Customer Satisfaction on Air Movement Replacement Motors for a Business

by

Mr. Satit Kiatkasemkul

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
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Project Title	Customer Satisfaction on Air Movement Replacement Motors for a Business
Name	Mr. Satit Kiatkasemkul
Project Advisor	Rear Admiral Prasart Sribhadung
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The Graduate School of Assumption University has approved this 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.

Approval Committee:

(Rear Admiral Prasart Sribhadung)
Advisor

(Prof.Dr. Srisakdi Charmonman)
Chairman

(Dr. Chamnong Jungthirapanich)
Dean and Co-advisor

(Assoc.Prof. Somchai Thayarnyong)
CHE Representative

November 2004

ABSTRACT

The project wants to uncover whether the customers are satisfied with the current level of services and range of products and find out the customer' s needs by conducting a survey research.

In this report, the survey was collected by using the designed questionnaire that was distributed to sample 100 respondents of FASCO air conditioning manufacturer's customers around Bangkok. The data from all questionnaires have been analyzed by the frequency distribution and descriptive statistics, particularly percentage by using the Statistical Package for Social Science (SPSS) to analyze and deliver the survey result.

The results of the survey indicate that the number of respondents who completed the questionnaire were 56 male and 44 female. The majority of respondents were in the age of 31-35 years. Most respondents had education level of bachelor's degree and it was also found that most respondents had occupation as engineer. Most respondents had monthly income in the range of Baht 20,001-25,000, and the years of knowing air movement replacement motors, the majority of respondents have more than 4 years.

The results of the survey indicate that FASCO' s customers are satisfied toward level of temperature in variety of speeds, fullness of service providing, promptness of service staff, service assistance and problem solving of staff, completeness of product, and accuracy of order. And FASCO' s customers are not satisfied toward noise, vibration, accuracy of speed, capability of service staff in providing information, overall performance of service staff, on time delivery, concerning training, and also price reasonableness for both selling product and repairing service.

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I. INTRODUCTION

1.1 Background of the Project

In recent years, the consumption of electricity has increased, especially on the home appliance because the technology of appliance has been developed and changed the lifestyle. In response to the changes, the business of home appliance is the period of strong competition. Because the human being would ask for more and more comfort for life and time saving. The business company must understand and reach the customer requirement to get a high turn over and customer satisfaction.

For example, the competition of marketing that tries to make many strategies, strength points, and more advantages, gave free or sales promotions and pay more advertisement expenses. Selecting a strategy depends on the status of market and strength-weakness point of the company. But in the long run making a good picture or brand loyalty is important because of the customer's announcement to others about quality and the good things of the company that is the lower cost and highest efficiency.

The company has to prepare and settle the following factors; the technology, quality control, efficiency of sales force team, service and after sales service, logistics and supply chain system. They are all important factors that will be controlled before sending the finished goods to the customer. And the company would check feedback from the customer by tools such as questionnaire, customer evaluation, and annual seminar for the highest customer satisfaction.

This project uses the questionnaire to be a tool to evaluate customer satisfaction because it is a simple and low cost way. Developing the customer questionnaire can be helpful when trying to identify, track and eliminate specific problems encountered by the customer either internal or external to the company. This tool questions the

customer regarding the specific problem, current solution, the criteria used when evaluating a different solution, any implementation issues encountered, and more.

Using this tool, the company will be able to easily consolidate the key problems, solutions, and implementation issues encountered when making a change process between the company and the customer company.

1.2 Objectives of the Project

The objective of this project is to conduct a survey research to identify Customer Satisfactions in Air Movement Replacement Motors for a business company.

1.3 Scope of the Project

The project will cover major parts of activities that are relevant to the customer satisfaction for a business company through the customer company as follows:

(1) The survey focuses on Air Conditioning Manufacturer Company.

(2) The survey scope is on the customer company around Bangkok.

(3) The model company of customer satisfaction in air movement replacement motors: FASCO is a model business company for all explanations of this project.

1.4 Deliverables

The deliverables of this project will be employed with:

(1) Questionnaire

(2) Project Report

II. LITERATURE REVIEW

2.1 Attitude Definition and the Significance of Customer Satisfaction

2.1.1 Attitude Definition

Attitude of the customer reflects the satisfaction and the requirement in product or service quality of the customer. To survey and measure the customer's attitude will help to plan the market strategy. There are many definitions of attitude, such as:

"An Attitude is an enduring disposition consistently respond in a given manner to various aspects of the world; composed of affective, cognitive, and behavioral components." [1]

"An Attitude is an individual enduring perceptual, knowledge-based, evaluative, and action-oriented processes with the respect to an object or phenomenon." [2]

2.1.2 The Significance of Customer Satisfaction

The customer is a critical key to do a business. In the high competitive market, "Focus on the customer" is a key to success or to survive in the business. The significance of the customer is described as:

"Your purpose is to serve customer who have the power to determine you are successful." [3]

"In the new regime, managers are not the deciders of the fate of employees; customer is. The company does not close plants or lay off workers; customer does, by their actions or inactions."

In addition, they also presented Hanaka and Hawkins' opinion as "The challenge for the winning organization of the future is to accurately predict and respond to the rate and breadth of the market changes that will inevitably cut across customer groups. To do this, the new organization should not be built around traditional structures like

lowest cost, product grouping, incumbents, or geography but rather around the customer. This new model of successful business will be based on understanding specific customer, their requirements, and their expectations." [4]

"The knowledge of customer needs give a direction to develop the product and service qualities. The knowledge of customer's requirement is essential for two reasons. First, it provides a better understanding of the way your customer defines the quality of your services and products. If you understand customer requirement, you are in a better position to know how to satisfy your customer. Second, knowledge of customer requirement will facilitate the development of customer satisfaction questionnaire. Its question should assess the extent to which customer is satisfied on each of the quality dimensions." [5]

2.2 Factors Affecting Customer Satisfaction

Customer attitudes can be reflected by their decision-making. The factors that affect their purchasing decision will reflect their satisfaction of product and service. Some of these factors are useful in designing the questionnaire by the suggestions of some researchers as follows:

Product and its components are one of the important factors. "If single items are attractively displayed than consumer will consider purchasing them as separately. But when the setting or display is not attractive, consumers would be more likely to purchase an item of comparable quality if they are displayed side with another item."[6]

Price and quality, the relation between them affects the customer's purchase decision. Ordonez, 1998 uses the price-expectancy model of consumer choice indicates that consumer assesses products by comparing the real price with a reference or expected price which is derived from a product's quality, and the price-quality correlation of the product category. Product preferences differ according to the

subjective correlation between price and quality. Increase in subjective correlation has a similar effect on the relative preference for higher priced/higher quality products over lower priced/lower quality products. [7]

The brand name seems to be a factor affecting a customer demand. According to the suggestion of Baltas, he uses an integrated model of category demand and brand choice for investigation. His study was conducted to characterize a two-stage framework of brand choice and category demand. The two-stage model was based on utility theory and supported a couple of interrelated factors affecting consumer decisions. A probabilistic description of the framework was also determined. Results indicated an explicit connection between brand choice and category demand correlated with a combined specification of purchase behavior. [8] Roy reports another examination of brand choice focusing on an approach to segmentation and modeling brand choice dynamics. The results are as follows; an error components approach model was utilized to segment and estimate the effects of marketing variables on brand choice of the attraction type. Prediction of choices is well achieved by the error approach model. The predictive accuracy that the model provides can enable manages to make improved evaluation of the effect of their promotional activities and pricing on different consumer sections. Moreover, the model provides insights about the preference characteristics of various sectors that can be utilized to create price-unrelated target segmentation strategies. [9]

Research on consumer behaviors indicates that cultural values embed in consumer attitudes. [10] They report that investigations into the implications of "cultural values" in consumer responses to marketing stimuli showed the ethnic factors matter little in the correlation between consumption behavior and marketing stimuli. This can be seen in the "brand loyalty" test, which showed the same level of brand loyalty between

Australians and Chinese consumer, with the only difference exhibited in the preference for branded products for first time product purchases or testing by Chinese consumer.

A consumer's mood is one of the important factors that should be considered. The conclusion is that a consumer's mood, feeling and emotion occur not only when the consumer inspects their feeling with the target in mind, but also when the subtle feeling toward the target is regarded as relevant. It is more likely pronounced when the consumer has a propensity for visual and sensory feeling. [11]

Consideration of the payment aspects, Gourville and Soman, study on the behavioral effects. They determine that consumer mentally acknowledge and reconcile the benefits versus the cost of items at the time of commitment. Once the investment in time, money of effort has been made, the consumer will generally purchase the product even though benefits do not outweigh the cost. In prepayment types of transactions, the consumer will increase his interest in the product or service nearest of the payment. [12]

The necessity and luxury are one of the factors affecting buying decision Kemp, finds that a correlation exists between people's perceptions of luxury and the economic concept of price elasticity. A goods tends to be regarded as more luxurious if it happens to be an object of desire rather than one, which relieves a state of discomfort. Also, a good's luxury rating exhibits a stronger correlation with preference for distributing the good via the market that distribution regulation when the goods encounters a short supply. [13]

Lastly, biographical background causes a customer's attitude. Brown, reveals this importance and study such a relationship. He indicated that basic sexual urges could be an important factor in the shopping experience. The link between sex and shopping is a factor often ignored by marketing expects, but comments made in the unguided essays reveal several aspects of eroticism in shopping amongst students of undergraduate age.

These factors include the opportunity to meet desirable people of the opposite sex during a purchasing encounter, the orgasmic experience of finding the right product, or the associations between shopping failure and sexual failure. [14]

2.3 Measuring Customer Satisfaction

This study uses Hayes' suggestion to develop the questionnaire. Hayes introduces his ideas as follows:

2.3.1 Model of Customer Satisfaction Questionnaire Development and Use Hayes, presents this model in 3-step as follows [15]:

Step 1: This process is identifying customer's requirement or quality dimensions, the important characteristics of a product or service. Customer requirements define the quality of the product or service.

Step 2: This process is developing the questionnaire. This step includes many specific components. The ultimate goal of this step is to develop a questionnaire that allows the assessment of specific information about the customer's requirement.

Step 3: This process represents the many specific uses of customer satisfaction questionnaires. The specific information about the customer's perception will be obtained.

2.3.2 Questionnaire Construction Relating to Customer Satisfaction

Hayes, introduced the idea to construct customer satisfaction questionnaires in four phases:

(1) Determining questions to be used in the questionnaire

(2) Selecting the response format

(3) Writing the introduction to the questionnaire

(4) Determining the content of the final questionnaire

2.4 The Induction Motor

Of all the various types of AC motors, the induction type is the most popular whether for use on single phase or on poly-phase circuits. The primary winding, which is usually on the stator, conducts current from the power supply. Current in the secondary winding, which is usually on the rotor, is induced by electromagnetic action, from which comes the name, induction motor. The simplest, and by far the most popular form of secondary winding on a rotor, is the squirrel cage which consists of individual conductors axially through slots; these conductors are all mutually short circuited at each end of the rotor by end rings (sometimes called resistance rings). The conductors and end rings are cast of aluminum.

