



CHAPTER 2

THEORETICAL CONSIDERATION

Author believes that the best way to go about solving problems in general is; to analyse the situation (Process, Procedure, System and etc); then search for solution. Search for solution in the sense of accumulating relevant techniques, theories and applied experiences that may lead to effective solution to the problems. This is exactly how the author intended to tackle this thesis.

2.1 Definition of Quality

Theory:

Several gurus had pronounced the term quality differently and that the reader must aware of the variations in definition:

- **The concise Oxford Dictionary** - *“A degree of excellence”*.
- **British Standard 4778** – *“The totality of features and characteristic that bear on the ability of a product or service to satisfy a given need”*.
- **Dr. W. E. Deming** – *“Improvement of the process, which increases uniformity of output of product, reduces rework and mistakes, reduces waste of manpower, machine-time, and materials, and thus increases output with less effort”*.
- **Dr. J. M. Juran** – *“Fitness for purpose”*.
- **Dr. A. V. Feigenbaum** – *“The total composite product and service characteristics of marketing, engineering, manufacture, and maintenance through which the product and service will meet the expectations of the customer”*.
- **P Crosby** – *“Conformance to requirements”*.

Comment:

Majority of the customer defines the term quality rather differently. Customers most often define quality in terms of the product and/or service's attributes that are relevant and most important to their requirements/expectation, which will result in customer satisfaction anytime and should every time the product and/or service is used. It is this definition that the author is most concerned in this thesis. Knowing how customers see the term quality helps author to interpret and enable to focus on customers in order to provide only quality product and/or service that they expected.

2.2 Continuous Improvement**Theory:**

In 1939, Dr. Shewhart a former pioneering statistician at Bell Telephone was the first to develop and describe about the cycle in his book "*Statistical Method From the Viewpoint of Quality Control*", the Shewhart Cycle Learning and Improvement cycle by combining creative management processes together with statistical analysis. The cycle was coined once again in 1950s when taken on by Dr. W. Edwards Deming, who popularised the concept in Japan. Deming encouraged the Japanese to adopt Shewhart cycle (PDCA or PDSA), and much to the Japanese's spirit they eagerly embraced PDCA along with other quality concepts (Deming's 14 points and 7 deadly diseases principle), from this they were able to transform from reputation for shoddy goods to a country that has a tremendous influence on quality. Thus, the Japanese honoured Deming and ever since accredited as the "*Father of Quality*", in which referred PDCA as the Deming cycle.

Continuous improvement is the practice based on the Japanese concept called *Kaizen*. *Kaizen* is the philosophy of continually seeking ways to improve processes, products and/or services. Lies at the heart of the continuous improvement philosophy are ongoing four stage activities to get from 'problem-faced' to 'problem-solved', which is referred to as **PDCA cycle** or is also known as the **Shewhart cycle** and the **Deming cycle** (or Wheel).

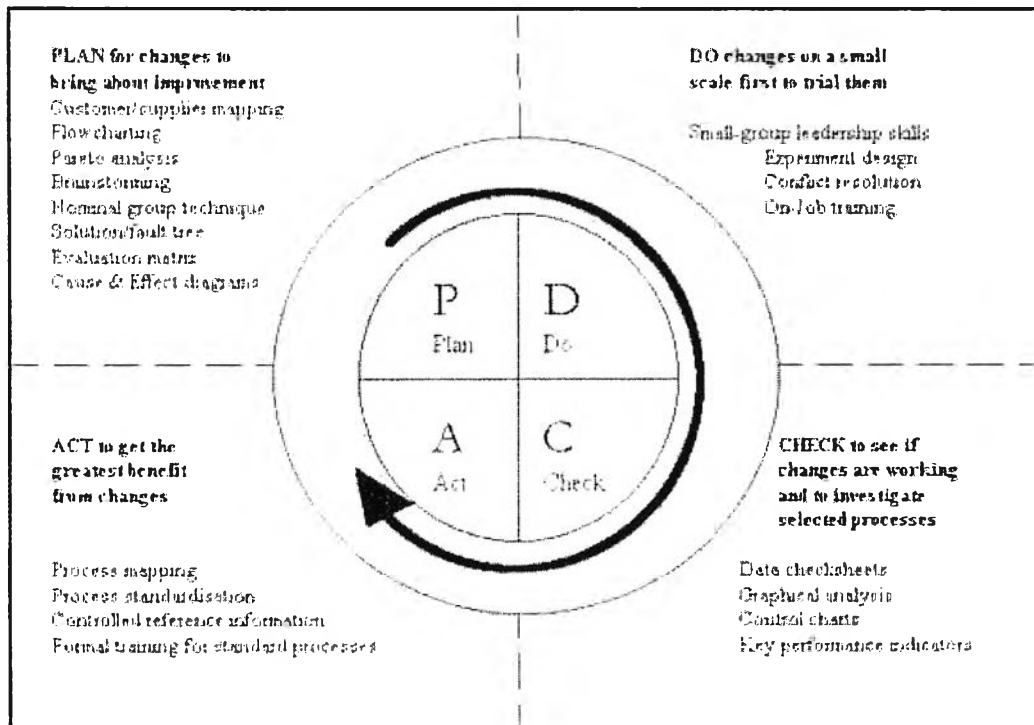


Figure 2.1 – Evolution of the PDCA cycle

Source – <http://www.hci.com.au/hcisite2/toolkit/pdcacycl.htm#Plan-Do-Check-Act>

1. Plan:

- a. Improvement team begins by realising that there is a need for an improvement on process (or for example; activity, method, machine, or policy and etc)
- b. Analyse and document selected process
- c. Sets qualitative and/or quantitative goals for improvement
- d. Formulate various strategies and pick one to achieve the goals
- e. Develop a plan with quantifiable measures for improvement.

2. Do:

- a. Plan on the scale of implementation/experiment to minimise disruption
- b. Improvement team implements the plan and monitors progress

3. *Check (or Study):*

- a. Analyse the data collected during the *Do* step, finding out how the outcome goes as according to the goals set in the *Plan* step.
- b. If the solution proves ineffective, the team returns to the *Plan* stage and repeat the process.

4. *Act:*

- a. If the measurable outcome proven to be effective, the team update documents the revised process so that it becomes the standard procedure.
- b. Perform training as necessary to ensure that the new standard procedure is fully integrated.

Comment:

There is one principle that author can certainly make a full use of is the PDCA cycle. By following the cycle ABC can continue to improve systematically upon self and to periodically review the qualitative and/or quantitative outcome in order to always update the standard procedure.

2.3 Total Quality Service

Theory:

Implementation of Total Quality Management (TQM) was certainly a successful principle of 1980, and since the world has become ever more competitive, so competitive that TQM alone is no longer effective on its own for the organisations. Hence Total Quality Service (TQS) is rapidly becoming the challenge of the 1990s and gets even more demanding yet in the 2000s. First, What is TQS? In its simplest form, it is the participation of the whole organisations to commit in the concept of customer focus, establishing service performance standards, measuring performance against benchmarks, recognising and rewarding exemplary behaviour, and maintaining enthusiasm for the customer at all times. Above all the aim is to integrate all functions to create a working union between sales and marketing and customer service and marketing research, to arrive at net result being superior service across the company (internal - value chain) and between suppliers and customers (external - supply chain).

