- (n) Supervising forecourt attendants to dress up and act properly.
- (o) Taking very good care of all equipment.
- (p) Giving consultations to forecourt attendants when they have problems.
- (q) When any accidents, such as fire or robbery take place, he or she must take action according to what he or she is trained.
- (r) Depositing money in the bank.

Support responsibilities: When the accountant has resigned, he or she can replace the accountant.

- (a) Caring of station budget.
- (b) Checking stocks at least one type a week, in case, any problem happens, it must be found out.
- (c) Keeping the office clean.
- (d) Issuing correct bill.

Support responsibilities: When the forecourt attendant is resigned, he or she can replace the forecourt attendant.

- (a) Responsible for serving engine oil, gasoline, distilled water or radiator coolant at clients request.
- (b) Taking care of clients when they are being served, any problems of clients must be reported, such as flat tire or radiator coolant problems.
- (c) Regarding the safety factor, giving the clients' notice for no smoking, stopping the car engine, getting off the motorcycles when filling the gasoline.
- (d) Knowing of how to use fire equipment.
- (e) While he or she is selling, she or he must provide careful service.
- (f) Receiving or giving changes honestly.

Ad-hoc responsibilities: Other works depend upon the assistant manager's request and daily plan.

Chain of Organization

Report directly to station manager.

## Forecourt attendant

### Position of forecourt attendant

- Sex : Male or Female, who is not crippled
- Age : More than 16 years old.
- Education : Higher than primary school.

### Applicant Quality

Clean, pleasant, neat and polite.

### Duty and Responsibility

Primary responsibilities: The main duties

- (a) Responsible for serving engine oil, gasoline, distilled water or radiator coolant at customers request.
- (b) Taking care of customers when they are being served, any problems of customers must be reported, such as flat tire or radiator coolant problems.
- (c) Regarding the safety factor, giving customers' notice for no smoking, stopping the car engine, getting off motorcycles when filling the gasoline.
- (d) Knowledge of how to use fire extinguisher.
- (e) While he or she is selling, she or he must provide careful service.
- (f) Receiving or giving changes honestly.

Support responsibilities: When the glass-cleaning attendant is resigned, he or she can perform the glass cleaning attendant's work.

- (a) Responsibility of cleaning car's glass.
- (b) Responsibility of tipping rubbish from the clients' car.

Support responsibilities: When the cleaning staff is resigned, he or she can perform the cleaning staff's work.

- (a) Keeping clean the sales office.
- (b) Keeping clean the front and back of the station.
- (c) Responsible for the continuous flow of the drainage system
- (d) Responsible for the well and any garbage
- (e) Ensuring efficient water supply and electricity supply in the toilet.
- (f) Taking care of gardening and watering trees.

Support responsibilities: When the engine oil changing attendant resigned, he or she can perform the engine oil changing attendant's work.

- (a) Changing engine oil, gear oil, power steering oil and lubricating the grease at the joints according to the job order.
- (b) Checking any car problems and making a record of items such as driving belt, lights tube, air tire, and coolant, brake oil and clutch oil.
- (c) Checking any leakage under the car body.
- (d) Keeping clean all the tools, equipment and accessories.
- (e) Ensuring that the well area is clean.
- (f) Taking care of any oil tanks such as gear oil, and keeping them in proper places.
- (g) Checking any loosen screws under the car including screw at the wheels.
- (h) No joking at work, it will show lack of responsibility or disrespect.

- (i) Doing the work according to the technical field, by controlling the quality before releasing cars to clients, such as oil, battery water, gear oil, any oil must be filled up at the proper level, otherwise they will damage the clients' cars.
- (j) When the engine oil, gear oil being released from cars, must be collected in a proper tank. Air cleaner products, oil cleaner products must be in the proper garbage.

- Notes:
- (a) Driving the clients' car is prohibited.
  - (b) Reporting any problems according to the job order.

Ad-hoc responsibilities: Other works depend upon the assistant manager's request and daily plan.

#### Chain of Organization

Report directly to the station assistant manager or accountant.

#### Engine Oil- Changing Attendant

##### Position of engine oil -changing attendant

- Sex : Male
- Age : More than 18 years old.
- Education : Higher than primary school (qualification in technical school will be first considered).

#### Applicant Quality

Enjoys being an engine worker. He has a good manner. He has to know about any engines and be honest because he has to take care of customers' cars for long life and he can be trained any new technology by the station.

#### Duty and Responsibility

Primary responsibilities: The main duties



- (a) Changing engine oil, gear oil, power steering oil and lubricating the grease for the weld according to the job order.
- (b) Checking any car problems and then making records such as problems of driving belt, lights tube, air tire, and coolant, braking oil and clutch oil.
- (c) Checking any leakage under a car body.
- (d) Keeping clean all the tools, equipment and accessories.
- (e) Ensuring the well area is clean.
- (f) Taking care of any oil tanks, such as gear oil, and keeping them in proper places.
- (g) Checking any loosen screws under a car including screw at the wheels.
- (h) No joking at work; it will show a lack of responsibility or disrespect.
- (i) Doing the work according to the technical field, by controlling the quality, such as oil, battery water, and gear oil. Any oil must be filled up in the proper level before releasing cars to customers; otherwise it will damage the customers' cars.
- (j) When the engine oil, gear oil are released from cars, they must be kept in a proper tank. Air cleaner products, and oil cleaner products must be in the proper garbage.

- Notes:
- (a) Driving customers' cars is prohibited.
  - (b) Reporting any problems according to the job order

Support responsibilities: When the petrol truck driver is resigned, he can perform the petrol truck driver' s work.

- (a) Receiving cheques and purchase orders from the station manager.
- (b) Driving trucks from the station to the gasoline warehouse.
- (c) Sending checks and purchase orders to the seller.
- (d) Receiving gasoline from the seller.
- (e) Driving trucks back to the station.

Support responsibilities: When the forecourt attendant is resigned, he can perform the forecourt attendant 's work.

- (a) Responsible for serving engine oil, gasoline, distilled water or radiator coolant at clients' requests.
- (b) Taking care of clients when she or he is being served, any problems of clients must be reported, such as flat tire or radiator coolant problems.
- (c) Regarding the safety factor, giving the clients' notice for no smoking, stopping the car engine, getting off the motorcycles when pumping the gasoline.
- (d) Knowledge of how to use fire equipment.
- (e) While he or she is selling, she or he must provide careful service.
- (f) Receiving or giving changes honestly.

Ad-hoc responsibilities: Other works depend upon the assistant manager's request and daily plan.

#### Chain of Organization

Report directly to the station assistant manager or accountant.

Accountant

### Position of accountant

Sex : Female

Age : More than 18 years old.

Education : High vocational school in accounting.

### Applicant Quality

She must be neat and polite, is interested in accounting, has knowledge about computer, and is diligent. Also she must close the account every day.

### Duty and Responsibility

Primary responsibilities: The main duties are:

- (a) Caring of station budget every day.
- (b) Checking at least one type of stocks a week, in case, any problem happens, it must be found out.
- (c) Keeping the office clean.
- (d) Issuing correct bills.