A poly-phase (usually 3 phases) winding on the stator when energized produces a revolving magnetic field, which cut the rotor conductors inducing current in them. These induced currents, acting in the revolving magnetic field, make the rotor follow this field. If two of the three leads connected to the three-phase power supply are reversed, the direction of the revolving field, and thus the rotor, is reversed. The rotor can never rotate as fast as the revolving field otherwise there would be no cutting of lines of force on the rotor conductors. The difference between the speed of the rotating magnetic field (known as the synchronous speed) and the speed of the rotor is called the slip.

Table 2.1. Synchronous speeds with various numbers of poles.

Number of Poles	Synchronous Speed RPM	Shaded Pole / PSC Rated Speed RPM	3 Phase / Spit Phase Rated Speed RPM
2	3,000	2,500 – 2,700	2,850 – 2,875
4	1,500	1,250 – 1,350	1,425 – 1,440
6	1,000	825 - 900	950 - 960
8	750	625 - 665	715 - 725

A single phase winding on the stator when energized with AC current produces a pulsating field, which is not revolving and therefore will not cause the rotor to revolve. However, if the rotor is started in either direction, the rotor conductors are cutting the magnetic field and current is induced in them. The rotor currents produce a " cross field " and the rotor will continue to rotate in whichever direction it is started. Thus, it is necessary to employ a starting device for any single-phase induction motor.

2.5 Motor Types

The different types of single-phase induction motors are named after the method used for starting them. For example: Shaded pole motor, Split-phase motor, Capacitor start motor, Permanent-split capacitor motor (PSC), Repulsion starting motor, and Reluctance start motor.

Shaded Pole Motors

Shaded Pole Motors are built in a number of different forms but the most common has a stator built with salient poles projecting towards the rotor, which rotates a shift at its center. One large coil is wound around each pole into a large slot between each pole. Around one, and the same, portion of each pole is

wrapped copper strap forming a closed coil. The " shading coil " encircles about one quarter to one third of the pole pitch at one pole tip. The shading coil is the method used in these single-phase induction motors to provide starting torque, and as such is a shorted auxiliary winding displaced about 60 electrical degrees from the main winding. Shaded pole motors are found in direct drive fans and blowers and in small pumps.

Split Phase Motors

Split Phase Motors use both a starting and running winding that is displaced by 90 degrees from each other. The running winding needs a high reactance, which it achieves by having many turns of large diameter wire wound in the bottom of the stator slots, and its current lags the current in the starting winding, causing a rotating field. As the motor comes up to rated speed from its low or moderate torque start, either an electrical or centrifugal switch disconnects the starting winding. Split phase motors are found on easy starting equipment, such as belt-driven fans and blowers, grinders, centrifugal pumps, washer and dryer motors and gear motors.

Capacitor Start Motors

Capacitor Start Motors are similar to split phase motors with the addition of a capacitor placed in series with the auxiliary, or staring winding. The advantages are that it can produce greater locked rotor and accelerating torque per ampere than does a split phase motor over a wide range of outputs. Capacitor start motors are found on hard starting application like compressors, positive displacement pumps and farm equipment. Their high starting torque makes them unsuitable for fan application where the " impulse " start is detrimental to the blade hub due to the inertia of the blade.

Permanent Split Capacitor (PSC)

Permanent Split Capacitor (PSC) Motors also have an auxiliary winding with a capacitor, but they remain continuously energized to aid in producing a higher power factor, which makes them well suited to variable speed applications. Permanent slit capacitor motors are usually found in direct drive fans and blowers, washers and dryers and in small pumps. Their lower starting torque makes them ideal for these applications.

2.6 Temperature

Today's competitive market no longer allows for a "one motor fits all" type of motor. Each application has a motor tailored to meet the unique specification laid down by the unit manufacturer and takes into consideration the nature of the load – if it is blower wheel or fan blade, the ambient conditions, exposure to whether, possible adverse condition, etc.

Improvements in materials and insulation mean that motors today are designed to operate safely at a higher temperature than they did in the past. Twenty-five years ago, class A 105°C was the norm with some motors being produced at class B 130°C, this means that total operating temperature was not to exceed the level specified in degrees Celsius.

Today we are using improved insulation that is rates at class B 130°C as the norm or even class F 155°C, this means that we are more effectively using the active materials within the motors ad are able to increase the temperature rise of the motors higher levels.

It is therefore quite understandable that you cannot put your hand on it, yet, one of the most common complaints during the summer is "my motor is running hot" and the

method of measurement is usually "I can't put my hand on it!" Rarely will you find anyone who has taken a skin measurement of the motor.

The simply way to respond is to ask the person what temperature they operate the hot water system in their house. The normal is now 65°C but can be up to 70°C. You ask the person if they can hold their hand under the tap with only the hot water turned on. The answer is almost certainly a "NO" any times vivid and creative adjectives accompany the "NO". It is then time to ask the person how they would expect to keep their hand on something rated at 130°C if they can't hold their hand under 65°C water! Half the temperature!

2.7 Noise and Vibration in Motors

Noise in electric motors is of two kinds – mechanical and electrical.

Mechanical

Mechanical is largely dependent on speed of running, the balance of the rotating parts, the method of mounting and the general design and workmanship.

Dynamic Unbalance

Dynamic Unbalance is caused by nonsymmetry of the rotating members. Non-uniform casting in the rotor or in an internal fan attached to the rotor can cause high values of unbalance. An easy way to check for dynamic unbalance is to run the motor and then shut of the power. If the vibration is still present during the coasting, the problem is likely one of mechanical dynamic unbalance.

Bearing Noise

One of the main causes of noise in ball bearings I the end shake caused by loose fit between the balls and the ring in which they roll. This is reduced by "preloading" that is using a wave (or spring) washer. Any imperfections on the surface of the balls will cause noise and is minimized by procuring bearings

produced to tight tolerances and noise standards. Noise is considered in grease selection also.

Fan

Fan can be a major source of noise and is determined by a great many factors, some difficult to evaluate. The point of maximum efficiency for a fan is also very early the point at which it will produce the least noise. The sound generated by a fan will change sharply with change in speed. So noise can be controlled by selecting a fan that will give the desired output at as low a speed as will be efficient for the application.

Air turbulence is, of course, a source of noise and obstructions brought in close proximately to a fan blade at high speed can cause an objectionable tone as the impeller blades pass that point (siren effect).

Noise problems can be aggravated by mechanical resonance, as commercially practical impellers are relatively flexible. Blades are designed to avoid this at normal speeds but with lower multi-speeds this can be a difficult problem.

Electrical

All single-phase induction motors have an inherent vibration of twice the supply frequency, which can be minimized by some type of resilient mounting. Poly-phase induction motors are quieter because of the pulsating field. Of the single-phase types split phase and shaded pole are moderate offenders for noise with permanent split capacitor being the best of all.

Electrical noise is largely beyond the control of the end user and is the responsibility of the manufacturer to consider the limitations during the design process. The noise can be caused by any or all of the following; saturation,

winding distribution, air gap, relation of stator / rotor teeth, stator design and harmonics.

2.8 Loads

(1) Wide Blade vs. Narrow Blade

In general, if a wide and narrow blade fan of the same diameter is pitched to deliver the same CFM against a given static pressure, two things become evident:

(b) The wide blade is quieter in operation

(c) The wide blade requires less horsepower (i.e. has higher efficiency)

(2) Blades of Propeller Fan

Free air tests of a certain group of fans identical in every way except number of blades showed the following results: The air delivery of 3-, 4-, and 6- bladed fans was respectively 13%, 22% and 31% more than the air delivered by a 2- bladed fan. These proportions vary somewhat according to the design of the fan.

Increasing the number of blades in a propeller fan increases the fan's ability to build up and maintain pressure, and the percentage gain in delivery under pressure rises more rapidly than in free air.

Air delivered and power required will increase with number of blades, but there is little change efficiency.

(3) Blade Pitch of Propeller Fans

Air delivery may increase by increasing the angular blade pitch whether the fan is operating in free air or against pressure. This increase in angular pitch will require more horsepower and the fan noise will also

increase. However, the steep pitch blade will have the same air delivery at lower speeds with less noise, for higher pressures – but at the sacrifice of efficiency and stability.

(4) Noise In Propeller Fan Units – Cause and Remedies

A propeller fan blade operating will have an inherent noise as a consequence of moving air. Smaller diameter, higher pitch fans are generally noisier than large, slow types

Fan noise increases with static pressure. To minimize airflow resistance, keep the airflow openings through the unit as large as possible.

Obstructions such as motor supports, motor control boxes, vanes and louvers too close to the fan blade, especially on the air intake side, will cause an increase in noise.

Most motors have alternating current hum (at twice line frequency), which can be transmitted through the motor mount into other parts of the unit that act as sounding boards. The hum results from torque pulsations in an angular direction and, to a lesser extent, from magneto striction (also called transformer hum). This noise transmission can be lessened by inserting resilient or flexible mounting between the motor and the frame of the unit. The effectiveness of the mount in reducing noise depends on the degree of rotational freedom. Resilient mounts located closest to the shaft center line are most effective.

Motor noises can also be transmitted along the motor shaft and into the fan blade, which can also act as a sounding board. The best means of minimizing this noise is to use a resilient or neoprene hub.

It is necessary that resonant frequencies of the blades are different than the fundamental frequencies of the motor. In cases where blade resonance noises are encountered, a change in structural design or in the operating speed is necessary.

(5) Long Leads Give Low Volts

Electronic motors, particularly those in the fractional horsepower range, have long suffered the effects of low voltage when connected to long flexible leads. Those most affected are single-phase motors used on host of portable machines such as concrete mixers, air compressors, pumps, polishers, air conditioners, blowers, fans and many others.

The effects of low voltage are injurious to motor performance and quite often lead to motor burnouts.

The following table can be used as a guide to the selection of table size and permissible length to give optimum motor performance. Selection is on the basis of the motor full load current which can be obtained from the motor nameplate.

Table 2.2. Metric Size Cable.