One of the biggest challenges in improving quality is to get managers to view the business at the customer level. to develop a one-on-one mentality toward customers, meaning that they should strive to never disappoint a single customer. Making quality service to work is not easy. it required concurrent participant from all levels within the organisation that starts with a personal and professional commitment by those from the top (management team), which shall slowly ingrain in the organisation's culture to the point where each personal be fully committed and responsible in achieving the goal set forth by the management. To support the statement made above, there are some practical steps a company can take to begin and maintain the process of delivering quality service:

1. **COMMITMENT:** - commit to improving quality and providing the resources to make improvement possible.
2. **DELEGATE:** - designate a person or establish a unit reporting directly to the top. Look at everything as if were dealing with customers on a one-on-one basis.
3. **CUSTOMER INFORMATION:** - develop a comprehensive marketing information system through utilisation of relation database management technologies.
4. **INTERNAL ASSESSMENT:** - conduct internal assessments to determine how capable the company is at delivering quality service.
5. **ACTION:** - initiate a feedback system and use the information to adjust operations to respond to customer needs, wants, and expectation. Review and where necessary alter procedures and/or even policies.

Comment:

This theory has pointed out the significant of TQS in the past decade from 1990s and yet at time present. Implementing TQS required totally commitment from all the functions and from all the people in making this work properly. This can be done in five-step routine as above. All the effort put into TQS could possibly result in an increase in sales and market share. TQS is a broad subject that involves consideration from various functions throughout the organisation, especially from the top management level, however, this is beyond the scope of this thesis and thus author would take in some of the key concept of TQS especially the 5-steps process to delivering quality service and where possible try to make use of it in the thesis where is most needed (phase 3 on service).

2.4 Relation between Quality: Customer (Perception and Satisfaction) and Sales

Theory:

It is valuable to define the factors that influence customer perception of quality. Proper clarification of perception helps organisation gain insight into complex requirements to market product/service successfully. This concept is evident by a research conducted by Takeuchi and Quelch (1983), it was concluded that the perception can be dissected into three phases – before purchase, at point of purchase, and after purchase (refers to table 1, below).

Table 2.1 - Factors influencing customer perception of quality

Source: Takeuchi and Quelch, 1983

Before purchase	At point of purchase	After purchase
<ul style="list-style-type: none"> • Company's brand name and image • Previous experience • Opinions of friends • Store reputation • Published test results • Advertised price for performance 	<ul style="list-style-type: none"> • Performance specifications • Comments of salespeople • Warranty provisions • Service and repair policies • Support programs • Quoted price for performance 	<ul style="list-style-type: none"> • Ease of installation and use • Handling of repairs, claims, warranty • Spare parts availability • Service effectiveness • Reliability • Comparative performance

Other research such as the American Management Association, was carried out in 1987, where various companies were asked to express their perceptions of the following questions on six tactics of customer service (The results are shown in table 2 below)

:

1. Whether or not they used the tactic,
2. What would they rating (from a low of 1 to a high of 5) their own performance, and
3. Which three tactics were the "most effective".

Table 2.2 - Perceptions of companies on tactics of customer service*Source: American Management Association, 1987*

Tactic	Companies using tactic, %	Rating	Companies listing tactic as “most effective”, %
Unconditional warranty/refund	65	3.86	26
Quality control and product assurance	89	4.00	60
On-time delivery	87	3.88	59
Post sale repair and replacement	69	3.90	28
Expedition of special customer requests	91	3.90	40
Special training for service personnel	82	3.60	36

Comment:

From both the research it can be summarised that Quality is by far the most influencing factor upon customers perception on sales. The first research carried out by Takeuchi and Quelch is beneficial to the thesis because it establishes useful guidelines or more rather like a focus-list for ABC, enabling the company to improve customer service aspect throughout the entire value chain (operation management or product/service delivery process). The third phase ‘**After purchase**’ meets the objective of the thesis: therefore must pay attention to the criteria in order to improve customer service.

As from the second research, it can clearly be seen from the table that Quality is the second most popular tactic used at 89% of the total companies, but yet to receive 4 out of 5 rating, and was also voted as the first ranked in most effective tactic at 60%. Undoubtedly customers always look for Quality, and in order for any organisation to become successful ones must be able to deliver that primary requirement.

Furthermore, having looked into researches on customer perception of quality, it is equally important to further attention on to the study of how the impact of quality on lost sales. There has been a case put forward to identify the importance of quality to retain present customers, it involves an industrial product and a survey was made of present customers who were buying the product made by one manufacturer and some of those customers had

purchased a different brand. One-third of these former customers said the primary reason was poor quality. The study conducted has also proven that besides the following criteria: features, price, delivery and warranty in product/service; customers too find quality as a very important aspect behind the purchase made. There has been some other case that even when the customer view of quality is "good", a quarter or more of the present customers wish not return. Another dimension of this phenomenon is the level of customer satisfaction with the handling of their complaints. The complaints those are resolved with less than complete satisfaction will result in significant sales lost and even with complete satisfactions some customers are not prepared to return.

All the researches and study have broadens author's vision on the term quality and how influential the quality issue has on customer's decision on sale. Thus resolving quality issue by ensuring that all features and function of ABC's product/service provided to the customers are working perfectly to minimise customer dissatisfaction..

2.5 Design and Delivery of Service

Theory:

Design and delivery are at the heart of service construction. Service design refers to the elements that are planned into the service; the features offered by the service, the nature of facilities where the service is provided; and the processes through which the service is delivered. all these are part of the design. The quality of the design determines the ability of the service to effectively and efficiently supply the performance level expected by the customers. The design is therefore the indicator of the stability and reproducibility of the service performance. In designing service, it is important to know what customers' requirements are from the service; along with the performance standards that the service needs to satisfy together form the specifications for the design. The design can be broken down into four related components:

1. *Service product design* – refers to the design of the physical attributes of the service for example serving meal at a restaurant or transaction made through an automatic teller machine etc.
2. *Service facility design* – refers to the design of the physical layout of the facilities where the service is delivered for example, interior at the restaurant, cleanliness, spaciousness, lighting and layout of the environment where the service takes place.
3. *Service operations process design* – refers to the activities that are needed to deliver or maintain a service. The activities that make up the operations processes required in order to help delivering service out put. For example, to rent a car the following procedures are performed: collect license, collect credit card, validate payment option, customer sign and etc
4. *Customer service process design* – refers to activities such as interactions between the customer and the service provider. This attribute often works together with the service operation activity, which therefore needs to be designed together, referring to the example above on car rental beside procedures the sale representative may greet the customer on arrival, refer to customers by name, ask for car preference and etc. all these are referred to as customer service. Since above the customer service and service operations activities together make up the car rental process.

Service delivery refers to the manner in which the service is offered to the customer during a service encounter. Unlike the design, whose quality can be measured against commonly established standards, the perceived quality of the delivery depends on the specific nature of the interaction between the service provider and the customer, the mutual roles played by each, the customer's prior experiences with the service, the customer's mood and stress level, and other intangible factors. The delivery is therefore an indicator of the individuality and heterogeneity of the service encounter.