Support responsibilities: When the station assistant manager is resigned, she can perform the station assistant manager's work.

- (a) Ensuring that toilets, gardens, drains and wells are cleaned by ensuring the workers do the job regularly.
- (b) Planning sales promotion in order to increase sales volume.
- (c) Training the officers and attendants to use fire apparatus.
- (d) Training the forecourt attendants to give good service.
- (e) Looking at the subordinate's behavior.
- (f) Replacing officers or attendants when some have not worked or have been dismissed.

- (g) Being in charge of the accounts, total sales and control the deposited money by the accountant.
- (h) Issuing checks and purchasing orders for the main company.
- (i) Providing and buying the accessories and equipment for use in the station.
- (j) Controlling the workers who work at the caring well and ensuring that the company plans are ready and at the set standard.
- (k) Training the new forecourt and other workers.
- (l) Considering good persons to be trained when the main company provides training programs.
- (m) Ensuring the cleaning of all the station areas every day.
- (n) Supervising the forecourt attendants' dress code and proper conduct.
- (o) Taking very good care of all equipment.
- (p) Giving consultation to the forecourt attendants when they have problems.
- (q) Taking action according to what she is trained, when the station has any accidents such as fire or robbery.
- (r) Depositing money to the bank.

Support responsibilities: When the forecourt attendant is resigned, she can perform the forecourt attendant's work.

- (a) Responsible for serving engine oil, gasoline, distilled water or radiator coolant at clients' requests.

- (b) Taking care of clients when she or he is being served, any problems such as flat tire or radiator coolant problems of clients must be reported.
- (c) Ensuring the safety factor, giving the clients' notice for no smoking, stopping the car engine, getting off the motorcycles when filling the gasoline.
- (d) Knowledge of how to use fire equipment.
- (e) While selling, she or he must provide careful service.
- (f) Receiving or giving changes honestly.

Ad-hoc responsibilities: Other works depend upon the assistant manager's request and daily plan.

#### Chain of Organization

Report directly to the station assistant manager.

#### Cleaning Staff

##### Position of cleaning staff

Sex : Female

Age : More than 30 years old.

Education : No education but she must be diligent, neat, polite, hard working, and love trees.

#### Applicant Quality

Clean, smiling, neat and polite.

#### Duty and Responsibility

Primary responsibilities: The main duties

- (a) Keeping the sales office clean.
- (b) Keeping the front and back of the station clean.

- (c) Responsible for the continuous flow of drainage system
- (d) Responsible for the well and any garbage
- (e) Ensuring efficient water supply and electricity supply in toilets.
- (f) Taking care of gardening and watering plants.

Support responsibilities: When the glass-cleaning attendant is out of work, she can replace the glass cleaning attendant's work.

- (a) Responsible for the cleaning of car's glass.
- (b) Responsible for the tipping of rubbish from the clients' cars.

Support responsibilities: When the forecourt attendant is resigned, she can perform the forecourt attendant's work.

- (a) Responsible for serving engine oil, gasoline, distilled water or radiator coolant at clients' requests.
- (b) Taking care of clients when she or he is being served, any problems such as flat tire or radiator coolant problems of clients must be reported.
- (c) Ensuring the safety factor, giving the clients' notice for no smoking, stopping the car engine, getting off the motorcycles when filling the gasoline.
- (d) Knowledge of how to use fire equipment.
- (e) While selling, she or he must provide careful service.
- (f) Receiving or giving changes honestly.

Ad-hoc responsibilities: Other works depend upon the assistant manager's request and daily plan.

#### Chain of Organization

Report directly to the station assistant manager or the accountant.



## Petrol Truck Driver

### Position of Petrol Truck Driver

- Sex : Male
- Age : More than 30 Years old
- Education : Higher than high school (technical school knowledge will be considered first)

### Applicants' Quality

He should have leadership personality, calmness and have knowledge of the engine. He should have experiences about truck driving and solving truck problems.

### Duty and Responsibilities

Primary responsibilities: The main duties

- (a) Receiving cheques and purchase orders from the station manager.
- (b) Driving a truck from the station to the gasoline warehouse.
- (c) Sending checks and purchase orders to the sellers.
- (d) Receiving gasoline from the sellers.
- (e) Driving the truck back to the station.

Support responsibilities: When the engine oil-changing attendant is resigned, he can perform the engine oil changing attendant's work.

- (a) Changing engine oil, gear oil, power steering oil and lubricating the grease for the joints according to the job order.
- (b) Checking any car problems and recording such items as driving belt, light tubes, air tire, and coolant, brake oil and clutch oil.
- (c) Checking any leakage under the car body.

- (d) Keeping clean all the tools, equipment and accessories.
- (e) Ensuring that the well area is clean.
- (f) Taking care of any oil tanks such as gear oil, and keeping them in proper places.
- (g) Checking any loose screws under the car including screw at the wheels.
- (h) No joking at work, it will show a lack of responsibility or disrespect.
- (i) Doing the work according to the technical field, by controlling the quality of oil, battery water, gear oil, any oil that must be filled up to the proper level, otherwise they will damage the clients' cars, before releasing vehicles to clients.
- (j) When the engine oil, and gear oil are released from cars, it must be collected in a proper tank. Air cleaner products, and oil cleaner products must be put in the proper garbage.

- Notes:
- (a) Driving the clients' cars is prohibited.
  - (b) Reporting any problems according to the job order

Support responsibilities: When the forecourt attendant is resigned, he can perform the forecourt attendant 's work.

- (a) Responsible for serving engine oil, gasoline, distilled water or radiator coolant at clients' requests.
- (b) Taking care of clients when she or he is being served, any problems of clients such as flat tire or radiator coolant problems, must be reported.

- (c) Ensuring the safety factor, giving the clients' notice for no smoking, stopping the car engine, getting off the motorcycles when filling the gasoline.
- (d) Knowledge of how to use fire equipment.
- (e) While selling, she or he must provide careful service.
- (f) Receiving or giving changes honestly.

Ad-hoc responsibilities: Other works depend upon the assistant manager's request and daily plan.

#### Chain of Organization

Report directly to the station assistance manager or the station manager.

#### Glass Cleaning Attendants

##### Position of Glass Cleaning Attendants

Sex : Female  
 Age : More than 18 years old.  
 Education : Higher than primary school

##### Applicant Quality

Clean, pleasant, neat and polite.

##### Duty and responsibility

Primary responsibilities: The main duties are:

- (a) Responsible for the cleaning of car's glass.
- (b) Responsible for the tipping of rubbish from customers' cars.

Support responsibilities: When the cleaning staff is resigned, she can perform the cleaning staff's work.

- (a) Keeping clean the sales office.
- (b) Keeping clean the front and back of the station.

- (c) Responsible for the continuous flow of the drainage system
- (d) Responsible for the well and any garbage
- (e) Ensuring efficient water supply and electricity supply in the toilet.
- (f) Gardening and watering plants.

Support responsibilities: When the forecourt attendant is resigned, he can perform the forecourt attendant's work.