Distance in Meters	**Current Amps.**				
	0-2	**2.1 – 3.4**	**3.5 – 5.0**	**5.1 – 7.0**	**7.1 – 10.0**
10	24/0.2	24/0.2	24/0.2	32/0.2	30/0.25
20	24/0.2	24/0.2	32/0.2	30/0.25	56/0.3
30	32/0.2	32/0.2	30/0.25	50/0.25	56/0.3
50	32/0.2	30/0.25	50/0.25	56/0.3	-
100	50/0.25	56/0.3	56/0.5	-	-

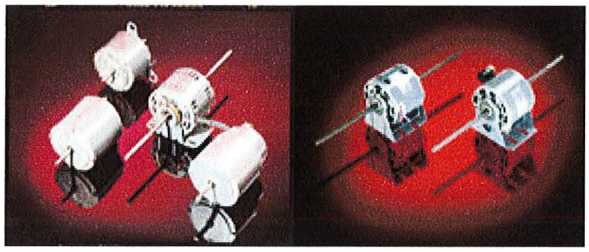

Figure 2.1. Sample of Air Movement Replacement Motors.

Figure 2.2. Sample of Air Conditioning.

III. BACKGROUND OF THE MODEL COMPANY

3.1 Background of the Model Company

The model company of Customer Satisfaction in Air Movement Replacement Motors for a business company is *"FASCO MOTORS (Thailand) Limited"* which has delivered the world's most complete line of custom fractional horsepower motors, blowers and gear motors for almost 100 years. Our motors power thousands of products for a diverse line of markets. Plus, our expanding global presence, superior customer service and experienced staff can provide you with the highest quality product at a competitive cost.

FASCO recognizes its responsibility to manufacture products, conduct operations, and provide services in a manner that is responsible to the Earth's environment and protective of its natural resources.

The Company will strive to:

(1) Develop and maintain a method of evaluating environmental performance for continual improvement. Setting and reviewing environmental goals are the basis for this evaluation.

(2) Recognize that protection of the environment is a company-wide priority and will practice waste minimization to prevent pollution in both product design and production operations to the extent practicable. Employees at all levels within the company will work together to aggressively seek and implement waste minimization measures.

(3) Comply with all relevant environmental legislation and regulations. Compliance will be part of the environmental goals and objectives that will be established and maintained. We will work with governmental entities for

the development of technical sound and financially responsible environmental laws and regulations.

This policy statement confirms the Company's intent to create and implement sound environmental principles throughout the organization.

In the years to come, FASCO will continue to develop and launch products to meet the requirements of our customers and the ever-changing marketplace. By listening to our consumers and combining this knowledge with our core expertise in key motor technologies, we can continue to create customized solutions for applications.

3.2 Current Problems and Areas for Improvement

Now the company gets the feedback from the customer many points and needs to be improved to reach higher levels of customer satisfaction. The topics are shown as below:

(1) After sales service

(a) Customer cannot get the solution when they contact the customer service at one time.

(b) Staff in customer service department is not enough to support all of customer and also has not enough knowledge to explain and solve the customer's problem.

(2) Technical support

(a) Staff in technical support department has not enough to support at customer site that is located around the country because they also have many tasks inside the company.

(3) Non competitive price

(4) On time delivery

3.3 SWOT Analysis

Strengths

(1) Brand name awareness: The company is well known in motor industry for almost 100 years.

(2) Quality: All finished goods were approved CE (Conformite Europenne, The CE mark is an indication that a company has met the essential heath, safety and environmental requirements detailed in 22 European Union directives covering an array of products, including electronics, machinery, simple pressure vessels, telecommunications, medical devices, toys and others.) and UL mark (The UL Marks are registered certification marks of Underwriters Laboratories Inc. The UL mark on a product means that UL has tested and evaluated representative samples of that product and determined that it meets UL's requirements. The requirements are primarily based on UL's own published Standards for safety).

(3) Transferring knowledge: Staff in engineering department at head quarters with the most experienced and imaginative designers who create value-added, innovative custom solutions. The forward-thinking team also delivers customer-centered testing including motor design and testing, vibration analysis, acoustics evaluation and analysis, and gas appliance efficiency and emissions testing.

Weaknesses

(1) Lack of human resources in professional technical experience and customer service skill.

(2) Non-competitive price; caused by the product positioning is at high level.

Opportunity

(1) By providing education and training, the company will have more efficient human resources. These will enable the company to cope with the changes in the business world.

(2) Expanding customer based.

Threats

(1) There are many increasing competitors in motor industrial business.

IV. RESEARCH METHODOLOGY

4.1 Research Design

The objective of research design is to conduct and solve problem by following plan to develop and analyze the data. For this study, the researcher selected the survey method for collecting the data because it allowed the researcher to collect original data from all sample sizes from direct customer. The 100 sets of questionnaires were distributed to respondents around Bangkok area during September 1 to 30, 2004. The questionnaire was divided into 2 sections. The first section of the survey contained 6 closed-ended questions that collected demographic. The second section contained 18 closed-ended questions and 1 open-ended question to survey on the customer satisfaction toward FASCO Air Movement Replacement Motors.

4.2 Questionnaire Design

The questionnaire was designed and divided into 2 sections. The first section of the survey collects the respondent's personal information and the second section is to survey on the customer satisfaction toward FASCO Air Movement Replacement Motors. The questionnaire and the interviewer are important factors of marketing research. The good or bad analysis and result depend on this process. According to the objective of the research, the customer satisfaction factor is the needed information such as Quality of Product, Service, Delivery, Knowledge of Product / Product Information, Price, and also Recommendation. The questionnaire has to be provided the necessary decision-making and required information question.

4.2.1 The questionnaire Development Process

Designing a questionnaire involves a logical series of steps as shown below:

Step 1: This process is identifying customer's requirement or quality dimensions, the important characteristics of a product or service. Customer requirements define the quality of the product or service.

Step 2: This process is developing the questionnaire. This step includes many specific components. The ultimate goal of this step is to develop a questionnaire that allows the assessment of specific information about the customer's requirement.

Step 3: This process represents the many specific uses of customer satisfaction questionnaires. The specific information about the customer's perception will be obtained.

4.2.2 The questionnaire construction

The questionnaire was easily designed to understand, short, and convenience for answering. The first section is about personal information which are needed to group the whole respondents classified by categories as shown below:

(1) Gender (Male and Female)

(2) Age (Under 25, 25-30, 31-35, 36-40, and Over 40 years old)

(3) Level of Education (High school, Vocational degree, Bachelor's degree, Master's degree, and Over Master's degree)

(4) Occupation (Technician, Engineer, Quality Assurance, Purchasing, and Sales Representative)

(5) Monthly Income (Below 15,000, 15,000-20,000, 20,001-25,000, 25,001-30,000, and Over 30,000 Baht)

(6) Year of Knowing Air Movement Replacement Motors (Less than 1 year, 1-2, 2.1-3, 3.1-4, and More than 4 years)

For the second section survey about customer satisfaction are shown below:

(1) Satisfaction toward Quality of Product (Noise of Motor during Running, Vibration of Motor during Running, Level of Temperature in Variety of Speed, and Accuracy of speed)

(2) Satisfaction toward Customer Service (Fullness of Service Providing, Capability of Service Staff in Providing Information, Promptness of Service Staff, Service Assistant and Problem Solving of Staff, and Overall Performance of Service Staff)

(3) Satisfaction toward Delivery of Product (On time Delivery, Completeness of Product, and Accuracy of Order)

(4) Satisfaction toward Knowledge of Product (Existing Product Training, New Product Launch Training, Environment of Training Center, and Quality of Product Trainer)

(5) Satisfaction toward Price of Product (Price Reasonableness for Selling Product and Price Reasonableness for Repairing Service)

(6) Other Option (s) and Recommendation (s)

All of the Closed-ended question in the second section can be easily answered by marking on the level of satisfaction represented with numbers. The categories were defined as 5 = Strongly Satisfied, 4 = Satisfied, 3 = Neutral, 2 = Dissatisfied, and 1 = Strongly Satisfied.

4.3 Data Collection

The researcher focuses on the air-conditioning manufacturer around Bangkok area. The 100 sets of questionnaires were distributed to the concerned respondents. After the respondents returned the questionnaires, the researcher checked it for any error or incomplete data. The researcher asked the respondents to fill or correct it again, if any errors were found.

4.4 Sample Size

The sample size is calculated to cover the concerned population, which are the whole air-conditioning manufacturer customers of FASCO around Bangkok.

Thus, the formula is: **n = N*p*q / (N-1)* D + p*q** [16]

Where,

N = 130 (Population)

p = 0.5 (Proportion of success)

q = 0.5 (Proportion of unsuccessful)

B = 0.05 (Limit of error)

Where as,

$D = B^2/4 \rightarrow = (0.05)^2/4 \rightarrow = 0.000625$

The populations, the air-conditioning manufacturers around Bangkok registered in Department of Industry of Thailand, are 130. The proportion of successful and unsuccessful are set to be 0.5. The confidence level is 95 percent so the limit of error is 5 percent or 0.05.

n = (130*0.5*0.5) / (129*0.000625) + (0.5*0.5)

= 99 or about 100 respondents (questionnaires)

Therefore, the sample size for the research is 100 respondents.

4.5 Data Analysis

The data from all questionnaires are analyzed in term of frequency distribution, descriptive statistics, and particularly percentage. The researcher used SPSS to analyze and deliver the result. The results are presented in the form of tables, pie charts and bar charts.

V. RESULTS AND ANALYSIS

5.1 Sample Design

The sample size of this survey was 100 respondents and the data were calculated and analyzed by using a systematic method of random sampling. The information from this survey will be obtained from the air-conditioning manufacturer company. A total of 100 questionnaires were done by directly surveying during September 1 to 30, 2004. The questionnaires were answered by the persons who show sign that he/she is interested and have willingness to give the answers. After finishing the interview, the questionnaires are checked to find the error or incompleteness. If the data is inadequate, the researcher asked those respondents to revise and complete it again. Finally, 100 questionnaires were completed and analyzed.

5.2 The Analysis of the Demographic Characteristics

The collected respondents in this first section of survey are the information in terms of demographic variables. And they are calculated and summarized in the following tables.

(1) Total Number of Respondents Classified by Gender.

Table 5.1. Respondents Classified by Gender.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	56	56.0	56.0	56.0
	Female	44	44.0	44.0	100.0
	Total	**100**	**100.0**	**100.0**	

In this research, there are totally 100 respondents, mostly 56% of the total respondents are male and 44% are female.