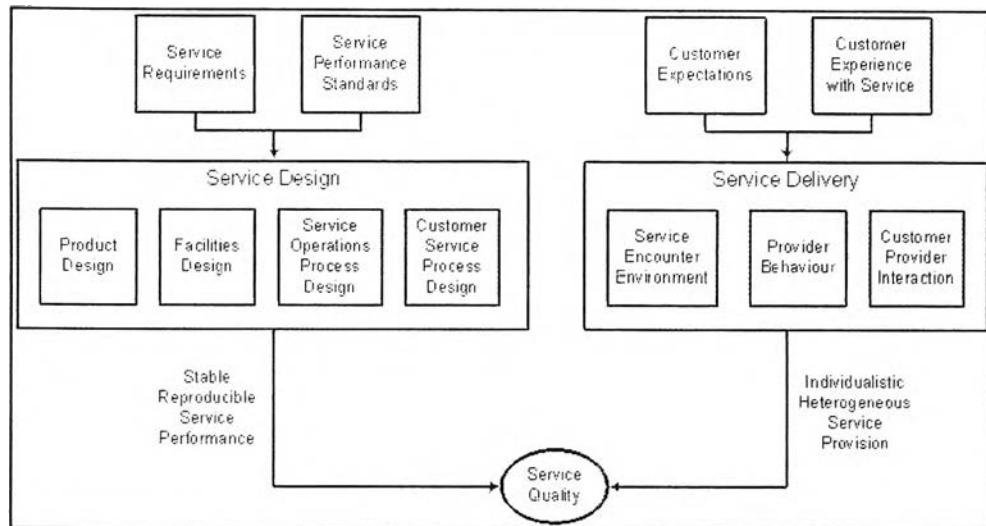


Figure 2.2 - Design and Delivery components of Service Quality

Source: Ramaswamy, Rohit, 1960

Comment:

This theory is particularly useful at the final stage of the thesis, as it breaks down the thinking of all the relevant issues that builds up a service. It allows author to see the detailed ingredients in designing and delivery service and what must be done to achieve good service.

2.6 Strategic Importance of Customers

Theory:

From a strategic point of view, Customer Satisfaction represents one of an overall nine criteria of the European Business Excellence Model. The philosophy behind the model is that CUSTOMER SATISFACTION, PEOPLE SATISFACTION and IMPACT ON SOCIETY are achieved through LEADERSHIP driving POLICY & STRATEGY, PEOPLE MANAGEMENT, RESOURCES and PROCESSES, leading ultimately to excellence in BUSINESS RESULTS. Each of the nine criteria can be used to assess an organisation's progress towards business excellence. It is significant that, within the assessment process, the highest weighting, 20%, is attributed to customer satisfaction.

A Model for Customer Service Excellence

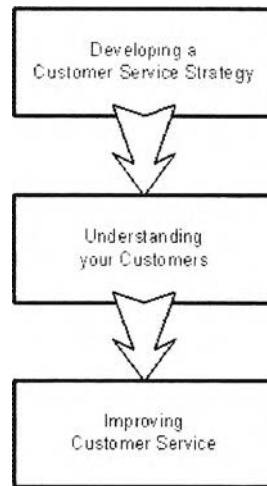


Figure 2.3 - A Model for Customer Service Excellence

Source: WMG - Quality Management & Techniques, 2003

A process in which to achieve excellence in customer service for an organisation can be done by managing all the activities that directly influence the customer. This involves a precise knowledge of customers and their requirements, management of processes to meet these requirements and a means of measuring customer's satisfaction. The process is an on going process that continuously improves to ensure that as requirements change, the organisation can respond accordingly. Refers to the customer service excellence model, above figure.

One of the most extensive research database involved over 3000 business units demonstrate the strategic importance of customer service is PIMS (Profit Impact of Market Strategy) **QM&T WMG, 2003**

- Better service performers can charge, on average, 9% more on the products
- Better service performers grow at twice the rate of poor performers
- Better service performers were significantly more profitable (12% vs. 1% ROS)

The following are also the benefits for improving customer service:

- Service excellence through process improvement
- Developing customer charters and standards
- Effective complaints handling
- Service excellence through benchmarking
- Customer care
- Service excellence through continuous improvement

The potential benefits include:

- Customer retention and loyalty
- New entry of customers
- Increased market share
- Enhanced product/service development
- Reduced costs (marketing, re-work, claims)
- Image and positive publicity
- Staff satisfaction and motivation
- Increased profitability
- Survival of business
- Increase business competitiveness

Instead of jumping into any detailed finding, clearly agree on the aims is required prior to identifying which specific customer is targeted and only then the decision on most suitable data collection method is chosen. There is a wide range of possible aims as follow:

1. General market information
2. Specific market details of a defined group
3. General or specific customer requirements
4. Measuring satisfaction
5. Response to complaints or loss of business

There is a wide range of possible aims listed above, where 1-3 are referred to as preventive in nature, 4 is in a form of appraisal activity, and lastly 5 is a case of 'fire-fighting'. Ideally

an organisation should be focusing on preventive actions. However, the more clearly the aims are defined, the more likely useful information can be collected.

Next step is to determine which method/s is most suitable deployed in meeting the aims and then to develop a plan to support it. Retrieving information from customers required a process for understanding customer requirements and satisfaction hence using relevant methods and techniques to collect data. Methods that are commonly available in collecting data include:

- Face-to-Face e.g. interviews, focus groups, exit polls
- Verbal e.g. through the phone
- Written e.g. questionnaires, score cards
- Analysis of existing data e.g. complaints, market research, market intelligence (sales force)

The overall planning for data collection involves:

1. Decide the activities to be carried out and sort out sequence
2. Decide the timing of the activities
3. Allocate roles and responsibilities to each activity
4. Allocate resources

The data collection planning should cover all aspects of the process from initial agreement and commitment, through to the development of chosen approach, communications, training where necessary, implementation, analysis, and finally improvement actions, which must be measurable.

Comment:

Author is able to grasp some useful dimensional thinking from this theory: above all the success to any organisation is to be able to interpret customer wants and to deliver that in an appropriate manner, since customer is the one who receives product and/or service. Saying this it does mean more than just managing complaints in order to become a customer-focused organisation, however, it is all about getting to know customers well, often by listening to what they have to say, knowing the requirements precisely and attempt to meet those requirements and/or even exceed them.

The above statement that is to satisfy customer through meeting their wants is always the most desirable standing point for all of the organisations and hence must go through these sequential preparations in order to meet the aim set forth:

1. First and foremost, formulate clear customer service strategy.
2. Secondly, is to clearly agree on the aims, as it would help in deciding targeted customer and data collection methods.
3. Thirdly, is to determine the most suitable method/s used to meet the aims
4. Finally, is to develop a plan to handle method to meet the aims.