- (a) Responsible for serving engine oil, gasoline, distilled water or radiator coolant at clients' requests.
- (b) Taking care of clients when she or he is being served, any problems of clients such as flat tire or radiator coolant problems, must be reported.
- (c) Ensuring safety, giving the clients' notice for no smoking, stopping the car engine, getting off the motorcycles when filling the gasoline.
- (d) Knowledge of how to use fire equipment.
- (f) While selling, she or he must provide careful service.
- (g) Receiving or giving changes honestly.

Ad-hoc responsibilities: Other works depend upon the assistant manager's request and daily plan.

#### Chain of Organization

Report directly to the station assistant manager or accountant.

The new job description has the quantity of workers in each duty as follows:

#### New structure

- (1) Station assistant manager 1 person

(2)	Forecourt attendants	5	persons
(3)	Engine oil- changing attendant	1	person
(4)	Accountant	1	person
(5)	Cleaning staff	1	person
(6)	Petrol truck driver	1	person
(7)	Glass cleaning attendant	1	person

The new structure can reduce labor cost. The number of workers is reduced but work efficiency better than that of the previous structure because of the TQM theory for the new structure as follows:

- (1) Every worker believes in the quality of work and usually improves their work. Their work is taken care by their heads.
- (2) Every worker believes in the station manager's policy of giving good service to the clients.
- (3) Workers must perform their tasks in the daily plan, which will look ahead.
- (4) If the worker is resigned, the other worker will be able to replace his work.
- (5) If the main company has a seminar, this gas station will send the worker to the seminar. It is good for the work to use his knowledge from seminars to create good impression to the clients.
- (6) Cross-functional team can decrease idle time and can increase efficient work.

Besides this new structure, we adapted the knowledge from maintenance backlog file in order to increase the job efficiency of the workers according to the table of daily plan as follows:

Table 3.1.Daily Plan.

(SUN) 7/3/42

NO	Jai	Sai	Choke	Tong	Mit	Yui	Chai	Mali	Job responsibilities	Result operating	Ying	Jai	Sai	Choke	Tong	Mit	Yui	Chai	Mali	Date
1					✓				To take grass cutting equipment	7/3/42	✓	✓								1/3/42
2					✓				To cut grass and decorate trees	7/3/42	✓	✓								1/3/42
3						✓			To clean engine-oil changing area	7/3/42	✓	✓								1/3/42
4	✓								To test density of gasoline from a Petrol truck	7/3/42	✓									4/3/42
5		✓							To check petrol truck condition	7/3/42	✓	✓								4/3/42
6				✓					To clean dispensing pumps	7/3/42	✓	✓								4/3/42



### Benefits of daily plan procurement

- (1) Increasing the job efficiency and it can check the latter workers' job also.
- (2) It is similar to kanban of JIT (Just in Time) that is commanding in writing is better than commanding by talking.
- (3) It can do the job plan in the future.
- (4) It can check 2 ways information, which is obtained from the work and the controller.
- (5) It can reduce indirect cost. The new structure has reduced the workers but the efficiency of work is good because the daily plan can help the work volume to be fixed with the number of workers at present.

The reducing cost from adjusting general expenditures or miscellaneous expenditures is obtained with the new approach.

This ways for reducing cost are:

- (1) Reducing cost from gardening

In the past, we hired outside persons to take care of the gardening so the cost was increased. At present, we use our workers (such as forecourt attendants, engine oil-changing attendant and petrol truck driver) to prune trees, grass and water plants. The workers will know their work looking at the daily plans that the station assistant manager and accountant will check whether their work is complete or not. The five workers are responsible for pruning trees, grass and watering plants one time per week and they are rotated every week.

- (2) Reducing cost from car maintenance

At present, we bring cars to the general garage for repairing or installing cars because the general garage can save labor cost better than

labor cost of the big garage by about 40%-45%, and the guarantees of the two garages is equal also. The result of reducing cost will be shown in the chapter of implementation.

- (3) Reducing cost from office and shop supplies costs
  - (a) By solving the problem of office supplies cost.
  - (b) By solving the problem of shop supplies cost.

#### The problem of office supplies cost

In the past, office supplies were usually lost and the cause of the problem occurred from:

- (1) It had not a controller.
- (2) The workers did not take care when using office supplies.

#### The solution to this problem

- (a) At present, the accountant is a controller. The accountant takes care by using office supplies. When the worker would like to use an office supply, he will sign his name in the notebook so that the accountant can check using an office supplies. The accountant will give an office supply to the worker who cannot pick an office supply by himself. The notebook can help the accountant to check the use and the remaining of office supplies in the stock including buying the office supplies in the future.
- (b) The office supplies were usually lost due to not being taken care of by the workers, so the workers want to employ a new office supply officer who must bring an old office supply to exchange with an new office supply, for example, pens etc. If some office supplies (ruler, rubber etc.) are lost, the worker must have reason for taking the new office supplies.

## Solving the problem of shop supplies cost

The shop supplies were usually lost and the cause of the problem occurred from:

- (1) Having no controller.
- (2) Shop supplies was not good.

The problem can be solved as follows:

- (a) Make the engine oil-changing attendant a controller. He is responsible for using shop supplies (screwdriver, engine oil-changing equipment etc.). The workers would like to take shop supply; they will borrow it from him. The engine oil-changing attendant has a notebook to check the borrowing of shop supplies.
- (b) In the past, the shop supplies were put together and were difficult to check. Now we have built-in cabinets for dividing the shop supply types that the users can easily take including being checked by the controller.

Solving the problem of office and shop supplies cost can reduce the cost of the gas station that you can see in the chapter of implementation.

- (4) Reducing the cost from the printing document.

The gas station solves this problem by ordering in great printing document volume, more than 1,000 bahts per time. The gas station will get 10% discount price by the printing shop and the printing document is ordered once now year. The result will be shown in the chapter on implementation.

### 3.3 Costs from Losses, Damages, Contamination, and Theft

From the administrative operation in previous time, we found that lost gasoline from the damaged equipment or the contaminated gasoline or theft caused the increasing cost.

There are two causes of problem as follows:

- (a) The problems of the underground petrol drum.
- (b) The problems of the petrol truck.

The problems of the underground petrol drum comprise of:

- (a) A lot of evaporating gasoline
- (b) Water mixing with gasoline.
- (c) Gasoline density is not standard in the underground petrol drum.
- (d) Gasoline is lost from the damaged equipment.

There are many reasons causing the above problems:

The cause of the problems of underground petrol drum comprises of:

- (a) The causes of a lot of evaporating gasoline:
  - (1) Some air pipes of the underground petrol drum are damaged.
  - (2) Some small covers under the big covers are damaged.
  - (3) Some big covers are damaged.
- (b) The cause of water mixing with gasoline:
  - (1) There is a flood in the gas station and water oozes and passes into the big and small covers into the underground petrol drum.
  - (2) The underground petrol drum is leaked and the groundwater oozes into it.
- (c) The cause of density of gasoline is not standard:
  - (1) The gasoline is not standard which is due to temperature, humidity or chemical reaction in the underground petrol drum.

(d) The cause of losing gasoline from damaged equipment:

- (1) The petrol pump gives gasoline overlaunches.
- (2) The gasoline pipe is damaged.