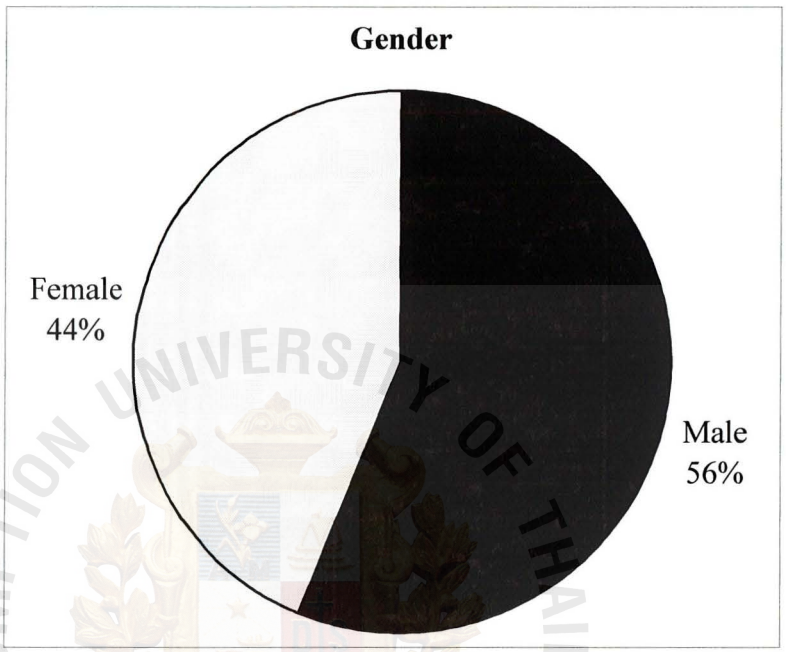

Figure 5.1. Respondents Classified by Gender.

(2) Total Number of Respondents Classified by Age

Table 5.2. Respondents Classified by Age.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 25	7	7.0	7.0	7.0
	25-30	29	29.0	29.0	36.0
	31-35	37	37.0	37.0	73.0
	36-40	23	23.0	23.0	96.0
	Over 40	4	4.0	4.0	100.0
	Total	**100**	**100.0**	**100.0**	

From this research, the group of age between 31-35 years is the majority with 37%. The second ranking group is in the range of age 25-30 years with 29%. The third ranking group is in the range of age 36-40 years with 23%. The fourth and the fifth ranking groups are in the range of age under 25 and over 40 years, respectively.

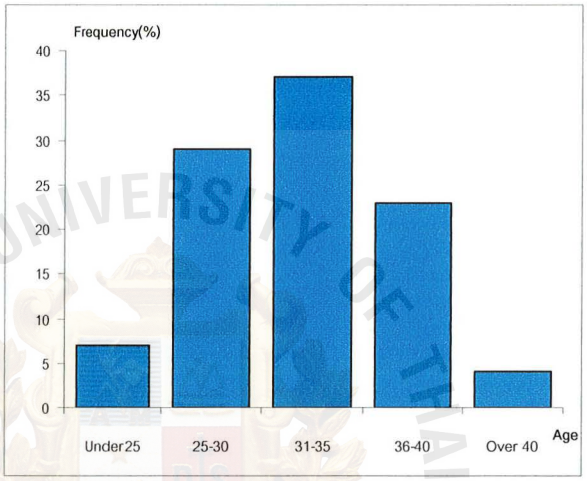

Figure 5.2. Respondents Classified by Age.

(3) Total Number of Respondents Classified by Education.

Table 5.3. Respondents Classified by Education.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School	1	1.0	1.0	1.0
	Vocational Degree	12	12.0	12.0	13.0
	Bachelor's Degree	76	76.0	76.0	89.0
	Master's Degree	10	10.0	10.0	99.0
	Over Master's Degree	1	1.0	1.0	100.0
	Total	**100**	**100.0**	**100.0**	

From this research, Level of Education of the majority respondents is Bachelor's Degree with 76%. The second ranking is the respondents who have Vocational Degree with 12%, 10% followed by Master's Degree, and Over Master's Degree and High School are the same ranking only 1%, respectively.

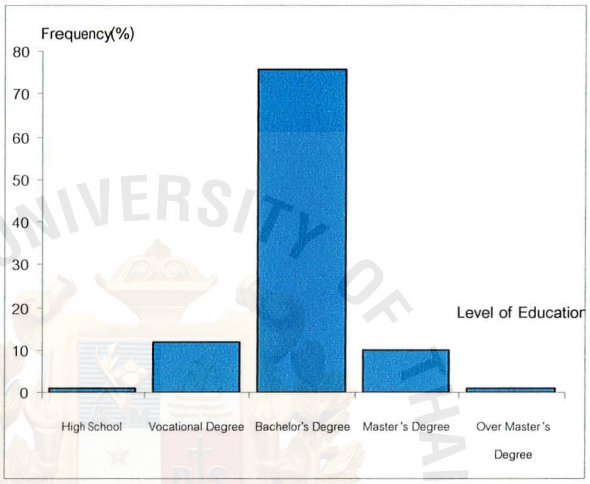

Figure 5.3. Respondents Classified by Education.

(4) Total Number of Respondents Classified by Occupation

Table 5.4. Respondents Classified by Occupation.

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Technician	8	8.0	8.0	8.0
	Engineer	32	32.0	32.0	40.0
	Quality Assurance	21	21.0	21.0	61.0
	Purchasing	27	27.0	27.0	88.0
	Sales Representative	12	12.0	12.0	100.0
	Total	**100**	**100.0**	**100.0**	

From this research, Occupation of the majority respondents is Engineer with 32%. The second ranking is the respondents who are in Purchasing department with 27%, the third ranking is group of Quality Assurance with 21%, Sales Representative is 12%, and Technician is 8%, respectively.

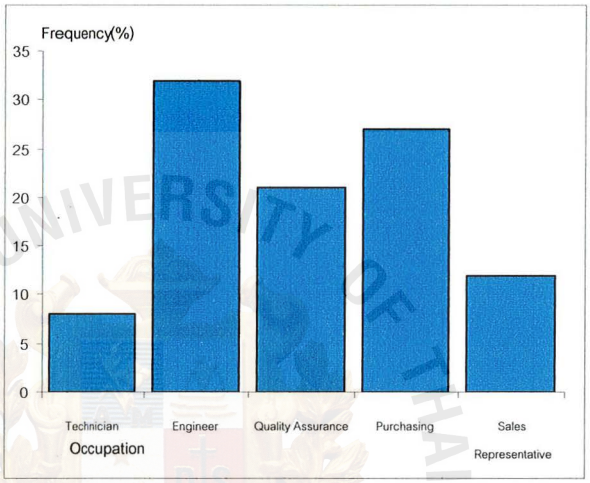

Figure 5.4. Respondents Classified by Occupation.

(5) Total Number of Respondents Classified by Monthly Income

Table 5.5. Respondents Classified by Monthly Income (TH BAHT).

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Below 15,000	6	6.0	6.0	6.0
	15,001-20,000	18	18.0	18.0	24.0
	20,001-25,000	27	27.0	27.0	51.0
	25,001-30,000	25	25.0	25.0	76.0
	Over 30,000	24	24.0	24.0	100.0
	Total	**100**	**100.0**	**100.0**	

From this research, the majority of respondents have monthly income between Baht 20,001-25,000 with 27%. The second ranking group has monthly income between Baht 25,001-30,000 with 25% and the third ranking group has monthly income over Baht 30,000 with 24%. The fourth and fifth ranking groups have monthly income between Baht 15,001-20,000 with 18% and below Baht 15,000 with 6%, respectively.

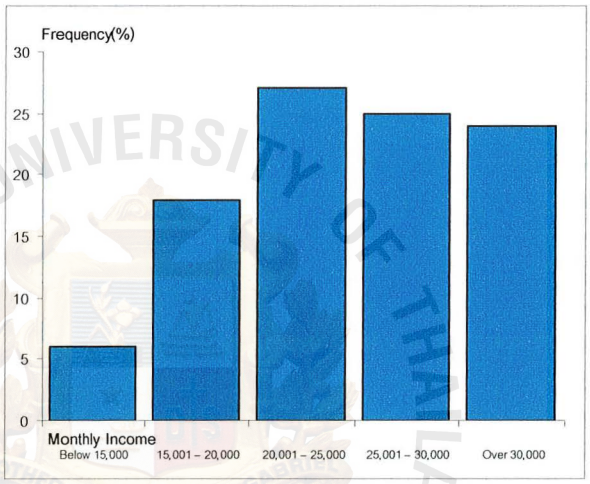

Figure 5.5. Respondents Classified by Monthly Income (TH BAHT).

(6) Total Number of Respondents Classified by Years of Knowing Air Movement Replacement Motors

Table 5.6. Respondents Classified by Years of Knowing Air Movement Replacement Motors.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 year	2	2.0	2.0	2.0
	1-2 years	12	12.0	12.0	14.0
	2.1-3 years	5	5.0	5.0	19.0
	3.1-4 years	21	21.0	21.0	40.0
	More than 4 years	60	60.0	60.0	100.0
	Total	**100**	**100.0**	**100.0**	

From this research, years of knowing Air Movement Replacement Motors of the majority of respondents are more than 4 years with 60%. The second ranking group is 3.1-4 years of knowing with 21%. The third ranking group is 1-2 years of knowing with 12%. The fourth and fifth ranking groups are 2.1-3 years with 5% and less than 1 year with 2%, respectively.

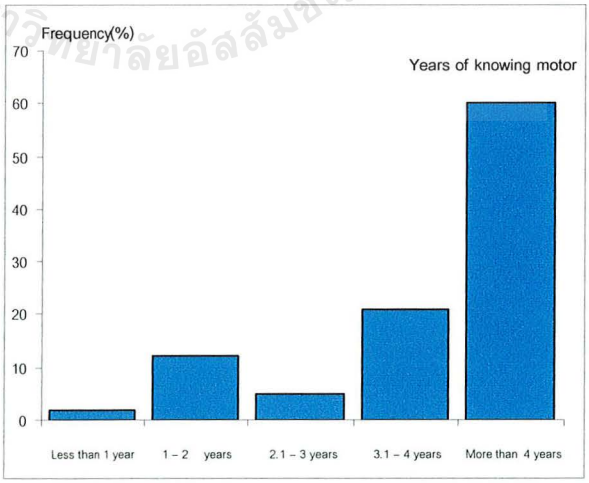

Figure 5.6. Respondents Classified by Years of Knowing Air Movement Replacement Motors.

5.3 The Analysis of the Customer Satisfaction

(1) Noise of Motor

Table 5.7. Level of Customer Satisfaction toward Noise of Motor during Running.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	3	3.0	3.0	3.0
	Neutral	50	50.0	50.0	53.0
	Satisfied	45	45.0	45.0	98.0
	Strongly Satisfied	2	2.0	2.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.7 shows the result of the research on customer satisfaction toward the noise of motor during running, the highest percentage of the respondents are neutral with 50%. The second highest percentages of the respondents are satisfied with 45%. Only 3% of the respondents are dissatisfied and the rest of respondents with 2% are strongly satisfied. According to above, it may be concluded that most customers are neutral but there are customers who are satisfied much more than dissatisfied with the noise of motor provided by FASCO.

