



# CHAPTER I

## INTRODUCTION

### 1.1 Introduction

The changing of economics and society is leading to the changing of customer needs, especially in the business down turn of this time. Quality of product have to be changed to be able to response the requirements of customers. So, what is the quality? And how should it be to make us survive in the jungle and can grow in the future as well.

Basically, the quality was defined by many professors into many concepts. One of them is Professor Dr. Shoji Shiba, Tsukuba University in Japan and Adjunct Professor at The MIT Sloan School of Management, USA. He stated that, "In Japan, many tops company have changed the quality concepts every decade.

- 1.1.1. During the 1950s, they used "Fitness to Standard" as a quality
- 1.1.2. During the 1960s, they used "Fitness to Use" as a quality
- 1.1.3. During the 1970s, they used "Fitness of Cost" as a quality
- 1.1.4. During the 1980s, they used "Fitness to Latent Requirement" as a quality
- 1.1.5. During the 1990s, they used "Fitness of Corporate Culture" as a quality
- 1.1.6. During the 2000s, they used "Fitness for Society and Global Environment" as a quality

After World War 2, Japan had to produce the goods as much as possible (Mass Production), after Japanese got lost in the war. Then, during 1960s, customer started to interest the fitness to use of product that we called the "Consumer Revolution". At that time, marketing issue started to be involved. After that, the oil crisis during 1970s effected across world-wide, Japanese faced with that crisis and started to concern on their costing. Cost reduction was one of the solution in that time and became a main avenue in business to compensate the increased cost. Not only the cost, but the quality had to be able to satisfy customer requirements as well.

After that, Japanese Yen became stronger and made price uncompetitiveness of Japan export products. During 1980s, it has a NICS (Newly Industrialised Countries) such as Korea, Taiwan, Singapore, and Hong Kong. All these 4 countries have abilities to compete with Japan in term of businesses and quality of product. Result of that, Japanese company focus more on customer requirements. But that time, it was different from usual. Japanese went to another step of customer requirements which was called "Latent Requirement" For example, Sony Walkman and Polaroid camera are the Japanese products which they did more on Latent requirements.

During 1991-1999, Japanese companies have promoted their own company culture world-wide. They started from individual, group, department and company. That will lead to the quality of finish goods and low cost as a result. During this time, many Japanese companies increase their manufacturing bases world-wide. In the year 2000, we will face with globalization. World Trade Organisation, WTO, play a big role and will involve in the world-wide business such as an environmental issues. That will be a trade barrier for developing countries and new businesses. Now, people start to concern more on quality of product and care for their environment.

Since then, every businesses must continue to improve their product quality to suite with customer requirements. Time goes fast and requirements keep changing and now we are in the world of competition. It is not just within Thailand but region basis and global basis as a name of the game. We have to move fast and serve customer requirements whatever they change to. We can not just produce what we would like to produce, but we have to produce what customer want and require. That is the main point. Molex Thailand is being a part of this game, so we have to do something out to survive and be able to grow in the future as well.

### **1.2 Molex Thailand**

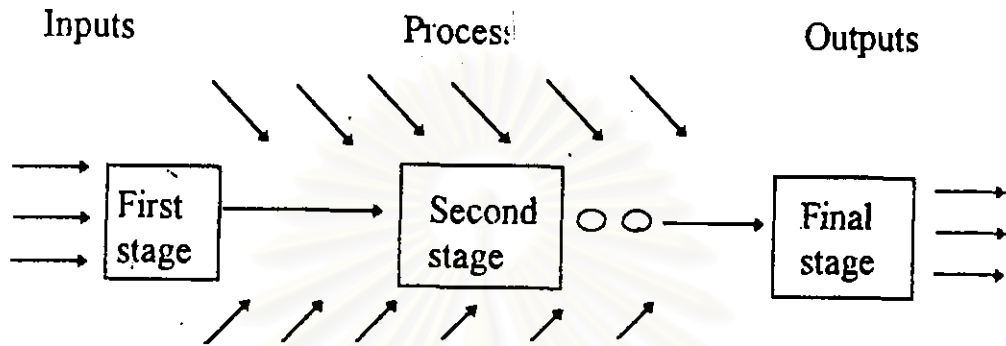
Molex Thailand is one of the country's leading connector suppliers. Through local manufacturing and value-added service as well as world-wide technology, Molex Thailand aim to be customers complete interconnection partner for the 1990s and beyond. Serving the market share since 1988, Molex Thailand today has over 300 employees at 44,500 sq. ft manufacturing facility at Bangpakong. The operations include capabilities for both connectors and value-added cable assemblies (harness wire). We provide high quality and reliable interconnection systems, when and where customers need them.

