UNIVERSITI PUTRA MALAYSIA

A CASE STUDY:
CHAMPION PHOTOCHEMISTRY (M) SDN BHD

GAN BOON TING

GSM 1997 5

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CHAMPION PHOTOCHEMISTRY (M) SDN BHD

BY:
GAN BOON TING
MATRIC NO: 45173

A CASE SUBMITTED TO THE FACULTY OF ECONOMICS AND MANAGEMENT, UNIVERSITY PUTRA MALAYSIA, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DRGREE OF BUSINESS ADMINTRATION.

NOVEMBER 1997

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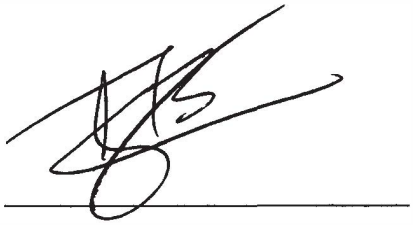
DISCLAIMER

I here by certified that this case study is a piece of my original work.



GAN BOON TING

(45173)

DATE : 3rd JANUARY 1998

ACKNOWLEDGEMENT

I would personally like to express my sincere thanks to the followings:-

Associate Professor Dr. Zainal Abidin Mohamed for his expert guidance, encouragement, my wife, Piang Sin for her utmost tolerance, continuous support and encouragement all these years, and lastly; Chiam Peng Ming for her tireless help with the personal computer.

ABSTRACT

The objectives of this case study is to appreciate the application of Statistical Process Control method and effective operation tools to facilitate the improvement of chemical processes in Champion Photochemistry (M) Sdn Bhd.

The industry of photochemical is facing intense competition from all angles:-

1) Higher customer demand.

2) Technology change

3) Stiff competition

4) Short product life cycle.

In this instance, in order to survive in the market place, continuous improvement activities and products innovative programs ia a necessity for the company.

PART I : CASE TEXT

1.0 INTRODUCTION

"Tan, I want to show you the statistic on our company's broad range of products and sales mix between 1992 till 1995. (As Table A). Despite of overall performance for the last 4 years was very encouraging. The company turnover in 1994 has decreased by 18%. Please go back and analyse the problems and expedite to improve the sales in 1995." brief by Dr. Philip.

The above was an extract of Dr. Philip (Company MD) briefing on 31st December 1995 during the Management meeting attended by his operation manager, Mr. Tan and his production and sales manager.

Further to the comments of Dr. Philip on 31st December 1995, an investigation team which was headed by Mr. Tan (Operation Manager) was formed. The team found that the decreased of sales in 1995 was mainly due to Champion's photochemicals quality and pricing were not competitive in the market.

The problems had been identified as follow:

(i) Low productivity of intermediate product in the reaction process.

(ii) Long pulverization time in the milling process.

(iii) High number of correction operations in the mixing process.

Due to the low productivity of intermediate product in the reaction process, the quality of end products were inconsistent. For instance, from January 1995 to January 1996, there had been 8 cases of customer complaints that the chemical strength of Product Q was poor compared to previous years. According to their feedback, the chemical strength of Product Q had been decreased by about 20%.

On top of this, the lumps formed during milling and high number of correction operations in mixing process have increased the production operating cost, due to low productivity and necessitating large numbers of analysts and large stock of intermediate products. Mr. Tan was then given the task to solve these problems in three weeks time.

	1992		**1993**		**1994**		**1995**	
Product Category	**RM '000**	**%**	**RM '000**	**%**	**RM '000**	**%**	**RM '000**	**%**
Colour	3,857	80.0	5,957	75.0	13,928	80.0	11,207	78.5
Graphic Arts	723	15.0	1,430	18.0	1,982	11.4	1,854	13.0
X-ray	241	5.0	556	7.0	1,500	8.6	1,210	8.5
Total	**4,821**	**100.0**	**7,943**	**100.0**	**17,410**	**100.0**	**14,271**	**100.0**

Table A: CPM Range Of Products And Sales Mix From 1992 To 1995

1.1 Company Milestones

The company involved in this project paper is CHAMPION PHOTOCHEMISTRY SDN. BHD. (A member of Champion Chemtech Limited - Canada). Champion Photochemistry Sdn. Bhd. is a company involved in manufacturing and distribution photographic processing chemicals in Asia (Please refer to Appendix page 1 and 2 for Champion Photochemistry milestone details).

CHAMPION PHOTOCHEMISTRY SDN. BHD. (CPM) was established in Kuala Lumpur, Malaysia in 1991 which is strategically positioned on Asia. It was the world's only producer of prepared photographic processing chemicals on 4 continents - North America, Europe, Asia and Africa. They were supported by CHAMPION PHOTOCHEMISTRY LIMITED (Canada), CHAMPION PHOTOCHEMISTRY INTERNATIONAL LIMITED (UK) and CHAMPION PHOTOCHEMISTRY PTE. LTD. (South Africa) respectively.

CPM had a factory with a built up area of 30,000 ft2, in Kepong light industry area, Kuala Lumpur. The factory is equipped with 4 United State's modern and sophisticated mixing and packaging lines which can produce up to 600,000 tons of photochemicals per month.

Between 1992 till 1995 total sales of CPM's products recorded a mean annual growth of 49.0%. Export sales average 90.5% of total sales.