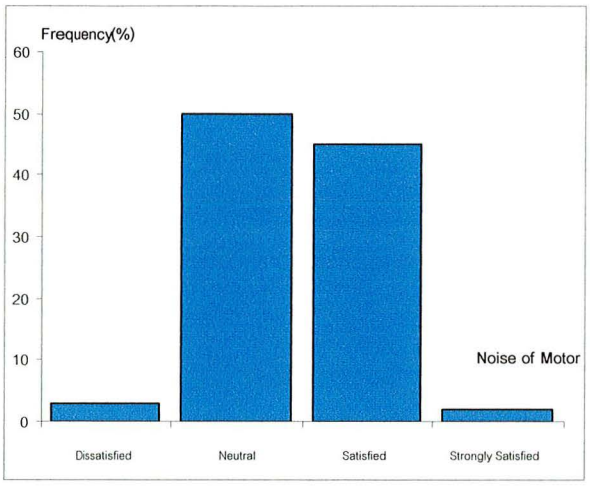

Figure 5.7. Level of Customer Satisfaction toward Noise of Motor during Running.

(2) Vibration of Motor

Table 5.8. Level of Customer Satisfaction toward Vibration of Motor during Running.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	3	3.0	3.0	3.0
	Neutral	53	53.0	53.0	56.0
	Satisfied	43	43.0	43.0	99.0
	Strongly Satisfied	1	1.0	1.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.8 shows the result of the research on customer satisfaction toward vibration of motor during running, the highest percentage of the respondents are neutral with 53%. The second highest percentages of the respondents are satisfied with 43%. Only 3% of the respondents are dissatisfied and the rest of respondents with 1% are strongly satisfied. According to above, it may be concluded that most customers are

neutral but there are customers who are satisfied much more than dissatisfied with the vibration of motor provided by FASCO.

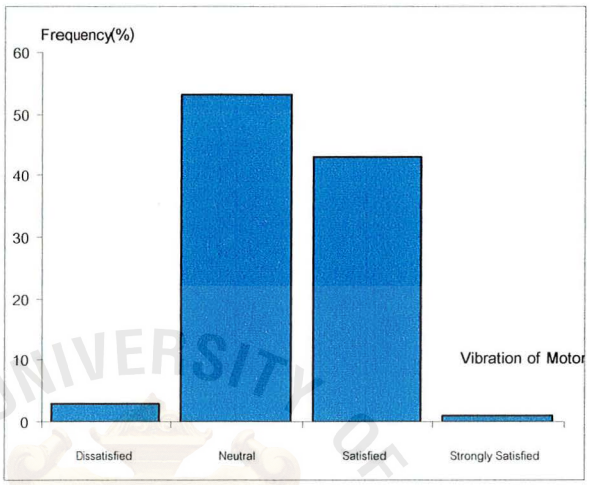

Figure 5.8. Level of Customer Satisfaction toward Vibration of Motor during Running.

(3) Level of Temperature in Variety Speed

Table 5.9. Level of Customer Satisfaction toward Level of Temperature in Variety Speed.

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Dissatisfied	1	1.0	1.0	1.0
	Neutral	35	35.0	35.0	36.0
	Satisfied	60	60.0	60.0	96.0
	Strongly Satisfied	4	4.0	4.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.9 shows the result of the research on customer satisfaction toward the temperature in variety of speeds, the highest percentage of the respondents are satisfied with 60%. The second highest percentages of the respondents are neutral with 35%. Only 4% of the respondents are strongly satisfied and the rest of respondents with 1% are dissatisfied. According to above, it may be concluded that customers are very satisfied with the temperature of motor in variety speed provided by FASCO.

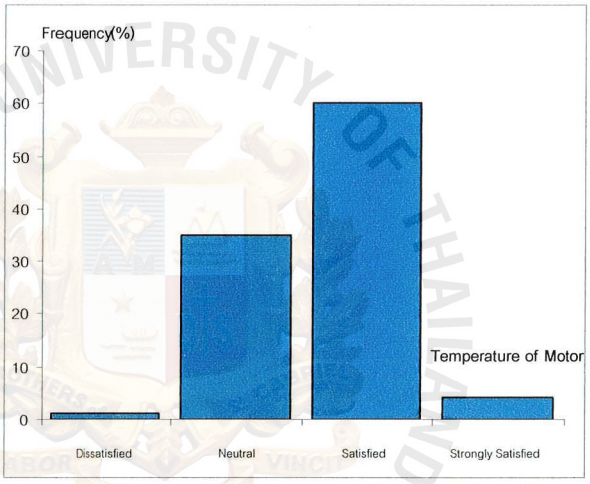

Figure 5.9. Level of Customer Satisfaction toward Level of Temperature in Variety Speed.

(4) Accuracy of Speed

Table 5.10. Level of Customer Satisfaction toward Accuracy of Speed.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	6	6.0	6.0	6.0
	Neutral	56	56.0	56.0	62.0
	Satisfied	35	35.0	35.0	97.0
	Strongly Satisfied	3	3.0	3.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.10 shows the result of the research on customer satisfaction toward the accuracy of speed, the highest percentage of the respondents are neutral with 56%. The second highest percentages of the respondents are satisfied with 35%. Only 6% of the respondents are dissatisfied and the rest of respondents with 3% are strongly satisfied. According to above, it may be concluded that most customers are neutral but there are customers who are satisfied much more than dissatisfied with the accuracy of speed provided by FASCO.

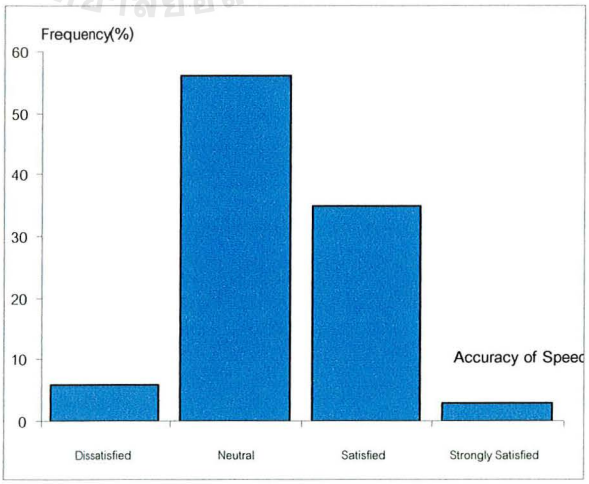

Figure 5.10. Level of Customer Satisfaction toward Accuracy of Speed.

(5) Fullness of Service Providing

Table 5.11. Level of Customer Satisfaction toward Fullness of Service Providing.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	3	3.0	3.0	3.0
	Neutral	34	34.0	34.0	37.0
	Satisfied	56	56.0	56.0	93.0
	Strongly Satisfied	7	7.0	7.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.11 shows the result of the research toward fullness of service providing, the highest percentage of the respondents are satisfied with 56%. The second highest percentages of the respondents are neutral with 34%. Only 7% of the respondents are strongly satisfied and the rest of respondents with 3% are dissatisfied. It may be concluded that customers are very satisfied with the fullness of service.

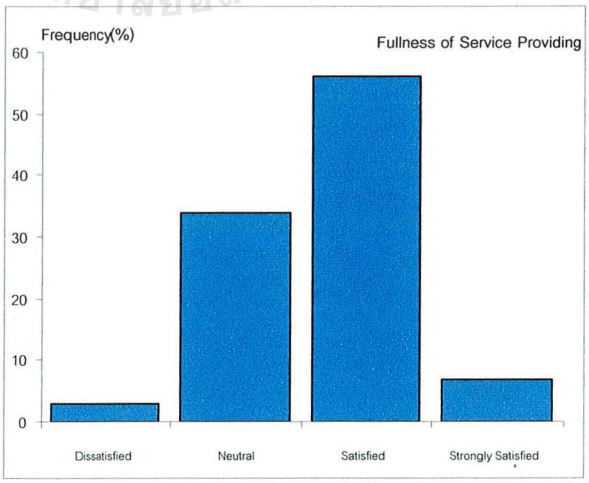

Figure 5.11. Level of Customer Satisfaction toward Fullness of Service Providing.

(6) Capability of Service Staff in Providing Information

Table 5.12. Level of Customer Satisfaction toward Capability of Service Staff in Providing Information.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	5	5.0	5.0	5.0
	Neutral	53	53.0	53.0	58.0
	Satisfied	38	38.0	38.0	96.0
	Strongly Satisfied	4	4.0	4.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.12 shows the result of the research on customer satisfaction toward capability of service staff in providing information, the highest percentage of the respondents is neutral with 53%. The second highest percentages of the respondents are satisfied with 38%. Only 5% of the respondents are dissatisfied and the rest of respondents with 4% are strongly satisfied. According to above, it may be concluded that most customers are neutral but there are customers who are satisfied much more than dissatisfied with the capability of service staff in providing information by FASCO.

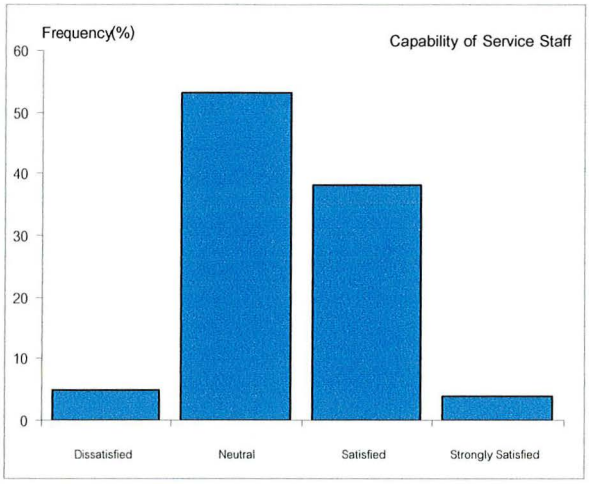

Figure 5.12. Level of Customer Satisfaction toward Capability of Service Staff in Providing Information.

(7) Promptness of Service Staff

Table 5.13. Level of Customer Satisfaction toward Promptness of Service Staff.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	5	5.0	5.0	5.0
	Neutral	31	31.0	31.0	36.0
	Satisfied	56	56.0	56.0	92.0
	Strongly Satisfied	8	8.0	8.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.13 shows the result of the research on customer satisfaction toward promptness of service staff, the highest percentage of the respondents is satisfied with 56%. The second highest percentages of the respondents are neutral with 31%. Only 8% of the respondents are strongly satisfied and the rest of respondents with 5% are

dissatisfied. According to above, it may be concluded that customers are very satisfied with the promptness of service staff by FASCO.