The problems of the petrol truck comprise of:

The problems of gasoline in the truck.

- (a) The gasoline is not standard.
- (b) The gasoline is stolen.

The causes of gasoline problem comprise of:

- (a) The cause of gasoline is not standard.
  - (1) The gasoline is not standard from the main company.
  - (2) The gasoline from the main company is mixed with the contaminated gasoline from another source that occurs on the way back to the gas station.
- (b) The cause of gasoline being stolen.
  - (1) The driver is a thief.

There are ways solving the problems in the topic of the cost reduction of lost gasoline from the damaged equipment or the contaminated gasoline or theft.

### 3.4 Reducing Losses, Damages, Contamination, and Theft

As we ever discussed the problems occurring in item 3.3, we can use the gasoline station management manual to solve the problems as follows:

- (a) Solving the problems of underground petrol drum
- (b) Solving the problems of petrol truck

Solving the problems of underground petrol drum comprises of:

- (1) Solving the problems about a lot of evaporating gasoline
- (2) Solving the problems about water mixed with gasoline
- (3) Solving the problems about gasoline density not being standard in the underground petrol drum
- (4) Solving the problems about lost gasoline from damaged equipment

The above four ways to solve the problem make the cost of lost gasoline decreased or not occur in the future anymore.

Solving the problems about a lot of evaporating gasoline.

If an officer checks the shortage of the gasoline volume due to evaporation in the underground petrol drum is more than the sales volume of gasoline, he should check the air pipes, the small cover, and the big cover whether they are damaged or not. If he sees the damaged items, he will report to the main office. The main office employs many technical supporting officers and it will send them to solve those problems, for example, an owner of shell gas station, reports to “shell care”, phone no. 2626000, 2626026. Shell care opens on Monday - Friday from 07.30 am. - 17.30 p.m. And it opens on Saturday from 07.30 am. - 13.00 p.m.



Solving the problems about water mixed with gasoline

The way to prevent this problem is to bring the material close to the small cover of the underground petrol drum. We have two ways which depend on the shape of the cover of the underground petrol drum.

The first way for preventing water is shown by the picture below.

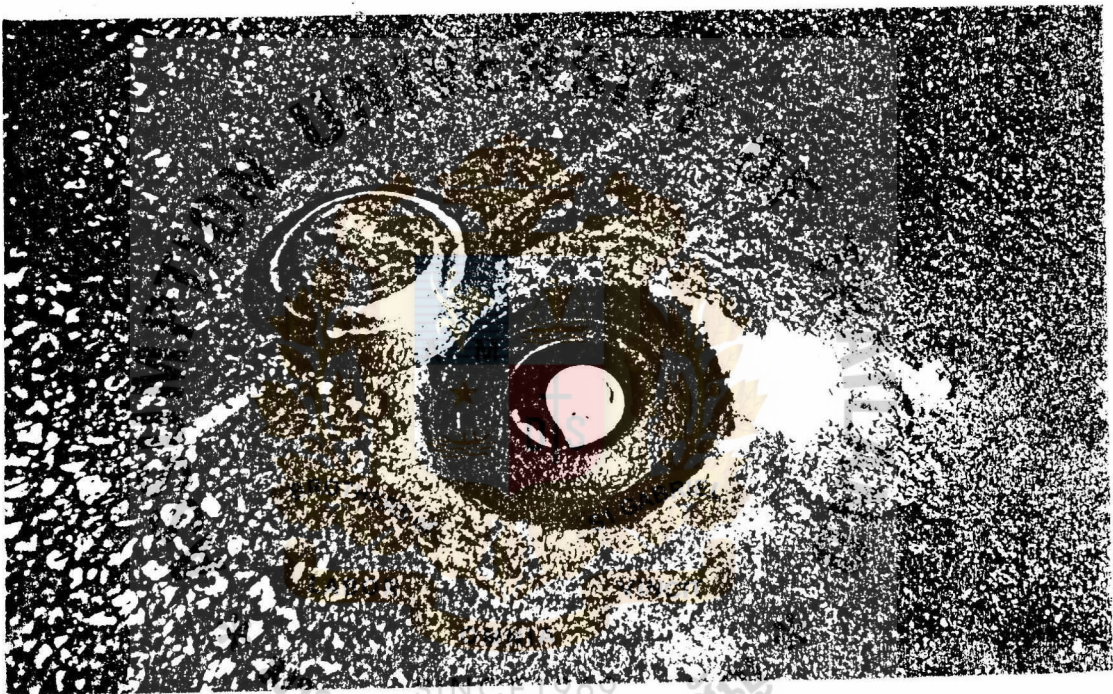


Figure 3.1. The First Shape of the Cover of the Underground Petrol Drum.

In Figure 3.1, we cut a plastic bottle and we use only the bottom part of the plastic bottle to fill with clay or plasticine. The bottom of the plastic is brought close to the small cover and the round bottom of the plastic contains bubbles. The bubbles help to absorb water and they prevent the small cover from submerging in water.

The second way for preventing water is shown by the picture below.

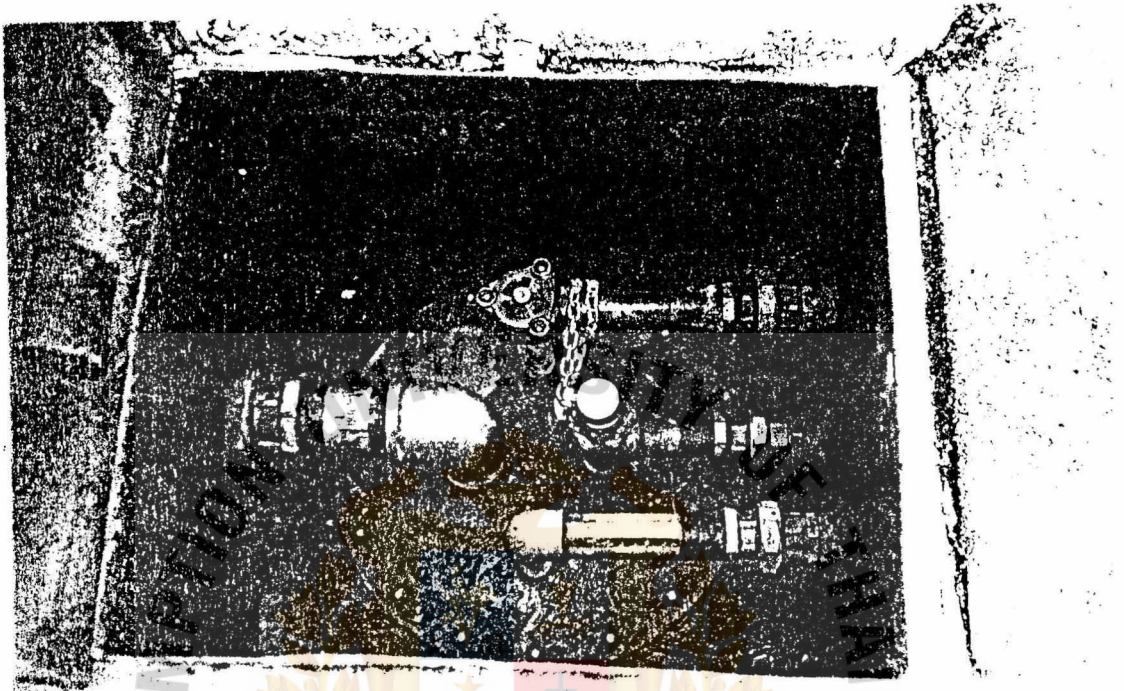


Figure 3.2. The Second Shape of the Cover of Underground Petrol Drum.