Molex Thailand is part of Molex's world-wide network of 43 factories in 19 countries on 6 continents. This network provides customers with a variety of global resources and access to the latest developments in connector technology. Along with our world-wide sales and design centres, Molex Thailand can help to determine customer global needs. At Molex Thailand, we have automated connector assembly capabilities that include a range of automatic machines equipped with on-line quality testing systems.

In addition to connector production, Molex Thailand provides value-added services such as cable assembly, approved to UL and CSA standards. This combined offering helps simplify your sourcing requirements, and saves customer time and money. Cable assembly capability in Thailand include CAD design supported by semi and fully automatic wire cutting and crimping machines, ribbon cable IDT termination tooling, and a complete range of harness testing equipment.

### 1.3 Statement of the problems

From interview with Sales Manager, it is found that quality of products still needed to be improved. Generally, the manufacturing system consists of three main parts as shown in figure 1.1



**Figure 1.1- Manufacturing system**  
(Source: Ronald D. Moen, 1991)

#### 1.3.1 Inputs

In general, the inputs are raw material, information, procedures, methods, people, skills, knowledge, training, plant, equipment and resell product

##### 1 Raw material

Raw material includes wire, terminal, pin, and housing. These material are imported from abroad and can be purchased from local suppliers. This raw material will be used for producing harness wire. Raw materials which used in Molex Thailand are shown in figure 1.2 and figure 1.3

##### 2 Information

The information refers to customer specifications and requirements

##### 3 Resell products

Molex Thailand bought some products from its subsidiaries and sold them to the customers. Resell products are products which Molex Thailand does not produce in house.

OS-1 TIN COAT ON CONDUCTOR



STR TIN DOES NOT COAT ON CONDUCTOR



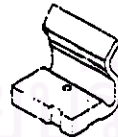
2 Terminal



3 Housing



4 Wafer



5 Pin

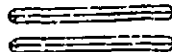
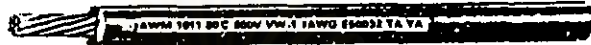


Figure 1.2- Example of raw material that used in assembling harness wire (OS-1 wire, STR wire, terminal, housing, wafer and pin)

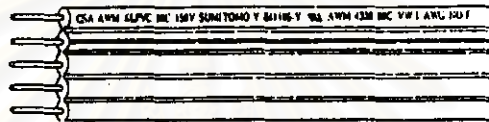
### Material

1 Wire

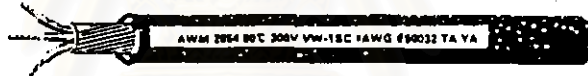
- Hook Up Wire



- Flat Cable



- Shield Wire



- Computer Cable



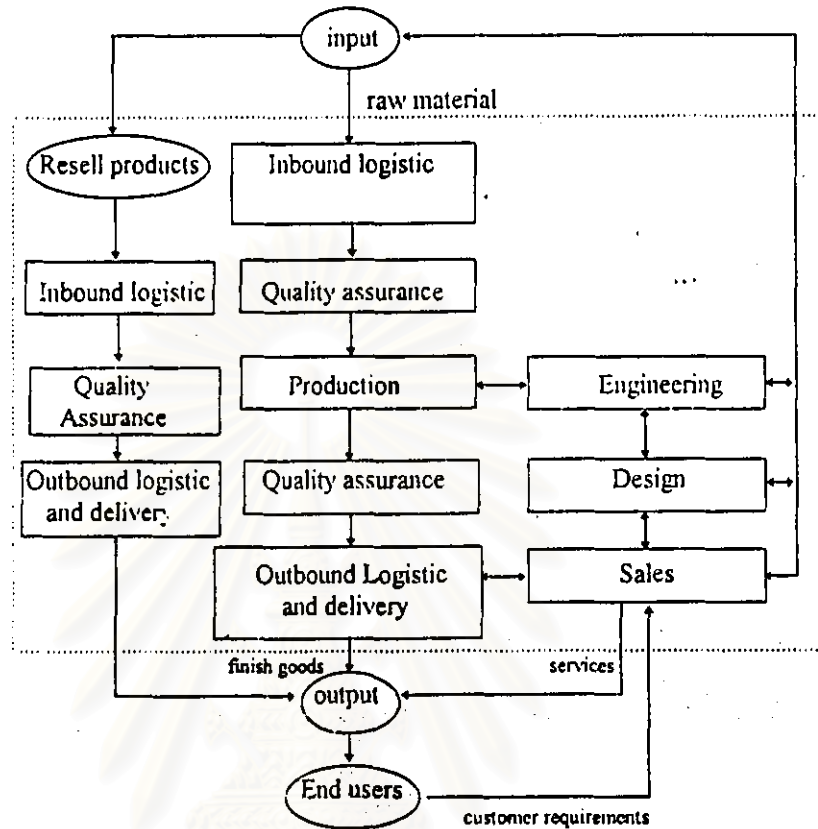
- Fiber Optic



Figure 1.3- Example of wire that used in harness wire assembly factory  
(Hook up wire, Flat cable, Shield wire, Computer cable, Fibre optic)

### 1.3.2 Process

The process is the transformation of a set of inputs into outputs that fulfil customer requirements and expectations. The process of Molex Thailand can be described in Figure 1.4



**Figure 1.4- Process of Molex Thailand**

### 1.3.3 Outputs

The outputs of process are transferred to customers. Generally, there are three kinds of outputs

#### 1 Finish products

Harness wire and connectors are finish products of Molex Thailand. In figure 1.5 show the picture of harness wire that are currently selling to customers. Not only that, connector and fibre optic cable assembly also shown in figure 1.5.