2.7 Benchmarking

Theory:

Some world-class organisations do not limit satisfaction to knowing only that their performance at present is better than what it was in the past. The concern, however, is to ensure that the performance, at corporate level, is better than the companies compete for the same markets. Thus benchmarking is a technique used to identify performance and is simply a continuous process of measuring products, services, practises and in certain areas against other companies that has been considered as being the “best in class” at the operation being examined. The benchmarking process compares methods and results of processes and practices and may be applied in both manufacturing and service environments.

The process for effective benchmarking can be broken down into ten-step approach that is commonly cited from this area of activity by Xerox during the 1980s:

1. Identify processes or practices to be benchmarked (this is typically based on the relevance to customer satisfaction).
2. Identify the companies that benchmarking will be made.
3. Identify data collection methods and collect the data.
4. Identify current performance levels and note differences. For every significant gap in performance (positive or negative), identify the causes.

5. Establish targets for future performance levels. This should be based not only on existing performance levels, but also the targets that companies have set for own future performance.
6. Communicate findings to management, process owners, and stakeholders to garner acceptance of reality and enthusiasm for improvement.
7. Establish intermediate functional goals that will support the achievement of targets established in step 5. Solicit stakeholders and process owner participation in improvement strategies as they are developed.
8. Develop detailed implementation plans and assign responsibilities for each significant action.
9. Implement improvement activity. Monitor progress and take corrective action as required to maintain momentum.
10. Recalibrate benchmarks and begin the process all over again. Make benchmarking an aspect of continuous improvement.

Several types of benchmarking:

- **Internal** – compare and identify areas for improvement and performance within own organisation.
- **Competitive** – direct comparison with other competitors, which the competitors are most unlikely to help in term of sharing information with the company.
- **Functional** – there may be other organisations who operate in a similar field of business but not at all company's competition therefore willing to co-operate than the direct competitors.
- **Generic** – comparing to other companies, where their processes are similar but no matter what industry they are in. Generally, the further the benchmarking against other the more likely the company will find information that could help divide a real breakthrough in performance.

Comment:

There are no other needs that would be of most acute for ones company than the necessity to increase company's competitiveness in the area of customer service. Customer own the right to receive quality service that is why they became so demanding and increasingly expecting for the decency in process and the performance standard of service provided to them by the service providers. Since vase majority of ABC's revenue much relies on the service work, referring back to the nature of company, it is therefore company's responsibility to serve customers to the best ability. Benchmarking customer service against large organisations best in class at servicing (not necessary from the same industry) would indeed be valuable lesson for ABC to further develop upon the service.

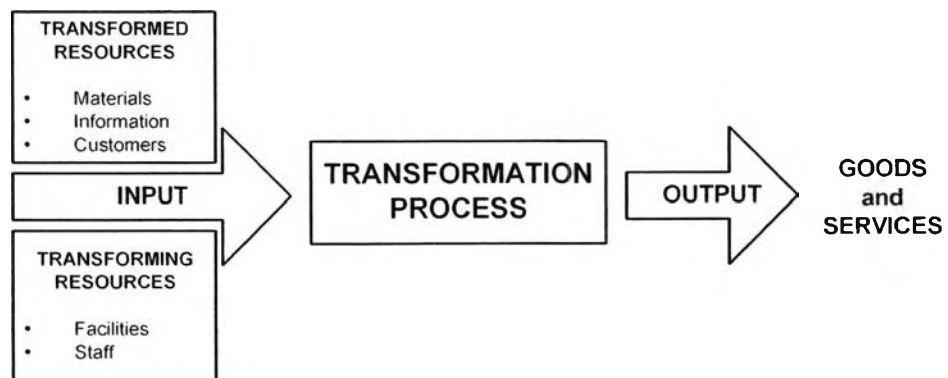
2.8 Operation Management**Theory:**

Figure 2.4 - The Input-Transformation-Output Model

Source: Operations Management Lecture Notes, University of Hertfordshire, 1999

Operation Management has been defined by Walter, 1991 *“is concerned with all activities involved in making a product or providing a service: it is responsible for the transformation of various kinds of inputs to useful outputs”*. In a few simple words, Operations management is about the way organisations produce goods and services. The model above can be used to describe all types of operations no matter what they produce, exactly in this sequence: input-transformation-output. However, it also involves people, the

activities, decisions and responsibilities that altogether combine to get the best potential out of them.

Comment:

It is important that author presents the reader this model because it allows understanding with ease by filtering out complicating tasks/process and leaves nothing but the true nature process of virtually all the organisations no matter what industries. Once the reader has grasped an overview understanding of the concept, they will be able to understand the typical process (input-transformation-output) that lies at the heart of any organisations.

2.9 Kano Model of Quality

Theory:

Kano method was developed in the 80's; the work of Professor Noriaki Kano, the model is based on the concepts of how customer defined quality by providing a simple ranking scheme, which distinguishes between essential and differentiating attributes. These categories are described as follows:

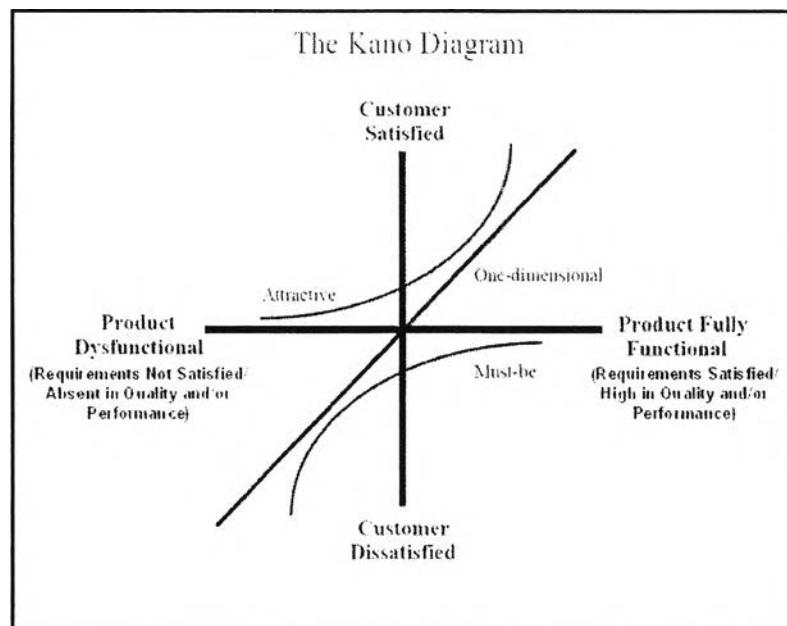


Figure 2.5 - The Kano model

Source: Kano, 1990

- An “*attractive*” (also recognised as Exciters or Delighters) attribute is simply that attractive. The attractive curve indicates areas in which the customer is more satisfied when the product is more functional but is not dissatisfied by the fact that product is less functional. In other words, customers will not be discontented or there is no penalty for not including an attractive element, however including it makes the product or service better to use. Companies that carry out “attractive” to differentiate themselves from others thus will delight the user.
- A “*one-dimensional*” (also recognised as Performance or Linear) attribute is shown in figure as the 45-degree straight-line through the origin. The graph indicates that customer satisfaction is simply proportional to how fully functional the product is or otherwise expressed as straightforward as being the one where more is always better (more functionality leads to more satisfaction). A lower degree of functionality in this attribute will displease customers, and a higher degree of functionality will please them.
- A “*must-be*” (also recognised as Threshold or Basic) attribute is the one that customer considers essential, without these prime functionalities or quality that customers consider as being essential, they will not buy. On the other hand, without the essential functions one company will not be a serious contender in an industry unless what the company is offering provides all of the must-be characteristics that only customers will know what are essential.