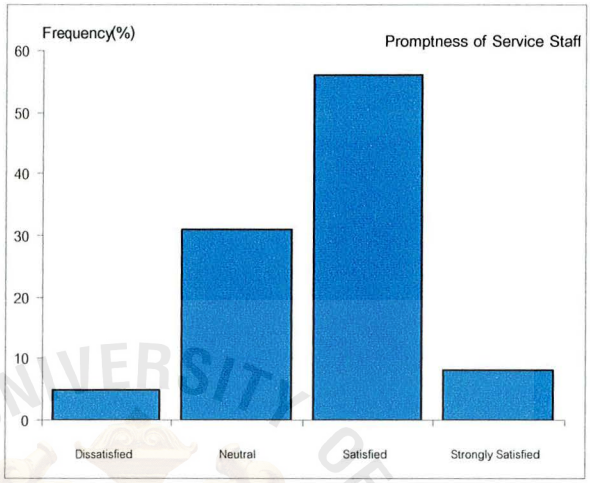

Figure 5.13. Level of Customer Satisfaction toward Promptness of Service Staff.

(8) Service Assistant and Problem Solving of Staff

Table 5.14. Level of Customer Satisfaction toward Service Assistant and Problem Solving of Staff.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	8	8.0	8.0	8.0
	Neutral	39	39.0	39.0	47.0
	Satisfied	46	46.0	46.0	93.0
	Strongly Satisfied	7	7.0	7.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.14 shows the result of the research on customer satisfaction toward service assistant and problem solving of staff, the highest percentage of the respondents is satisfied with 46%. The second highest percentages of the respondents are neutral with 39%. Only 8% of the respondents are dissatisfied and the rest of respondents with 7% are strongly satisfied. According to above, it may be concluded that customers are satisfied with the service assistant and problem solving of staff by FASCO.

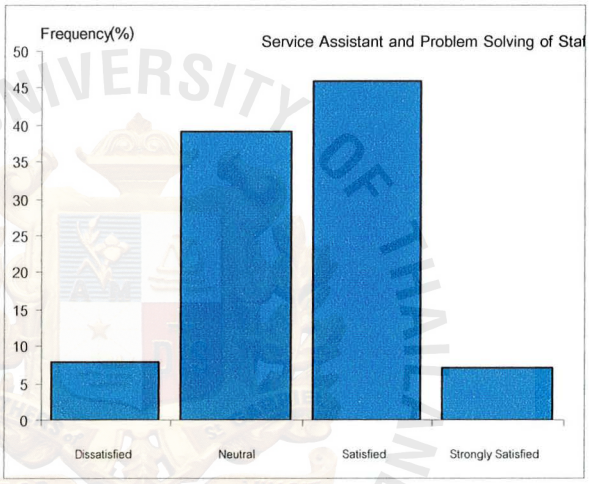

Figure 5.14. Level of Customer Satisfaction toward Service Assistant and Problem Solving of Staff.

(9) Overall Performance of Service Staff

Table 5.15. Level of Customer Satisfaction toward Overall Performance of Service Staff.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	4	4.0	4.0	4.0
	Neutral	49	49.0	49.0	53.0
	Satisfied	46	46.0	46.0	99.0
	Strongly Satisfied	1	1.0	1.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.15 shows the result of the research on customer satisfaction toward overall performance of service staff, the highest percentage of the respondents is neutral with 49%. The second highest percentages of the respondents are satisfied with 46%. Only 4% of the respondents are dissatisfied and the rest of respondent with 1% is strongly satisfied. According to above, it may be concluded that most customers are neutral but there are customers who are satisfied much more than dissatisfied with the overall performance of service staff by FASCO.

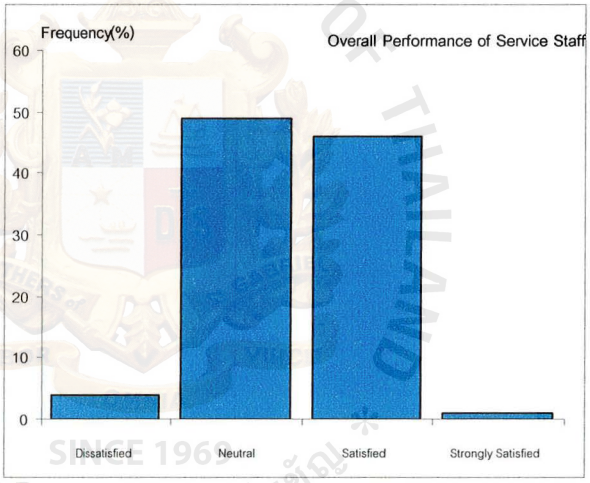

Figure 5.15. Level of Customer Satisfaction toward Overall Performance of Service Staff.

(10) On time Delivery

Table 5.16. Level of Customer Satisfaction toward On time Delivery.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Dissatisfied	1	1.0	1.0	1.0
	Dissatisfied	10	10.0	10.0	11.0
	Neutral	53	53.0	53.0	64.0
	Satisfied	35	35.0	35.0	99.0
	Strongly Satisfied	1	1.0	1.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.16 shows the result of the research on customer satisfaction toward on time delivery, the highest percentage of the respondents is neutral with 53%. The second highest percentages of the respondents are satisfied with 35%. The third highest percentages of respondents are dissatisfied with 10%. Only 1% of the respondents are strongly dissatisfied and strongly satisfied each. According to above, it may be concluded that most customers are neutral but there are customers who are satisfied more than dissatisfied with the on time delivery by FASCO.

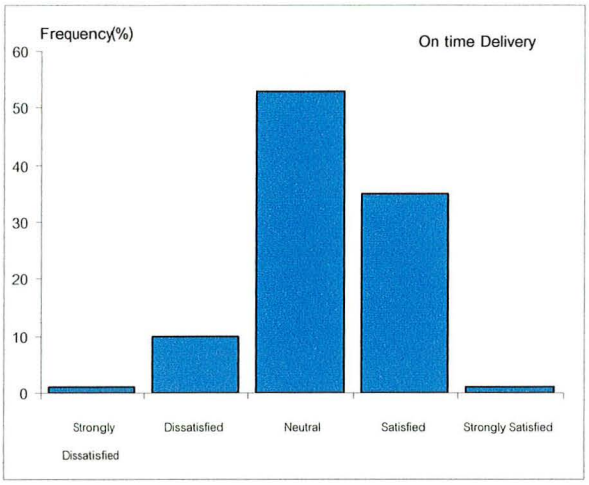

Figure 5.16. Level of Customer Satisfaction toward On time Delivery.

(11) Completeness of Product

Table 5.17. Level of Customer Satisfaction toward Completeness of Product.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	8	8.0	8.0	8.0
	Neutral	36	36.0	36.0	44.0
	Satisfied	53	53.0	53.0	97.0
	Strongly Satisfied	3	3.0	3.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.17 shows the result of the research on customer satisfaction toward completeness of product, the highest percentage of the respondents is satisfied with 53%. The second highest percentages of the respondents are neutral with 36%. Only 8% of the respondents are dissatisfied and the rest of respondents with 3% are strongly

satisfied. According to above, it may be concluded that customers are very satisfied with the completeness of product by FASCO.

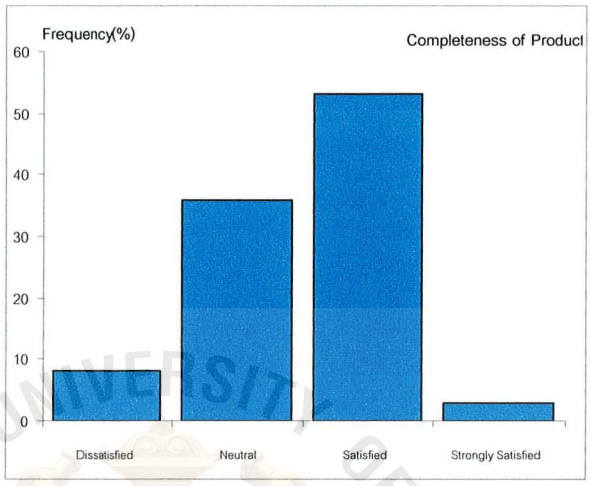

Figure 5.17. Level of Customer Satisfaction toward Completeness of Product.

(12) Accuracy of Order

Table 5.18. Level of Customer Satisfaction toward Accuracy of Order.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	5	5.0	5.0	5.0
	Neutral	40	40.0	40.0	45.0
	Satisfied	48	48.0	48.0	93.0
	Strongly Satisfied	7	7.0	7.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.18 shows the result of the research on customer satisfaction toward accuracy of order, the highest percentage of the respondents is satisfied with 48%. The

second highest percentages of the respondents are neutral with 40%. Only 7% of the respondents are strongly satisfied and the rest of respondents with 5% are dissatisfied. According to above, it may be concluded that customers are satisfied with the accuracy of order by FASCO.

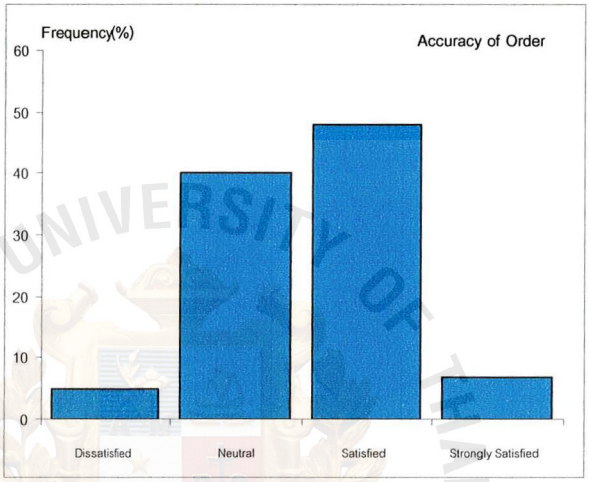

Figure 5.18. Level of Customer Satisfaction toward Accuracy of Order.

(13) Existing Product Training

Table 5.19. Level of Customer Satisfaction toward Existing Product Training.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Dissatisfied	1	1.0	1.0	1.0
	Dissatisfied	9	9.0	9.0	10.0
	Neutral	57	57.0	57.0	67.0
	Satisfied	33	33.0	33.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.19 shows the result of the research on customer satisfaction toward existing product training, the highest percentage of the respondents is neutral with 57%. The second highest percentages of the respondents are satisfied with 33%. Only 9% of the respondents are dissatisfied and the rest of respondents with 1% are strongly dissatisfied. According to above, it may be concluded that most customers are neutral but there are customers who are satisfied more than dissatisfied with the existing product training by FASCO.