#### 2 Services

This is to help customers designing their products

#### 3 Paperwork and information

Specification is the sample of paperwork

### Products

1 Harness



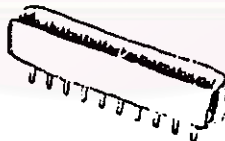
2 Process Wire



3 Telephone Jack



4 Connector



5 Fiber Optic



Figure 1.5- Example of harness wire, connector and fibre optic cable assembly



1.3.4 Examples of quality characteristics in each department that might possibly be related to the quality of the outputs.

## 1 Marketing Sales & Service

- 1.1 Time to process a customer request
- 1.2 Error in filling out dealer order
- 1.3 Overdue accounts
- 1.4 Customer complaints
- 1.5 Wrong counts
- 1.6 Customer satisfaction
- 1.7 Sales performance
- 1.8 Slow/missed delivery

## 2 Engineering

- 2.1 Time to process engineering
- 2.2 Failure time of product change
- 2.3 Number of engineering design change
- 2.4 Change request
- 2.5 Shortage of parts

## 3 Manufacturing

- 3.1 Downtime
- 3.2 Amount of scrap
- 3.3 Laboratory precision
- 3.4 Amount of rework
- 3.5 Repair time
- 3.6 Level of inventory
- 3.7 Physical dimensions
- 3.8 Cost of inspection
- 3.9 Quality outgoing
- 3.10 Employee suggestion
- 3.11 Viscosity of batch process

## 4 Administrative

- 4.1 Time to process reports
- 4.2 Telephone usage
- 4.3 Errors in accounts receivable
- 4.4 Waiting time
- 4.5 Cost of inspection
- 4.6 Transit times
- 4.7 Incoming calls
- 4.8 Time filling orders



- 4.9 Computer downtime
- 4.10 Amount of suppliers
- 4.11 Errors in purchase order
- 4.12 Clerical errors
- 4.13 Idle time of cars
- 4.14 Cost of warranty

## 5 Management

- 5.1 Number of accidents
- 5.2 Time lost by accidents
- 5.3 Turnover of people
- 5.4 Appraisal of people
- 5.5 Training and educating people
- 5.6 Cost of health care
- 5.7 Variance firm budget
- 5.8 Wasted worker hours due to the system
- 5.9 Percent of overtime

(source: Ronald D. Moen, 1991)

### 1.4 Objective of study

The objective of this research is to improve product quality of harness wire so as to fulfil customer requirement in an electronic component assembly factory.

### 1.5 Scope of study

The study will be basis on the following assumptions:

- 1.5.1 Study finish goods, in this case, harness wire will be focused
- 1.5.2 Emphasise on the improvement of manufacturing quality only in Molex Thailand

### 1.6 Study Methodology

1.6.1 Literature survey and data collection

1.6.2 Analyse previous customer complaints and investigate the current methods and procedure of quality control

1.6.3 Investigate whether the company has an appropriate corrective and preventive action for all possible potential failures due to the previous customer complaint issues and team brainstorming

1.6.4 Propose methods and procedures for reducing product quality problems for the end users

1.6.5 Perform and implement some proposed methods

1.6.6 Monitor how effective the quality output of the methods are achieved after improvement

1.6.7 Compare the selected criteria before and after improvement

1.6.8 Modify the product quality improvement procedure as the proposed standard

1.6.9 Write and review report

## **1.7 Expected Benefits of the study**

1.7.1 To reduce customer complaints of harness wire for the end users

1.7.2. To reduce quality criteria which are the main quality problems in Molex Thailand

1.7.3. To have an appropriate standard procedure for product improvement

## **1.8 Organisation of the report**

Chapter I covers the introduction of this thesis. In chapter II introduces the related theoretical concepts that applied in this thesis. In chapter III investigates and analyses the customer complaints and chapter IV show the current methods of quality control in Molex Thailand.

Chapter V present the proposed method for product quality improvement and chapter VI show the implementation of FMEA technique. Then the evaluation of results were provided in chapter VII. Chapter VIII present the product quality improvement standard procedure and conclusion. Recommendations were provide in Chapter VIII.