Comment:

The reader may wonder what has Kano got to do with this thesis hence a question arises how would the Kano’s theory be useful to the thesis? From the Kano diagram author could visualise the concept and understand clearly what customers’ satisfaction worth. This can be segmented into three basic attributes; it gives author a sense of direction on what customers appraise from the product/service.

Author could make use of the Kano principle by applying the attribute concept as a guideline to this thesis. In view of tackling this thesis for one the problems can be segregated into three subgroups rather like three attributes; “must-be” attribute represents the problems that must not exist in product/service (For example: leakage, cracks,

breakdown etc) in order to complete customer's basic expectation. Then "one-dimensional" attribute in this thesis represents what other responsibilities that the company has towards customers in order to make them more satisfied with the product/service. Lastly an "attractive" attribute represents what the company must do, in term of service, to exceed customer expectation.

2.10 Problem Solving Process

Theory:

The process for solving problems composes of the following logical and sequential activities. At each stage of the activities there are several effective techniques that are believed to be the most effective technique employed at each individual stage. The figure below indicates a generic approach to problem solving.

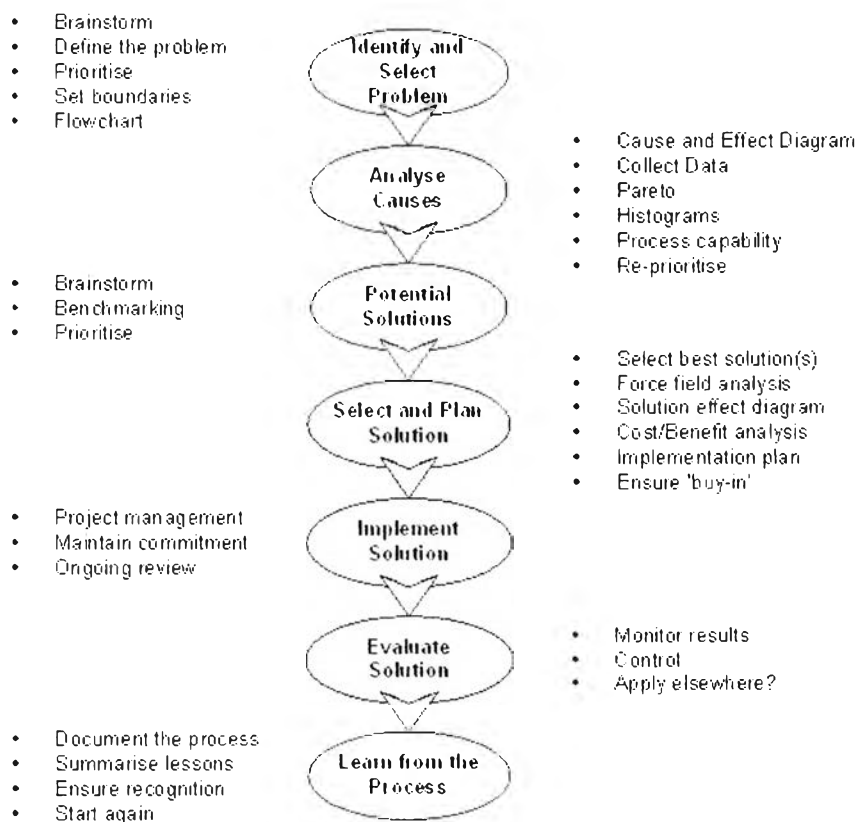


Figure 2.6 - A Quality Improvement Process

Source: WMG - Quality Management & Techniques, 2003

In order to make a sensible stab at installing a complete, workable solution in the first attempt, the series of stages must be followed closely and relatively inflexible. The reason behind this inflexibility is rather similar to all Quality issue that there is no easy path and any possible shortcuts tend to have a negative rather than positive effect on the outcome. Thus best to follow those systematic steps logically, for example, to fully define the problem before thinking in terms of solutions to avoid incomplete response to the issue. Similarly, prior implementing a solution, perform a proper planning to minimise any possible trouble that is likely to occur later in the future. Furthermore, the techniques applied at each stage (as listed beside at each stages above in the figure), are suggested as a sensible some may not be necessary in situations

The problem solving process can be implemented together with the Quality Circles (PDCA cycle). The logic behind the process remains the same but only the people take part that changed. Always remember the KISS acronym, it is the principle of “Keep it Simple, Stupid!” at all times and appropriately design suitable analysis to support the data.

Comment:

This problem solving process has been sequenced in a logical manner. The process is set up as a clear guideline and easy for the author to follow, which would be particularly useful during the 1st and 2nd phase of the thesis, where the author must somehow arrive at solution(s) for problem statement of both phases. For phase 1 and 2 of the thesis, author has in mind a similar problem solving process but as a whole still very much relies on the same logical flow. Furthermore, at each stage in the problem solving process specific problem solving tools such as Cause and Effect Analysis, and etc would be employed in order to help identify problems and formulate solutions to the problems.

2.11 Pareto's Principle: The 80-20 Rule

Theory:

In 1906, the Italian economist and avid gardener, Vilfredo Federico Damaso Pareto studied the distribution of wealth in Italy as well a variety of countries in which he noticed an unequal distribution of wealth in his country and in most countries that 80 percent of the land was owned by 20 percent of the population. Pareto later observed this noteworthy disproportion/ratio applies to other parts of life for example gardening: 80 percent of his peas were produced by 20 percent of the peapods. Pareto called this a “predictable imbalance”, which over time this concept became better known as “The 80:20 Rule”, “The Pareto's Principle”, and “The Pareto's Law”. Dr. Joseph Juran, who recognised this universal principle while working in the US in 1930s and 40s, he called this “The Vital Few and Trivial Many”. This principle of 80:20, the inverse proportion is shown below by a simple symmetry, where the smaller first part increases to the larger second part as shown by the shaded areas. Ones might quibble about the 80:20 ratios (80% to 20%) it may sometimes be 60:40 or 90:10, the most important concept of this however must be recognised and that being two individuals are inversely proportional to one another.