In Figure 3.2, we divide the ways to prevent water into three steps

- (1) Use the clay or plasticine to close the round small cover and bring the plastic bag close to the clay or plasticine again. Use the plastic bag prevent the clay or plasticine moving from the round small cover.
- (2) Use the babbles around the small cover to absorb the water and prevent the small cover from submerging in water.
- (3) Put sandbags around the big cover. They can prevent the big cover from flood.



If there is no flood on the gas station but the underground petrol drum has water mixed with gasoline, conjecture the conditions that the ground water oozes into the underground petrol drum and the underground petrol drum is leaked from three ways.

- (1) The underground petrol drum is pressed from near the ground. For this condition, contact the main company to send technicians to check and solve these problems.
- (2) The scale steel measures the volume of gasoline in the underground petrol drum. The officers often measure the gasoline in the underground petrol drum and will release the scale steel immediately. The scale steel will affect the bottom underground petrol drum and create holes in the the underground petrol drum. With this problem, we must teach officers to use the scale steel correctly and tell them about the advantage and the disadvantage of using it.
- (3) Decay: for this condition, call or contact the main company.

The ways to solve these problems when water is mixing with gasoline consists of three steps:

- (1) Use the chemical solution for testing water in the underground petrol drum.
- (2) Separate water from the gasoline.
- (3) Eliminate oil sludge.

The steps for testing water are as follows:

- (1) Officers clean the point of scale steel with clean dry cloth.
- (2) The scale steel is painted with the chemical solution used to prove the water level in the underground petrol drum.
- (3) The officer lets go of the scale steel slowly until it reaches the bottom of an underground petrol drum.

- (4) After the scale steel is released for ten seconds, the office will pull it. If the chemical solution is changed into red, it displays water in the underground petrol drum. The volume of water depends on the length of the red color on the scale steel.

The steps for separating water from the gasoline

- (1) The officer uses a water pump which is put in the underground petrol drum.

See Figure 3.3.

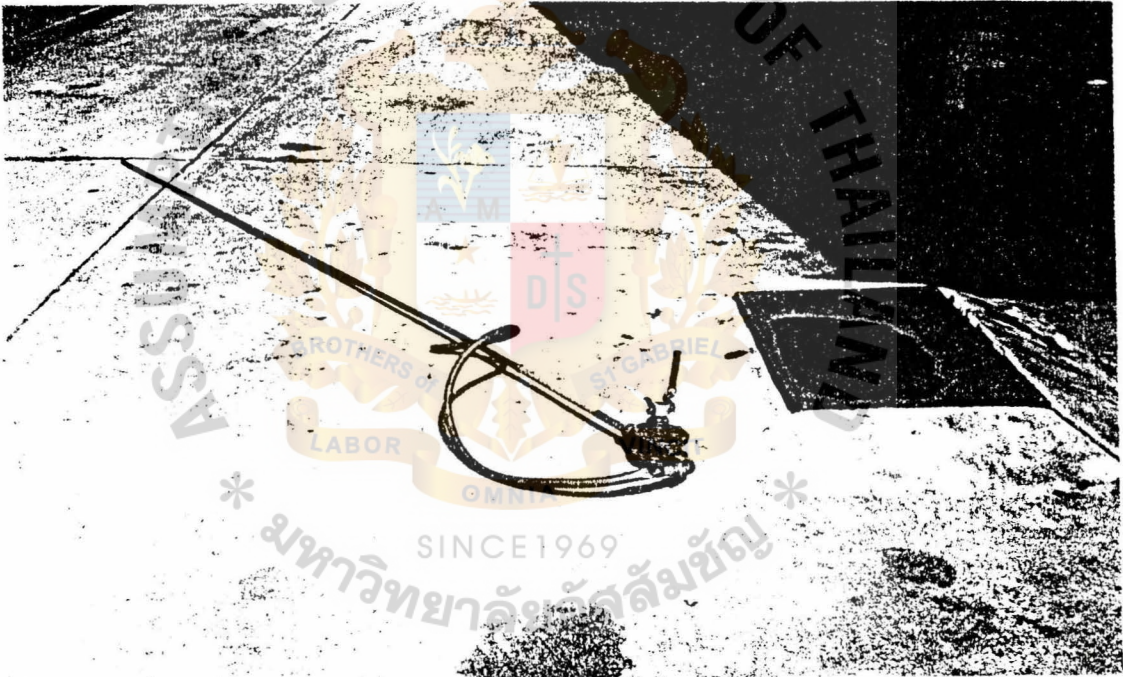


Figure 3.3.A Water Pump.

- (2) The specific volume of water is more than the specific volume of gasoline. The gasoline floats on water. A water pump can suck up water which stays

at the bottom of an underground petrol drum. The officer uses the scale steel if it has not changed to red which indicates no water in the drum.

- (3) If water mixed with gasoline is from a water pump, the officer will separate the water from the gasoline. The gasoline floats on water so he will pour out the gasoline from it.
- (4) The separated gasoline is poured in the petrol drum again.
- (5) Water with little gasoline is poured in the well. The three wells in the gas station are drained off of water in and flows to the drainage ditch. After the water is strained, it will pass through the drain. The residual oil is damaged and the municipality is responsible for this.

Solving the problems about gasoline density not being standard in the underground petrol drum.

When the officer tests the density of gasoline, and he knows that it is non-standard, the officer should contact or call the main company so that it will send technicians to check or test the gasoline in the underground petrol drum again. If the main company finds gasoline non-standard, he will find the cause of the problems.



Four tools for testing gasoline density in a underground petrol drum are shown by the below picture.



Figure 3.4. Tools for Testing Gasoline Density.

- (a) Glass tube for putting gasoline from the underground petrol drum.
- (b) Hydrometer for finding the density at 15 °c.
- (c) Thermometer for reading temperature.
- (d) Density plate for finding the value of density.

Preparaing gasoline and testing

- (1) The officer uses a dry glass tube which is clean and dry to be put in the gasoline from the oil pipeline.



- (2) The officer lays a glass tube on the table without air and the air bubbles do not form on the surface of the gasoline.
- (3) After the tube is laid for 5-10 minutes, the officers put the hydrometer into the glass tube. The hydrometer will float on gasoline and the surface of gasoline is somewhere between the marks of the hydrometer.
- (4) The officer puts a thermometer in the gasoline. The thermometer does not touch the glass tube.
- (5) While the hydrometer floats on gasoline, the officer will read the value from the marks on the stem of the hydrometer. The officer must read the value at eye level, and read the temperature from the thermometer also. After they read the value from the hydrometer and the thermometer, they will write these in the report.
- (6) The officer brings the value of the density and the temperature at 15°C, which he uses on a density plate.