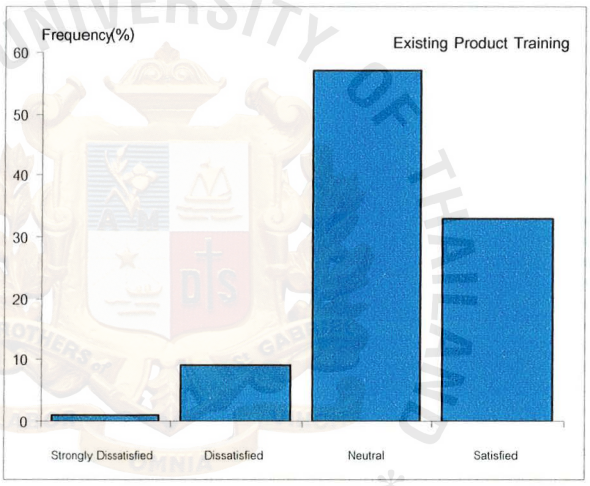

Figure 5.19. Level of Customer Satisfaction toward Existing Product Training.

(14) New Product Launch Training

Table 5.20. Level of Customer Satisfaction toward New Product Launch Training.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	28	28.0	28.0	28.0
	Neutral	54	54.0	54.0	82.0
	Satisfied	18	18.0	18.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.20 shows the result of the research on customer satisfaction toward new product launch training, the highest percentage of the respondents is neutral with 54%. The second highest percentages of the respondents are dissatisfied with 28%. The rest of respondents with 18% are satisfied. According to above, it may be concluded that most customers are neutral but there are customers who are dissatisfied more than satisfied with the new product launch training by FASCO.

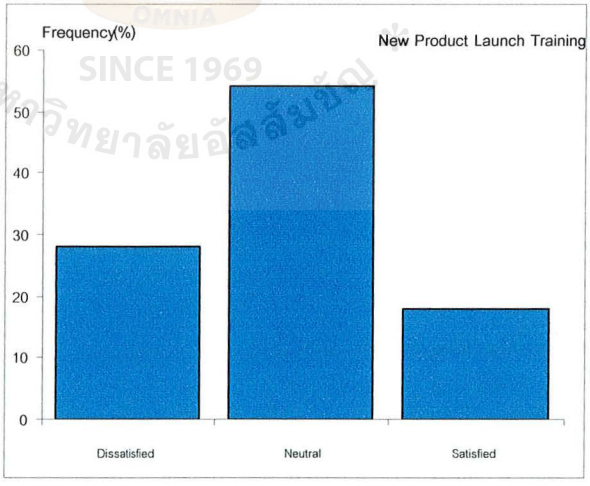

Figure 5.20. Level of Customer Satisfaction toward New Product Launch Training.

(15) Environment of Training Center

Table 5.21. Level of Customer Satisfaction toward Environment of Training Center.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Dissatisfied	1	1.0	1.0	1.0
	Dissatisfied	13	13.0	13.0	14.0
	Neutral	58	58.0	58.0	72.0
	Satisfied	25	25.0	25.0	97.0
	Strongly Satisfied	3	3.0	3.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.21 shows the result of the research on customer satisfaction toward environment of training center, the highest percentage of the respondents is neutral with 58%. The second highest percentages of the respondents are satisfied with 25%. The third highest percentages of the respondents are dissatisfied with 13. Only 3% of the respondents are strongly satisfied and the rest of respondents with 1% are strongly dissatisfied. According to above, it may be concluded that most customers are neutral but there are customers who are satisfied more than dissatisfied with the environment of training center by FASCO.

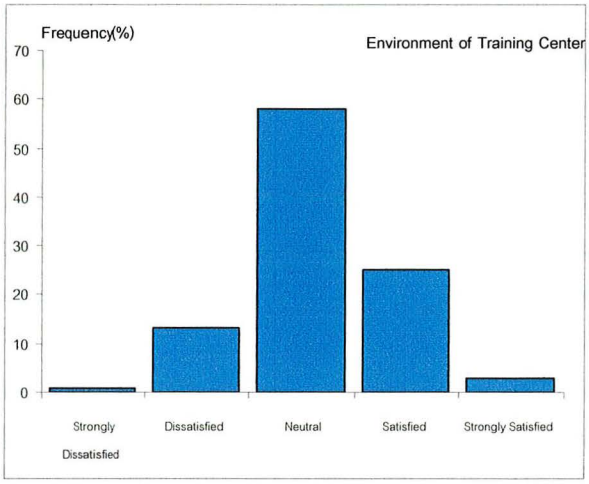

Figure 5.21. Level of Customer Satisfaction toward Environment of Training Center.

(16) Quality of Product Trainer

Table 5.22. Level of Customer Satisfaction toward Quality of Product Trainer.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Dissatisfied	1	1.0	1.0	1.0
	Dissatisfied	9	9.0	9.0	10.0
	Neutral	57	57.0	57.0	67.0
	Satisfied	29	29.0	29.0	96.0
	Strongly Satisfied	4	4.0	4.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.22 shows the result of the research on customer satisfaction toward quality of product trainer, the highest percentage of the respondents is neutral with 57%. The second highest percentages of the respondents are satisfied with 29%. The third highest percentages of the respondents are dissatisfied with 9%. Only 4% of the

respondents are strongly satisfied and the rest of respondents with 1% are strongly dissatisfied. According to above, it may be concluded that most customers are neutral but there are customers who are satisfied more than dissatisfied with the quality of product trainer by FASCO.

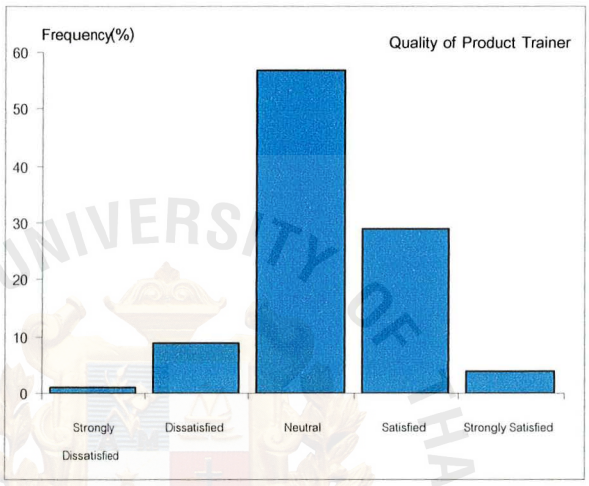

Figure 5.22. Level of Customer Satisfaction toward Quality of Product Trainer.

(17) Price Reasonableness for Selling Product

Table 5.23. Level of Customer Satisfaction toward Price Reasonableness for Selling Product.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	5	5.0	5.0	5.0
	Neutral	66	66.0	66.0	71.0
	Satisfied	28	28.0	28.0	99.0
	Strongly Satisfied	1	1.0	1.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.23 shows the result of the research on customer satisfaction toward price reasonableness for selling product, the highest percentage of the respondents is neutral with 66%. The second highest percentages of the respondents are satisfied with 28%. Only 5% of the respondents are dissatisfied and the rest of respondents with 1% are strongly satisfied. According to above, it may be concluded that most customers are neutral but there are customers who are satisfied much more than dissatisfied with the price reasonableness for selling product by FASCO.

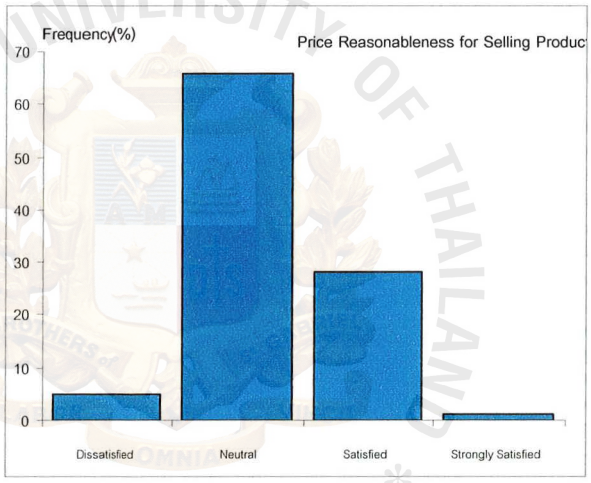

Figure 5.23. Level of Customer Satisfaction toward Price Reasonableness for Selling Product.

(18) Price Reasonableness for Repairing Service

Table 5.24. Level of Customer Satisfaction toward Price Reasonableness for Repairing Service

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	22	22.0	22.0	22.0
	Neutral	51	51.0	51.0	73.0
	Satisfied	27	27.0	27.0	100.0
	Total	**100**	**100.0**	**100.0**	

Above Table 5.24 shows the result of the research on customer satisfaction toward price reasonableness for repairing service, the highest percentage of the respondents is neutral with 51%. The second highest percentages of the respondents are satisfied with 27%. The rest of respondents with 22% are dissatisfied. According to above, it may be concluded that most customers are neutral but there are customers who are satisfied more than dissatisfied with the price reasonableness for repairing service by FASCO.

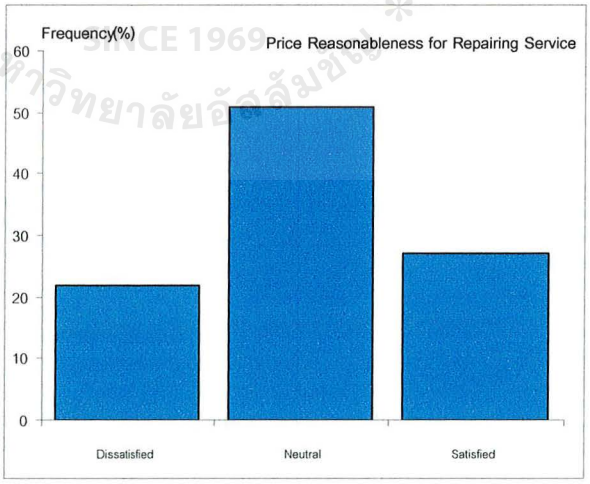

Figure 5.24. Level of Customer Satisfaction toward Price Reasonableness for Repairing Service.

VI. CONCLUSIONS AND RECOMMENDATIONS

The research is to survey level of customer satisfaction toward FASCO Air Movement Replacement Motors from 100 air conditioning manufacturers around Bangkok. The purpose of this study is to survey whether the customers are satisfied with the current level of services and range of products and survey what customers need to improve on product and services. The collected data is analyzed and delivered by using SPSS (the Statistical Package for Social Sciences) to show the survey result in forms of tables, pie chart, and bar charts.

6.1 Research Summary

The results of the survey indicate that the number of respondents who completed the questionnaire were 56 male and 44 female. The majority of respondents were in the age of 31-35 years. Most respondents had education level of bachelor's degree and it was also found that most respondents had occupation as engineer. Most respondents had monthly income in the range of Baht 20,001-25,000, and the years of knowing air movement replacement motors of the majority of respondents were more than 4 years.

6.2 Conclusions Reached

The results of this research on customer satisfaction toward FASCO Air Movement Replacement Motors, the survey focused in 5 areas of services:

(1) Satisfaction toward Quality of Product

The result of the survey is analyzed and delivered that most of customers have currently been satisfied toward the level of temperature in variety speed provided by FASCO. But most customers have been neutral toward the noise of motor during running, the vibration of motor during running, and also accuracy of speed provided by FASCO.