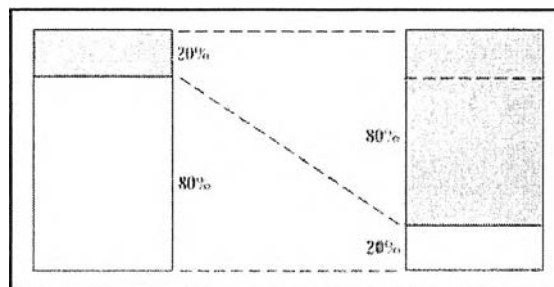


Figure 2.7 - A simple symmetry representing the 80:20 ratio

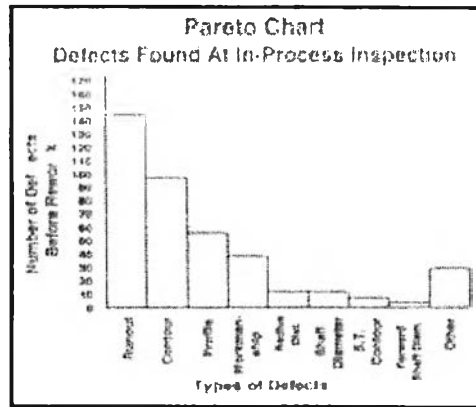


Figure 2.8 - Pareto Chart in Vertical bar graph represents No. of defects found in a process

Source: Brassard, 1996

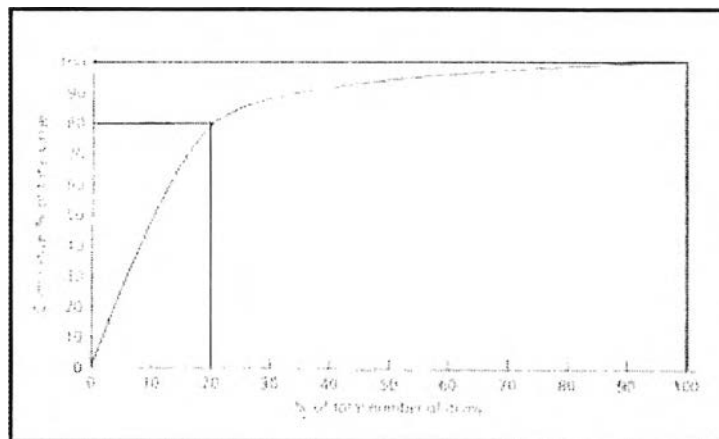


Figure 2.9 – A chart representing the 80:20 ratio

Source: Manufacturing Systems Engineering Lecture Notes, University of Hertfordshire, 1999

Such the principle has an influence to life and the samples of those instances are:

- Approximately 80% of managerial problems and headaches are caused by just 20% of the problems;
- 80% of measurable results and progress will come from just 20% of the items on daily To-Do list;
- Roughly 80% of customer complaints are initiated by just only 20% of the projects, products or services;
- Roughly 20% of the advertising will produce 80% of the campaign's results;
- Only 20% of the total numbers of items are worth as much as 80% of the total value.

Comment:

The Pareto's Principle is absolutely useful for this thesis, since the 80:20 ratio is an influential concept that guides author to focus on the 20% of the problems, which are the vital few, rather than to solve the trivial many that accounted 80% of the total problems. Pareto can be viewed from various perspectives depending on the classification or category chosen for example, frequency, costs, significant and etc. In this thesis author has to make a choice on whether to deal with the 20% of the problems that is at 80% significant but rarely occurred (e.g. the problem is found once or twice a year) or to direct concern to the problems that are less significant but occurred so often (e.g. the problem is found 20 times in a year). Given further information and time to analyse in the later chapter, author would be able to decision upon which scenario is best appropriate for the situation.

2.12 Cause and Effect Analysis**Theory:**

Kaoru Ishikawa the Japanese pioneer quality management processes in the Kawasaki shipyard was the developer of the Cause and Effect diagram, which he became one of the founding fathers of modern management. Various names that cause and effect diagram is commonly called: Ishikawa diagram, fishbone diagram or Ishikawa fishbone diagram. The diagram helps to determine the main causes and sub-causes that have resulted in an effect (symptom) or quality problem such as defects. It had been used as management aiding tool to trace customer complaints, which track down directly to the operations that were involved. However, other operations that have no bearing on a particular defect are left out from the diagram for that defect (cause).

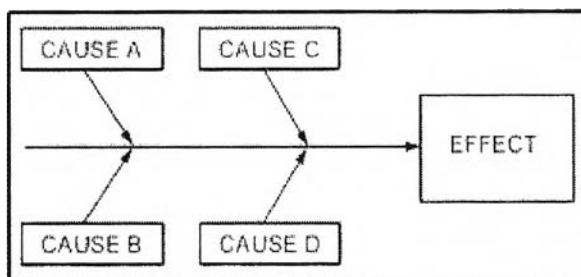


Figure 2.10 - Basic layout of Cause and Effect Diagram

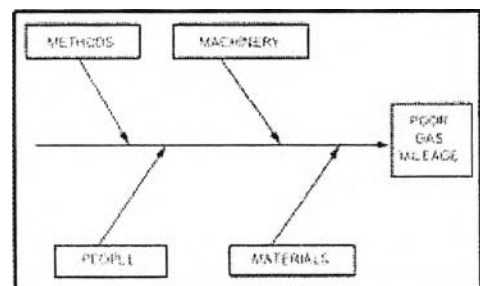


Figure 2.11 - Identify Main Categories

The construction of such diagram involves an analyst identifies all the major categories of potential causes for the quality problem. Causes in a cause and effect diagram are frequently arranged into these four default major categories: however these categories can be anything. For example, the use is with manufacturing four major categories are: manpower (personnel), methods (processes), machines, and materials; the use is with administration and service: equipment, policies, procedures, and people.

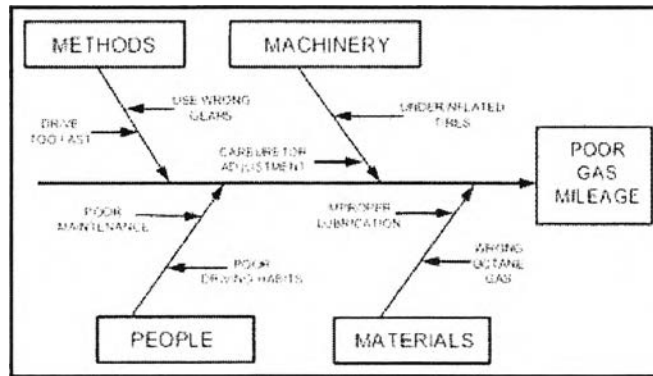


Figure 2.12 - Identify causes and influencing effect (Main Category)

Under each major category a single effect (or output/outcome) the analyst lists down the potential or real causes (or input) of the quality problem, for example under Manpower category (personnel) the suspected causes may be listed “lack of training”, “poor communication”, and “absenteeism”. Brainstorming by making list this way helps the analyst to identify and properly classify all suspected causes, which the analyst then systematically investigates the causes listed on the diagram for each major category, and update the chart as new causes became apparent. The process of constructing a cause and effect diagram calls management and worker attention to the primary factors affecting product or service quality.

Comment:

Another tool that is useful in finding out details of the various causes to an effect that graphically represented in a diagram allowing analyst (author) to see the over all picture of the causes and effect. The tool helps author to identify areas where problems are the cause to an effect. Breaking down each causes by looking in depth the variation in a process and illustrates the relationship between the outcome and all the factors that influence the outcome, in which to arrive at corrective action to be taken. The advantage of this analysis encourages participation from various functions in utilising group knowledge of the process in deriving at an agreeable solution to problems.