He rotates an internal density plate (showing the value of the temperature) according to the temperature read from item 5. He will see the black arrow at the internal density plate that shows the point at 15°C. The arrow point shows the number of the external density plate that shows a point at the density of 15°C.

- (7) He will get the value of the density at 15°C, which will be compared with the value of the density at 15°C obtained from item 8.
- (8) The way to calculate the density at 15°C. of gasoline in the underground petrol drum is as follows:

$$Y = \frac{(a \times A) + (b \times B)}{a + b}$$

When Y - The value of density at 15°C

a - The volume of gasoline in the underground petrol drum before it is filled with new gasoline (the unit is liter).

b - The volume of the new gasoline from a gasoline truck

A - The density at 15°C of gasoline before it is obtained new gasoline (The value is gotten from the density at 15°C of a ticket)

B - The density at 15°C of the new gasoline (it is obtained from a ticket)

- (9) If the value from item 7 is different, by more than  $\pm 0.002$ , the officer should check the value again starting from item 5 to item 7.
- (10) If the value from item 9 is still different, by more than  $\pm 0.002$ , the officer should begin to check item 1 to item 7 again.
- (11) If the value from item 10 is the same, the office keeps the gasoline from the same source of item 1 in a clean tin of 1-2 liters in size. They must note the details (the gasoline type, the day when the gasoline is kept, the name of the gas station, gasoline injector number). The officers send the details to the laboratory in the main company to check again.

Solving the problems about lost gasoline from damaged equipment.

- (a) When officers change the meter of the petrol pumps, they should always test the volume of the gasoline to be correctly consistent with the changing meter, for example, today gasoline is 10.00 Baht/liter, so the officers launch the gasoline into the tube (1 tube) to be 10.00 Baht also. If the gasoline is

over or less than 1 liter, the officers should call or contact the area manager of the main company (who takes care of or is responsible for the gas station in that area). The area manager will send technicians to check the meter of petrol pumps.

- (b) The officers check the quantity of the liter that changes the meter of petrol pump if it is correctly consistent with the volume of the gasoline lost in the underground petrol drum. If the quantity of the liter makes the meter of petrol pump less than the volume of gasoline lost in the underground petrol drum, the officer should call the area manager because the gasoline pipe in underground has been damaged.

Besides using the gasoline station management manual, previous experience also was applied to solve the problem that happened in the underground petrol drum. It made the cost of lost gasoline decrease or not occur in the future. From now on we will discuss the topic of the solutions for the petrol truck.

Solving the problems about petrol truck

Solving the problems about non-standard gasoline comprises of :

- (1) If the seals of the locks are not opened, but the gasoline in the tank is not standard, the officer should call the gasoline warehouse to solve the problem such as sending the technicians to check or to change the gasoline.
- (2) If the seals of the locks are opened, and the gasoline in the tank is not standard, the officer should inform this problem to the station manager or the station assistant manager to interrogate the driver. Because the driver may bring gasoline from the warehouse to sell to the others and then filled non-standard gasoline to replace. Whenever we prove that the driver really behaved, as mentioned we can call a police to take legal action on him. The

ways to prove that gasoline is standard or not is seen from the steps for testing the density of the gasoline in a petrol truck.

#### Solving the problem of stolen gasoline

If the seals of the locks are opened and the volume of gasoline is less than the scale in the tank, the officer should inform this problem to the station manager or the station assistant manager for interrogating the driver. From the previous experience, if seals are opened, the volume of gasoline will always be lost. The truck driver must be proven. If we found that he made a mistake, he will be dismissed.

The tools for testing the density of gasoline in a petrol truck comprise of four tools.

- (1) The glass tube for putting fuel oil in.
- (2) The hydrometer for finding the density at 15°C.
- (3) The thermometer for reading the temperature.
- (4) The density plate for finding the value of the density.

Note : See these tools in Figure 3.6.

#### Preparing gasoline and testing

- (1) The officer uses a dry glass tube, which is cleaned without dust and dampness to be put in the gasoline from a channel gasoline of a truck, and he will put the gasoline in a clean can (1 liter) also.
- (2) A clean can must be closed and written about the details (gasoline storage date, the type of gasoline, the name of petrol truck, and the number of ticket). The driver and the officer (who checks the gasoline) sign their names together on the document when there are problems.
- (3) The officer lays a glass tube (from item 1) on the table without air for 5-10 minutes and the air bubbles do not form on the face of the gasoline.

- (4) The officer puts the hydrometer in the glass tube. The hydrometer floats on fuel oil and the face of the gasoline is between the marks. The marks are made on the stem of the hydrometer.
- (5) The officer puts the thermometer in the gasoline. The thermometer does not touch the glass tube.
- (6) When the hydrometer still floats on the gasoline, the officer will read the value from the marks on the stem of the hydrometer. The officer must read the value at eye level and read the temperature from the thermometer also. After he reads the value from the hydrometer and the thermometer, he will write them in the report.
- (7) The officer brings the value of the density and the temperature to change at the density of 15°C, when he uses a density plate.

He rotates an internal density plate (it shows the value of the temperature) that the temperature is read from item 5 in accordance with the value of the density from item 5 (it shows the value of an external density plate) also. He will see the black arrow symbol at the internal density plate that shows the point of 15°C. The arrow point shows the number of the external density plate that shows a point to be at the density of 15°C.
- (8) The value of the density of 15°C is read which is defined differently from the density of 15°C of a ticket of not more than  $\pm 0.002$ .
- (9) If the density at 15°C is different by more than  $\pm 0.002$ , the officer should read it again starting from items 5 to 7.
- (10) If the result from item 8 is different by more than  $\pm 0.002$ , the officer should start doing it again from item 1 to item 7.

(11) If the result from item 9 is the same, the officer should contact the main company to check it again.

All of the above preparations are the ways to prove the standard of gasoline in a petrol truck and to prevent theft of gasoline.





## IV. IMPLEMENTATION

### 4.1 Results of Excessive-expense Cost Reduction

The results make the cost reduction of the gas station as follows:

- (1) The result of employees restructuring
- (2) The result of adjusting general expenditure or miscellaneous expenditure with the new approach.

The result of employees restructuring

- (a) It made the cost especially the monthly salary decrease. For example, the monthly salary of 16 workers in the previous structure is 66,000 Baht/month, but for the new structure it is 49,500 Baht/month from 11 workers. The new structure can reduce the cost to be 16,500 Baht/month  $(66,000 - 49,500)$  or 198,000 Baht/year  $(16,500 \times 12 \text{ month})$ , see Table 4.1.
- (b) Add up the working efficiency of the workers. For example, the idle time of workers in previous work structure is decreased and the daily plan is used to apply for work. Table 4.2 shows the behavior observation of workers in the years 1998 and 1999.

Table 4.1. Salary Comparison between the Previous Structure and the New Structure.