(2) Satisfaction toward Customer Service

The result of the survey analyzed and delivered that most of customers have currently been satisfied toward fullness of service providing, promptness of service staff, and service assistant and problem solving of staff. But most customers have been neutral toward capability of service staff in providing information and overall performance of service staff provided by FASCO.

(3) Satisfaction toward Delivery of Product

The result of the survey analyzed and delivered that most customers have currently been satisfied toward the completeness of product and accuracy of order. Regarding the on time delivery, the survey found that most customers have been neutral toward on time delivery provided by FASCO.

(4) Satisfaction toward Knowledge of Product

The result of the survey is analyzed and delivered that most customers have currently been neutral toward the existing product training, new product launch training, environment of training center, and quality of product trainer provided by FASCO.

(5) Satisfaction toward Price of Product

The result of the survey is analyzed and delivered that most customers have currently been neutral toward price reasonableness for selling product and the price reasonableness for repairing service provided by FASCO.

The result of the survey in the last part showed that the open-ended question on other opinions and recommendations could be summarized as follows:

(1) Customers need more product quality improvement

(2) Customers need more price reduction

(3) Customers need more improvement on service

6.3 Recommendations

The result of the survey showed that there are many points of focused areas to be improved. According to the result of the survey, knowledge of product and price of product are very urgent things to be improved.

The knowledge of product is one of tooling to satisfy customer and show the strength of the product. FASCO should give more programs on existing and new launched product training to make more understanding and impress customers. The environment of training center and quality of product trainer are important factors of training program to be completed. FASCO may need to improve training center to make customers more comfortable and find qualified trainers.

The price of product is normally one of the most critical factors that directly affect the customers in decision-making. Due to competitive situation, FASCO may need to reduce cost of product by improving the efficiency and performance, negotiate with supplier to reduce raw material cost is one way to reduce overall cost.

6.4 Recommendations for Further Research

This research is focused on customer satisfaction toward FASCO Air Movement Replacement Motors only around Bangkok. To research more on other areas such as upcountry and other countries are recommended. The result will show the overall customer satisfaction and FASCO will understand and improve on dissatisfied area more.

APPENDIX A

THE SURVEY INSTRUMENT

Assumption University

I am a graduate student of Assumption University. Now I am conducting a marketing research on Customer Satisfaction Factor toward FASCO AIR MOVEMENT REPLACEMENT MOTORS, which is in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

I would like to ask for your kind cooperation in completing the questionnaires for a few minutes. Your response to these questionnaires will be kept strictly confidential

Thanks you for your cooperation.

FASCO AIR MOVEMENT REPLACEMENT MOTORS

CUSTOMER SATISFACTION STUDY

Part I About Yourself: Please fill in the blank ( ) that represents the most appropriate response for each of the following items. Remember that all your responses will remain confidential.

1. Gender

( ) Male ( ) Female

2. Age

( ) Under 25 ( ) 25 – 30

( ) 31 – 35 ( ) 36 – 40

( ) Over 40

3. Education

( ) High School ( ) Vocational Degree

( ) Bachelor's Degree ( ) Master's Degree

( ) Over Master's Degree

4. Occupation

( ) Technician ( ) Engineer

( ) Quality Assurance ( ) Purchasing

( ) Sales Representative

5. Monthly Income (TH BAHT)

( ) Below 15,000 ( ) 15,000 – 20,000

( ) 20,001 – 25,000 ( ) 25,001 – 30,000

( ) Over 30,000

6. Years of Knowing Air Movement Replacement Motors

( ) Less than 1 year ( ) 1 – 2 years

( ) 2.1 – 3 years ( ) 3.1 – 4 years

( ) More than 4 years

Part II About Your Consumer Satisfaction Levels: Please check the one number that represents the most appropriate response for each of the following items. Remember that all your responses will remain confidential.

5 = Strongly Satisfied

4 = Satisfied

3 = Neutral

2 = Dissatisfied

1 = Strongly Dissatisfied

1. Satisfaction toward Quality of Product					
- Noise of Motor during Running	5	4	3	2	1
- Vibration of Motor during Running	5	4	3	2	1
- Level of Temperature in Variety Speed	5	4	3	2	1
- Accuracy of Speed	5	4	3	2	1
2. Satisfaction toward Customer Service					
- Fullness of Service Providing	5	4	3	2	1
- Capability of Service Staff in Providing Information	5	4	3	2	1
- Promptness of Service Staff	5	4	3	2	1
- Service Assistant and Problem Solving of Staff	5	4	3	2	1
- Overall Performance of Service Staff	5	4	3	2	1

3. Satisfaction toward Delivery of Product

- On time Delivery	5	4	3	2	1
- Completeness of Product	5	4	3	2	1
- Accuracy of Order	5	4	3	2	1

4. Satisfaction toward Knowledge of Product

- Existing Product Training	5	4	3	2	1
- New Product Launch Training	5	4	3	2	1
- Environment of Training Center	5	4	3	2	1
- Quality of Product Trainer	5	4	3	2	1

5. Satisfaction toward Price of Product

- Price Reasonableness for Selling Product	5	4	3	2	1
- Price Reasonableness for Repairing Service	5	4	3	2	1

Other Opinion (s) and Recommendation (s)

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มหาวิทยาลัยอัสสัมชัญ

ผมเป็นนักศึกษา ปริญญาโทของ มหาวิทยาลัยอัสสัมชัญ ขณะนี้ผมได้จัดทำ การค้นคว้าวิจัยทางด้านการตลาดเกี่ยวกับความพึงพอใจของมอเตอร์ไฟฟ้าแลกเปลี่ยนอากาศของฟาสโก้ (ยี่ห้อฟาสโก้), ซึ่งการวิจัยนี้ใช้เป็นส่วนหนึ่งของการศึกษา ปริญญาโท คณะวิทยาศาสตร์ สาขา คอมพิวเตอร์ และการจัดการทางวิศวกรรม

ผมขอความกรุณาในความร่วมมือตอบแบบสอบถามเพื่อความสมบูรณ์ ในระยะเวลาอันสั้น สิ่งที่ท่านตอบกลับมาในแบบสอบถามจะถูกเก็บเป็นความลับที่สุด

ขอขอบคุณสำหรับความร่วมมือของท่านเป็นอย่างสูง

มอเตอร์ไฟฟ้าแลกเปลี่ยนอากาศของฟาสโก้
การศึกษาเกี่ยวกับความพึงพอใจของลูกค้า

ส่วนที่ 1 เกี่ยวกับข้อมูลของคุณ : กรุณาเขียนเครื่องหมาย ลงในช่อง ( ) ซึ่งเป็นคำตอบที่เหมาะสมที่สุดของแต่ละหัวข้อดังต่อไปนี้ กรุณาจำว่าสิ่งที่ท่านตอบมาทั้งหมดจะถูกเก็บเป็นความลับ

1. เพศ

( ) ชาย ( ) หญิง

2. อายุ

( ) น้อยกว่า 25 ( ) 25 - 30

( ) 31 - 35 ( ) 36 - 40

( ) มากกว่า 40

3. ระดับการศึกษา

( ) มัธยมศึกษา ( ) อาชีวะศึกษา

( ) ปริญญาตรี ( ) ปริญญาโท

( ) สูงกว่าปริญญาโท

4. อาชีพ

( ) ช่างเทคนิค ( ) วิศวกร

( ) ผู้ดูแลคุณภาพสินค้า ( ) จัดซื้อ

( ) ตัวแทนขาย

5. รายได้ต่อเดือน (บาท)

( ) ต่ำกว่า 15,000 ( ) 15,000 – 20,000

( ) 20,001 – 25,000 ( ) 25,001 – 30,000

( ) มากกว่า 30,000

6. จำนวนปีที่ท่านรู้จักมอเตอร์ไฟฟ้าแลกเปลี่ยนอากาศ

( ) น้อยกว่า 1 ปี ( ) 1 – 2 ปี

( ) 2.1 – 3 ปี ( ) 3.1 – 4 ปี

( ) มากกว่า 4 ปี

ส่วนที่ 2 เกี่ยวกับระดับความพึงพอใจของการบริโภคของคุณ : กรุณาเลือกหนึ่งตัวเลขที่เป็นคำตอบที่เหมาะสมที่สุดของแต่ละหัวข้อดังต่อไปนี้ กรุณาจำว่าสิ่งที่ท่านตอบมาทั้งหมดจะถูกเก็บเป็นความลับ

5 = พึงพอใจอย่างยิ่ง

4 = พึงพอใจ

3 = ปานกลาง

2 = ไม่พึงพอใจ

1 = ไม่พึงพอใจอย่างยิ่ง

1. **ความพึงพอใจต่อคุณภาพของสินค้า**					
- เสียงของมอเตอร์ระหว่างหมุน	5	4	3	2	1
- การสั่นสะเทือนของมอเตอร์ระหว่างหมุน	5	4	3	2	1
- ระดับของอุณหภูมิ ณ. ความเร็วต่างๆ	5	4	3	2	1
- ความเที่ยงตรงของความเร็ว (รอบ/นาที)	5	4	3	2	1
2. **ความพึงพอใจต่อการบริการลูกค้า**					
- ความเต็มที่ของการให้บริการ	5	4	3	2	1
- ประสิทธิภาพของพนักงานบริการในการจัดหาข้อมูล	5	4	3	2	1
- ความพร้อมของพนักงานบริการ	5	4	3	2	1
- การให้ความช่วยเหลือและการแก้ปัญหาของพนักงาน	5	4	3	2	1
- สมรรถภาพโดยรวมของพนักงานบริการ	5	4	3	2	1
3. **ความพึงพอใจต่อการจัดส่งของสินค้า**					
- ความตรงต่อเวลาในการจัดส่ง	5	4	3	2	1
- ความสมบูรณ์ของสินค้า	5	4	3	2	1
- ความถูกต้องตามใบสั่งสินค้า	5	4	3	2	1
4. **ความพึงพอใจต่อความรู้ในตัวสินค้า**					
- การอบรมเกี่ยวกับสินค้าที่มีอยู่ในปัจจุบัน	5	4	3	2	1
- การอบรมเกี่ยวกับสินค้าใหม่ที่จะออกสู่ตลาด	5	4	3	2	1
- สิ่งแวดล้อมของศูนย์อบรม	5	4	3	2	1
- คุณภาพของผู้อบรม	5	4	3	2	1
5. **ความพึงพอใจต่อราคาของสินค้า**					
- ความสมเหตุสมผลของราคาสินค้า	5	4	3	2	1
- ความสมเหตุสมผลของราคาสำหรับการให้บริการซ่อมแซม	5	4	3	2	1

ความคิดเห็นและคำแนะนำอื่นๆ

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