2.13 Why-Why Analysis

Theory:

“Why-Why” analysis is a process of asking *Why?* at least five times in a row in which it helps to structure brainstormed ideas towards the root causes of a particular problem or situation on a single diagram. This method of asking *Why?* enables the analyst to use higher order thinking skills that cuts through layers of bureaucracy to find the true meaning.

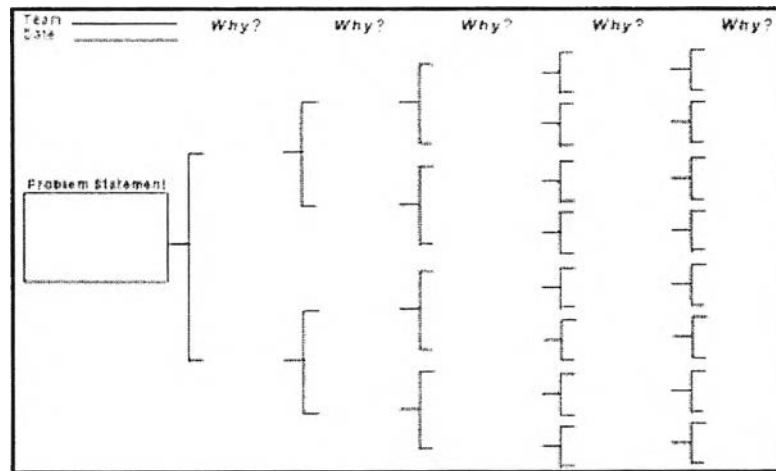


Figure 2.13 - Basic Layout of Why-Why Analysis

Source: Australian Continuous Improvement Group (2000)

Procedure to Why-Why Analysis: -

1. Identify a problem, situation to be analysed (problem statement);
2. Ask *Why?* – For example, what are the first level that causes of the problem;
3. Breakdown the resultant causes from the main problem and write on the diagram;
4. For each cause ask *Why?* again and write the next cause in the next column, linking to the previous cause;
5. Continue asking the *Why?* question until no more causes can be suggested and that analyst and those involved in the analysis are satisfied at the outcome root cause;
6. Use the causes listed at the very last level of the diagram to generate possible solutions to the cause of the problem;
7. Review data for evidence of which causes are most important and gather fresh data if necessary.

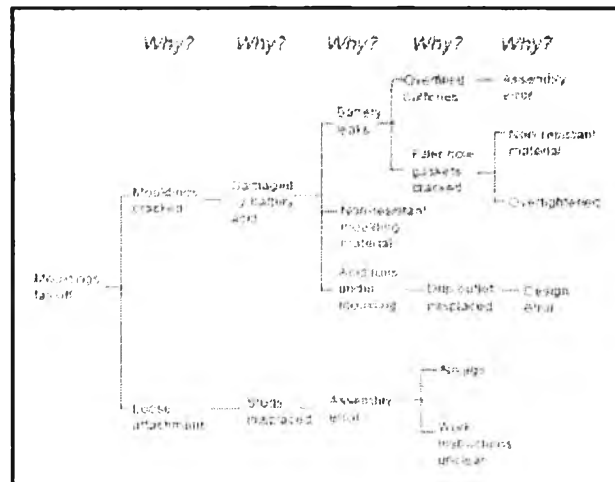


Figure 2.14 – Example of "Why-Why" Analysis

Source: Australian Continuous Improvement Group (2000)

Example of a situation using Why-Why Analysis: -

Q: Why are you taking Algebra I?

A: I have to.

Q: Why do you have to take Algebra I?

A: In order to graduate.

Q: Why do you have to graduate?

A: In order to get a job.

Q: Why do you have to get a job?

A: In order to buy the things that I want.

Root Cause: You are taking Algebra I in order to buy the things you want.

Comment:

Such an analysis has shown author a great approach to finding the main causes of a particular problem. Author can make use of this method in search for the root cause to a problem. However, to be able to complete this analysis successfully this activity must include participation from various functions because the problem statement may not necessarily situate in one function, therefore, interviewing, questionnaire and inspecting involving functions together can complete why-why analysis effectively.

2.14 The Flow Charting/Diagram

Theory:

The flow-charting (recent jargon is “process map”) is a graphic means using basic symbols to construct flow diagram depicting series of sequential activities in a process (or procedure and system). The flow-charting has become a common tool employed in a process improvement scenario. The tool is often the first step of a process improvement because it simplifies and increases the understanding of a process overview, thanks to its diagrammatic format that present the process through the use of basic shape symbols.

There are basic and detailed type of flow charting, where the basic flow depicts the overall process, while the detailed flow break down the basic flow and expand that into more details version of the flow. Both flow types are separated by the symbols used as describes below:

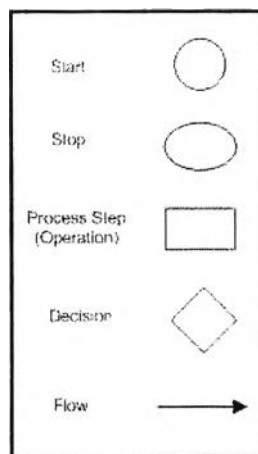


Figure 2.15 - Standard flow-charting symbols

Source: WMG - Quality Management & Techniques, 2003

1. The figure above illustrates a set of symbols that are regularly used to construct an overview picture of a process that begins with the “Start” symbol through to the “Stop” symbol, with further involvement of “Process step” and “Decision” joined by flow arrows.

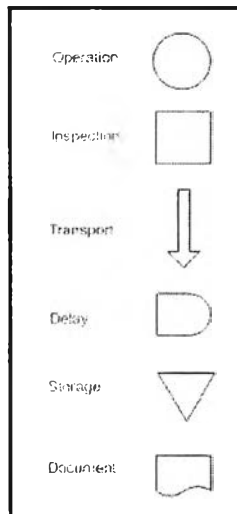


Figure 2.16 - Detailed process flow symbols

Source: WMG - Quality Management & Techniques, 2003

2. The second level is used in order to elaborate upon the first level activities that required focusing in depth detail of the process. This involves using an extended set of symbols to define the type of activities occurring in line with the categories identified in the figure above;

These charts may be used to represent any of the four basic scenarios:

1. **PERSON** recording what people actually do
2. **MATERIAL** recording how material is handled or treated
3. **EQUIPMENT** recording how equipment is used
4. **INFORMATION** recording how information flows

A few points needed to bear in mind when constructing flow chart:

- Flow charting is an activity that involves people from several functions (cross-functional activity),
- It is important to set the boundaries accurately for the process that is under investigation into a manageable size, otherwise the chart could become very complex.
- All the team members must agreed on the validity of the boundaries set forth in order to ensure that the analysis works properly.
- All data must be visible and clear to all the team members at all times,

- Allow enough time, especially for the unexpected event that may take longer than is planned and to also allow more time for additional information to be gathered,
- Review for possible errors such as:
 - Incorrect recording of facts
 - Oversimplifying assumptions
 - Factors concerning the process omitted

Comment:

The flow diagram is an activity that required multifunctional teams preparation and thus provide members understanding of the whole, as the complete process. It enables the team to clearly visualise characteristic (e.g. boundary of the system, who are involved and impacted) of the present running system. This tool would be particularly helpful for this thesis in verifying how company ABC is currently approaching the customers with problems. By monitoring the existing flow, the team can identify opportunity for further improvement on a better flow so that it can be put to place in order to reduce non-conformance product/service.