THE POSITION STRUCTURE OF THE STATION					
Item	Position	Previous structure		New structure	
		No. of person	Salary	No. of person	Salary
1	Station Assistant Manager	1	10,000	1	10,000
2	Forecourt Manager	8	28,000	5	17,500
3	Engine oil-changing attendant	2	6,000	1	3,000
4	Accountant	1	7,000	1	7,000
5	Cleaning Staff	1	3,000	1	3,000
6	Petrol truck driver	1	6,000	1	6,000
7	Glass cleaning attendant	2	6,000	1	3,000
TOTAL SALARY			66,000		49,500

Table 4.2. Workers' Idle Time Comparison between 1998 & 1999.

PREVIOUS WORK STRUCTURE					NEW WORK STRUCTURE				
Time	Item No.	Idle Time of The Worker	Accept		Item No.	Idle Time of The Worker	Accept		
			Yes	No			Yes	No	
7.00-12.00	1	Sleeping during work		✓	1	Cleaning the forecourt	✓		
	2	Fooling about during work		✓	2	Providing the booth of oil products	✓		
	3	Playing chess during work		✓	3	Watering the trees and grass	✓		
	4	Smoking cigarettes		✓	4	Helping one another with work	✓		
	5	Telling jokes	✓		5	Telling jokes	✓		
	6	Watering the trees and grass	✓		6	Smoking cigarettes		✓	
12.01-17.00	1	Sleeping during work		✓	1	Smoking cigarettes		✓	
	2	Playing chess during work		✓	2	Providing the booth of oil products	✓		
	3	Smoking cigarettes		✓	3	Decorating the trees	✓		
	4	Telling jokes	✓		4	Telling jokes	✓		
	5	Watering the trees and grass	✓		5	Watering the trees and grass	✓		
	6	Providing the booth of oil products	✓		6	Cleaning the forecourt	✓		
	7	Cleaning the forecourt	✓		7	Helping one another with work	✓		
	The number of results (previous)		6	7	The number of results (new)		11	2	
	The percentage of results(previous)		46%	54%	The percentage of results(new)		85%	15%	

The result of adjusting general expenditure or miscellaneous expenditure with new approach.

The miscellaneous expenditure has two types.

- (1) The miscellaneous expenditure cannot be decreased with the new approach.
- (2) The miscellaneous expenditure can be decreased with the new approach.

The miscellaneous expenditure cannot be decreased with the new approach.

These expenditures cannot be changed such as water and electricity expenditures which are paid at 3,000 Baht/month by the gas station's owner and the remaining is paid by cleaning, washing car gas station following the contract. Also, tax such as business tax, signboard tax, municipal tax, cleaning drain and garage charges are constant as you can see in Table 4.3 and Table 4.4.

The miscellaneous expenditure can be decreased with the new approach.

Referring to the topic of "COST REDUCTION STRATEGIES", after we adjust the new approach, the effects are as follows:

- (a) The result of gardening cost.

When we compare Table 4.3 with Table 4.4, we can see that the daily plan can be made and this cost is decreased by 2,000 Baht/month. The gas station can save 24,000 Baht/year.

- (b) The result of car maintenance cost.

After surveying the topic of car maintenance, we know that the general garage's car maintenance cost of especially installing is cheaper than the big garage's car maintenance cost by about 40% - 45%. For example, if we compare the big garage's car maintenance to the general garage's car maintenance cost with equal spare-part cost, we can see the differential cost to be installing cost as follows:

(1) In August

The big garage's car maintenance cost is 2,643 Baht. The general garage's car maintenance cost is 2,243 Baht. The different cost between the two garages is 400 Baht.

(2) In September

The big garage's car maintenance cost is 1,348 Baht. The general garage's car maintenance cost is 1,098 Baht. The different cost between the two garages is 250 Baht.

(3) In November

The big garage's car maintenance cost is 1,960 Baht. The general garage's car maintenance cost is 1,610 Baht. The different cost between the two garages is 350 Baht.

Note: (1) Seeing additional item 1 to item 3 in Table 4.5.

(2) The cost will be decreased in three months when you locate the general garage's car maintenance cost to be  $400+250+350=1,000$  Baht.

(3) The general garage offers the three months guarantee for the customer's car that is equal the guarantee of the big garage.

(c) The result of office and shop supplies cost.

After we can solve this problem verifying the way and having controllers, it make the ratio of office supplies decrease and equipment does not last like in previous time.

We buy office and shop supplies about two times per year. We can see that purchasing on the first time in the year 1999 is decreased and we expect

that purchasing on the second time in the same year will be decreased also.

(see Table 4.6)

- (d) The result of printing document cost.

Referring to Table 4.3, printing order was not at a discount price because it was small volumes and not more than 1,000 Baht at each time. Referring to Table 4.4, printing order got 10% discount price by the printer store of more than 1,000 Baht at each time. For example, (based on the same volume) In the year 1998, the cost is equal to 1,700 Baht while in the year 1999 the cost is equal to 1,530 Baht due to 10% discount (1,700-170).

In Summary: all miscellaneous expenditures have been decreased as you can see at Table 4.7.





Table 4.3. Total Costs in 1998.

(baht)

COSTS/MONTHS/98	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Salary	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000
Electricity + Tap Water	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Car Maintenance								2,643	1,348		1,960	
Gardening	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Accessories/Equipment			2,560					1,065				
Cleaning Drain										1,000		
Printing Document						850						850
Municipal Tax				2,000								
Business Tax												800
Gabage Charge			600									
Signboard Tax		200										
Total Costs	71,000	71,200	74,160	73,000	71,000	71,850	71,000	74,708	72,348	72,000	72,960	72,650

Table 4.4. Total Costs in 1999.

(baht)

COSTS/MONTHS 1999	Jan	Feb	Mar
Salary	49,500.00	49,500.00	49,500.00
Electricity + Tap Water	3,000.00	3,000.00	
Car Maintenance			
Gardening			
Accessories/Equipment			1,570.00
Cleaning Drain			
Printing Document			
Municipal Tax			
Business Tax			
Gabage Charge			600.00
Signboard Tax		200.00	
Total Costs	52,500.00	52,700.00	51,670.00

Table 4.5. Automobile Maintenance Costs Comparison between the Big Garage and the General Garage.

(baht)

Car Maintenance	August		September		November	
	Big Garage	General Garage	Big Garage	General Garage	Big Garage	General Garage
Spare-part cost	1,643.00	1,643.00	748.00	748.00	1,210.00	1,210.00
Installing cost	1,000.00	600.00	600.00	350.00	750.00	400.00
Total cost	2,643.00	2,243.00	1,348.00	1,098.00	1,960.00	1,610.00

Table 4.6. Office and Shop Supplies Losses in 1998 and 1999.