2.15 Mean, Median and Mode

Theory:

Mean or arithmetic mean is used to describe the middle of a set of data that does not have an outlier, where outlier is a data value that is much higher or lower than the other data values in the set. By calculating the mean of a set of data, you take account of the data spread. Hence mean is often referred to as the average and is given by this formula:

$$\text{Mean} = \text{Sum of the data items} / \text{Total number of data items}$$

Median is the middle value in a set of numbers when are arranged in order from least to greatest. Median is usually used to describe the middle of a set of data that does have an outlier. The median provides statisticians with a quick way of estimating the average (arithmetic mean).

Mode is the number/value/item that occurs/appears most times (also called as frequency) in a set of data. It is possible for a set of data to have no mode (when all numbers appear once), one mode, or more than one mode (when 2 or more numbers appear most). Mode is often used for so called qualitative data that is data that describes qualities rather than quantities.

Comment:

Author can make the use of one or all of these principles later on in the thesis (chapter 4), where data received back from the survey shall be processed. The processing of data would be finding out the mean, mode or median value of the question, which best answer the question.

2.16 Literature Review

Kano Method:

CENTRE OF QUALITY MANAGEMENT PUBLICATIONS (1993) has pulled together materials relating to the instruction, experience, ideas, and theories that have evolved from using Kano's methods circulating within CQM companies. They presents several concepts relating to understanding customer-defined quality based on the work of Professor Noriaki Kano of Tokyo Rika University and several of his colleagues in Japan. The concept has been implemented and practice in a number of CQM companies as part of their product development process in order to define customer requirements.

DELPHI MARKET RESEARCH, Inc., (2000) has been assisting Honeywell Corp., with the Kano portion since Honeywell's decision to outsource Kano work. Honeywell Corp. is a large manufacturer of consumer, industrial and commercial products and services, conducts extensive research on customer in order to use their requirements as an input to improve product related decisions, which is a part of its product development process. Honeywell has experimented with several processes, and several divisions that operate in commercial and industrial markets agreed to rely on what they called Market Driven Product Definition (MDPD) Process, which is a multi step research process, where one of the steps involves a Kano method survey. Honeywell uses the survey results to determine which products to develop or change, and how development resources should be allocated. At Honeywell, Kano is the method use to validate and refine two things; first, what was learned during the earlier steps in the new product development process; second, the new product development process itself.

Before Honeywell came to Kano, for several years they were using Quality Function Deployment (QFD) analysis, or otherwise also known as House of Quality (HOQ) process. However, they found that for their particular business, QFD/HOQ was not being consistently applied, so they turned to other Voice of the Customer processes, which they reckon that the future processes should provide a thorough, easy to follow logic and structure, to help ensure consistent administration of whatever techniques were used.

Honeywell realises that by combining qualitative and quantitative research, they are able to gain significant insights into their markets and to more effectively meet their customers' needs.

Servicing:

DAVIDOW and UTTAL (1989) emphasise the importance of service strategy; developing a service strategy is an essential step toward choosing an optimal mix and level of service for different segment customer to be served. Providing too little service, or the wrong kind, and customers will leave; provide too much, even the right kind, and the company will go broke or price itself out of the market.

Without a strategy they reckon that you cannot develop a concept of service to rally employees or catch conflicts between corporate strategy and customer service or come up with ways to measure service performance and perceived quality.

They further distinguish the differences between market segment and customer service segments as follows:

- a. Market segments is a broader area compare to Customer Service segment that tends to be narrower;
- b. Marketing segmentation focuses on what people and organisations need, while customer service segmentation focuses on what they expect.

JONES & SASSER (1995) reported research, which demonstrated that the case of customers' satisfaction-to-repeated purchase proportionality could be observed across five different industries; automobiles; personal computers purchased by businesses; hospitals; airlines; and local telephone services. For example: **Xerox** found that its completely satisfied customers were six times more likely to repeat their purchase within the next 18 months than customers who were merely satisfied.

NEELY (1998) refer back to organisations in the early 1980s and how they used customer satisfaction as the key to measurement thus monitored how satisfied their customers were by keeping track of the number of complaints they received. He clarifies the problem of such a measure that only one in ten dissatisfied customers complain, while the other nine simply tell ten of their friends.

Quality:

KENNETH L. ARNOLD (1994) he suggested strategy for implementation as: design control; process control; inspection and testing; document control; corrective action; and delivery.

CROSBY (1979) quoted that the real strength and value of quality engineering involves learning from the past to make a smoother future. The most non-conformance problems are preventable. In preparation to prevent problems, the best sources to information for situations that required corrective action are through the observation of actual rejections and analysis of trends.

JHAKKRIT THEPPORNPITAK (1995) this research analysed into the ISO9002 quality system implemented in an electronic parts factory from the commencement to the phase of certification. The outcome of the research given the insight to the problem to be the working form use in the studied factory. The form did not complied with the document control system ISO 9002. The author thus suggested corrective actions to prevent the problem of document control system prior to the implementation. There were 7 non-conformance items that came from the document control system. After the implementation, no non-conformance on document control was found in the next audits.

CHRYSLER, FORD, GENERAL MORTOR (1994) as part of the quality management system they adopted the continuous improvement methodology known as the "Plan-Do-Check-Act" (PDCA). It is described in ISO 9001 as:

1. *Plan* – establish objectives and processes necessary to deliver results in accordance with customer requirements and the organisation's policies;

2. *Do* – implement the processes;
3. *Check* – monitor and measure processes and product against policies, objectives and requirements for the product and report the results;
4. *Act* – take actions to continually improve the performance of process.

THANA BOON PRASIT (1994) this research is to improve the quality inspection system of incoming parts and production processes using a refrigerator factory as a case study. The author has proposed to designing and improving the document system used in the quality inspection task, setting the training courses for staffs and inspectors, and developing the performance indication and corrective action system. After implementation, the rejection of incoming parts was reduced by 22% and the quantity of the defective product using the sampling inspection was reduced by 41%.

Problem Solving:

DALE H. BESTERFIELD (1994) his view toward problem was that for every failure/s, there is/are a root cause/s and that all the cause is preventable, and that prevention is cheap. So he recommended the following as the strategy to improve upon quality:

1. Reduce failure costs by problem solving.
2. Invest in the 'right' prevention activities.
3. Reduce appraisal costs where appropriate and in a statistically sound manner.
4. Continuously evaluate and redirect the prevention effort to gain further quality improvement.

BEN SUTAROM (1995) he researched into the development of quality problem solving methods in metal parts production process for the home appliance industry. He uses the cause and effect diagram (or Ishigawa diagram) to identify the cause of each selected quality problem, set up a basic system for quality assurance. After implementation, the percentage of defective products was reduced by 81%.