Year	The average of lost Office Supplies per month	The average of lost Shop Supplies amount per month
1998	4 times	1 piece
1999	1 time	-

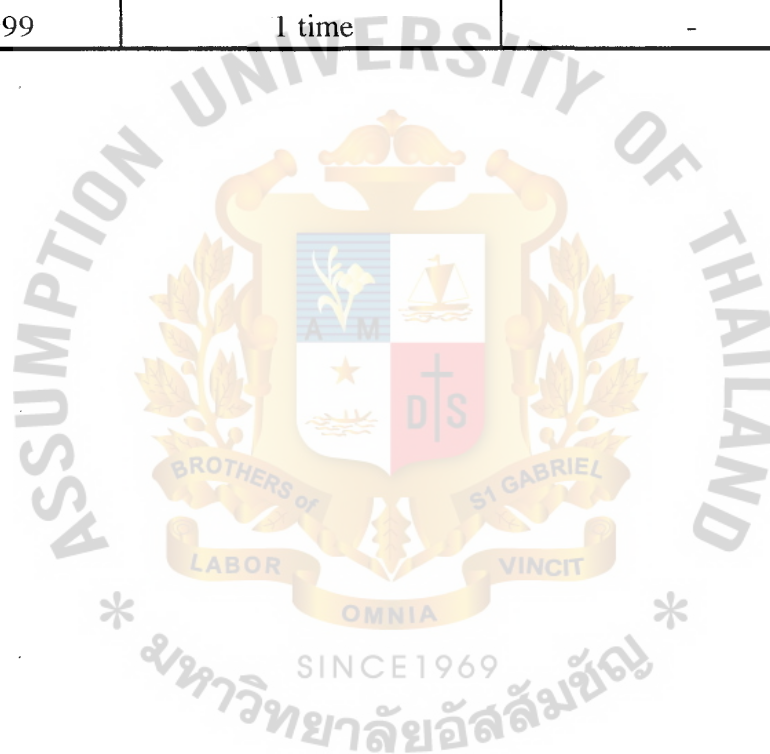


Table 4.7. Miscellaneous Expenditures in 1998 and 1999.

Detail Items	Miscellaneous Cost In 1998	Miscellaneous Cost In 1999	Saving Costs	Expenditures Reasons
Electricity + Tap Water	3,000	3,000	-	Agreement
Car Maintenance	5,951	4,951	1,000	Same Spare-parts & Different installing cost
Gardening	24,000	-	24,000	Using our workers
Accessories/Equipment	-	-	Decreasing	See table 5.6
Printing Document	1,700	1,530	170	Buy a lot of printing volume
Cleaning Drain	1,000	1,000	-	Payment to the government
Municipal Tax	2,000	2,000	-	"
Business Tax	800	800	-	"
Gabage Charge	600	600	-	"
Signboard Tax	200	200	-	"
Total Costs	39,251	14,081	25,170	

Table 4.8. Results of Cost Reduction on Losses, Damages, Contamination, and Theft.

PREVIOUS STRUCTURE(1998)						NEW STRUCTURE (1999)					
Item No.	Problems	Solutions		Losing gasoline		Item No.	Problems	Solutions		Losing gasoline	
		Yes	No	Yes	No			Yes	No	Yes	No
	The underground petrol drum						The underground petrol drum				
1	A lot of evaporating gasoline		*	*		1	A lot of evaporating gasoline	*			*
2	The mixing of water with gasoline		*	*		2	The mixing of water with gasoline	*			*
3	Non-standard gasoline density		*	*		3	Non-standard gasoline density	*			*
4	Lost gasoline from damaged equipment		*	*		4	Lost gasoline from damaged equipment	*			*
	The petrol truck						The petrol truck				
1	Non-standard gasoline density		*	*		1	Non-standard gasoline density	*			*
2	Gasoline is stolen		*	*		2	Gasoline is stolen	*			*



## 4.2 Results of Cost Reduction on Losses, Damages, Contamination, and Theft

The results of problem solving have two items as follows:

- (1) The results of problem solving from the underground petrol drum
- (2) The results of problem solving from the petrol truck

The results of problem solving from the underground petrol drum have four items as follows:

- (a) The results of solving a lot of evaporating gasoline

When the main office send the officers to check and repair the air pipes, small cover and big cover, they found that the lost gasoline is from checking the gasoline volume in the underground petrol drum. At present, the lost gasoline in the underground petrol drum is reduced when it is compared with lost gasoline in the previous time.

- (b) The results of solving the mingle water with gasoline

A material closes the small cover of underground petrol drum, that can prevent water from flood. The leaking underground petrol drum does not occur at present after the main office solved this problem. The mingled water which came from the ground water does not occur.

- (c) The results of solving non-standard gasoline density

After we obtain knowledge about testing the density of gasoline from technical officers, we can prevent losing gasoline from non-standard gasoline density. When the gasoline density in underground petrol drum is not standard, we will not launch gasoline from petrol truck to it. After the technical supporting officers from the main company test and solve this problem already, we will launch gasoline from petrol truck to underground petrol drum. At present, we check gasoline everyday.

- (d) The result of solving the lost gasoline from damaged equipment

After the technical supporting officers checked and solved the damaged equipment already, the launching-out gasoline in underground petrol drum is equal to the gasoline volume in selling. We check the equipment everyday and teach the workers to check the gasoline volume in underground petrol drum including the gasoline volume in selling. At present, this way can prevent lost gasoline from damaged equipment.

The results of problem solving from the petrol truck have two items as follows:

- (a) The results of solving non-standard gasoline density.

After we know about testing the density of gasoline, we can know whether the gasoline density is standard or not. We can know the source which brings about the non-standard gasoline density. Which petrol truck has problem about the non-standard gasoline density. We will not launch the gasoline from the petrol truck to the underground petrol drum. At present, we can prevent the loss of gasoline from the non-standard gasoline of the petrol truck including preventing the loss of gasoline in the underground petrol drum from mixing the non-standard gasoline of the petrol truck.

- (b) The results of solving the loss gasoline from theft.

When we know about the testing of the density of the gasoline and know about checking the seals, we can know whether the gasoline is stolen or not. At present, the gasoline is not stolen when we compare with the previous year.

Table 4.8 shows the result of how these problems have been solved.

## V. CONCLUSION

### 5.1 Research Summary

When we know the problems from the information of the gas station, it can be concluded that the problems can be divided into three areas:

- (a) The problems of excessive attendants or the imbalance between the excessive attendants over the job assignment, which affected the salary cost and the attendants had many idle time.
- (b) The problems of excessive cost from general expenses or miscellaneous expenses such as: gardening cost, car maintenance cost, office and shop supplies cost, and printing document cost which affected the miscellaneous cost.
- (c) The problems of lost gasoline from damaged equipment, contaminated gasoline, theft that affected the gasoline cost.

The result of these problems have made the gas station lose profit and the working system is not efficient.

### 5.2 Achievements

By solving these problems, we can get achievements in three areas:

- (a) We can reduce the idle time of attendants and attendants can do efficient work more than with the previous structure.
- (b) We can save the salary cost of 198,000 Baht/year and we can save the miscellaneous cost of 25,170 Baht/year. The sum of the saved cost is 223,170 Baht/year.
- (c) We can prevent the problems of loss gasoline from the damaged equipment, the contaminated gasoline, and theft. This helps the gas station to reduce the gasoline cost.

The cost reduction strategies can help the gas station to be stable in the current business condition, which has a serious competition and the total sales of gasoline has reduced.



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