1.2 Company Activities and Products Line

Its main business activity was to manufacture and distribute photographic processing chemicals, to meet the needs of photo (colour chemicals), graphic arts, x-ray and electronic customers. Basically, the company's main products line were:

(a) Colour photographic chemicals:

(i) Film

(ii) Paper

(b) Graphic Arts Chmicals

(c) X-ray Chemicals

1.3 Global Performance

Overall, CPM products were distributed in over 80 countries of which 26 countries in Asia region were supported by CPM. The customers ranged from small mini photo labs to mass merchandisers, including professional photo studios, national newspapers, international fashion magazines, world renowned hospitals and electronic industry. (Please refer to Appendix page 3 for distribution countries details).

2.0 COMPANY'S OBJECTIVES

Numerous organisations in Malaysia were jumping onto the bandwagon to improve the quality of their products and services. Improving quality was the ultimate long term winning strategy in today's high competitive business world. Various empirical studies showed a strong positive correlation between quality and profitability.

There was numerous reasons why CPM felt the need of quality and productivity improvement in its company. "As far as we are concerned there are four major reasons why CPM did this," explained a senior manager in CPM. The four reasons given were:

(a) *Higher Customer Demand*

- In general, a business's success depends on the accuracy of its perceptions of customer expectations and its ability to bridge the gap between consumer expectations and operating capabilities. Consumers are much more quality - minded now than in the past and in many cases prefer to spend more for a product that last longer or a service that is delivered promptly and thoroughly. A survey by Strategic Planning Institute of Cambridge Massachusetts indicated that a high-quality product has a better chance of gaining market share than does a low quality product.

- The 'product-out' era, in which anything made could be sold has now passed, and satisfying the requirements of the market place (the market-in approach) has become a categorical imperative.

(b) *Technology Change*

The most dramatic force shaping people's lives is technology. Every new technology is a force for industry company to continuous improve their products and services. The high accelerating pace of technological change in photo finishing industry on:

➢ *Processing Time Change*

One hour ⟶ 30 minutes ⟶ 17minutes ⟶ 10 minutes

➢ *Odor Improvement*

Odor ⟶ Odor free ⟶ Fresh air-included

➢ *Material Change*

Conventional film ⟶ APS film ⟶ Digital (without film)

had created a major force for photofinishing industry to continuous improve their products and services in order to survive in the market place.

(c) *Stiff Competition in Chemical Industry*

Due to the stiff competition (both domestic and global) in productivity, quality and time, CPM is aggressively seeking better ways to operate their manufacturing processes system. The philosophy of quality improvement activities seeks ways to improve operations. It means selecting valid performance measures, getting internal and external feedback on current performance, setting goals for future improvement and enlisting everyone in the change process. On top of this, the changes or improvement of new technology in analytical equipment such as NMR, UV and chromatographic equipment has also directly increased the chemical products initiation rate. In this instance, in order to survive in the market place, continuous improvement activities and products innovative programs is a necessity for the company.

(d) *Short Product Life Cycle - Photofinishing Products*

Products and markets have life cycles that call for changing marketing strategies over time. Every new need follows a demand life cycle that passes through the stages of emergence, accelerating growth, maturity and decline. As such for short product life cycle -photofinishing products, CPM force to seek innovative strategies to renew sales growth, including market, product improvement and marketing-mix modification. CPM must try to anticipate new attributes that the market wants. Profits go to those who introduce new and valued benefits early.

Based on the above market situations, the company's main objective is to develop a photochemical manufacturing business well positioned in targeted global markets and ensure that their customers are enjoying high quality products with most competitive price.

3.0 QUALITY AND PRODUCTIVITY IMPROVEMENT ACTIVITIES

3.1 Resistance From The Workplace

Another CPM manager said that:

"CPM had encountered strenuous objections from all workplaces on starting their improvement activities. The three main reasons for this resistance included; firstly, we've always done things properly in our department that's why we have been able to go on producing the product. We don't need these activities now. Secondly, our technology is very specific and our production methods are also highly specialized. Generalized approaches like quality don't apply to us and finally, do these activities really give good results? If so, give us some concrete examples. We'll join in if we can see the benefit."

"These three objections had been classified as 'The Three Initial Objections'. Those in charge of promoting improvement activities must use patient persuasion to overcome them and change the atmosphere in the workplace" elaborated the manager.

3.2 Starting Quality Improvement Activities and Setting Goals

As discussed above, there was deep-rooted resistance from the workplace. However, CPM judged that careful review and observation of individual workplaces from the quality control viewpoint would reveal any number of items requiring improvement.

In fact, the more a workplace protested that it was doing things properly, the lower its level of control seemed to be.

To break the deadlock, CPM decided to invite an outside consultant to promote the improvement activities and charge him with giving specific guidance on how to proceed. Although CPM aimed to evolve the activities company-wide, they thought that trying to introduce them into all their division right from the start would only invite confusion. CPM, therefore, adopted a policy of concentrating on one particular workplace in the first phase of improvement with the intention of identifying, the results obtained and using them as a 'success story' to persuade other areas to take part. CPM could then gradually and steadily expand the activities throughout the whole company.

CPM was also to establish quality and productivity improvement programs as top priority and demonstrate management commitment to it. In the words of Philip B. Crosby, "the key to quality is having management understand that they are the problem." For this instance, top management must formulate a strategic quality plan, provide resources for quality improvement, select quality and productivity improvement projects, monitor quality performance and "walk the talk".

After careful discussion with the consultant, CPM decided to choose a certain Graphic Arts chemical line for the first phase, specifically targeting one of its products, Product Q (see Figure 3).

In their first session with the consultant, the following recommendations were made:

a) Conduct orgnisation quality awareness programs to gain employee support for quality and productivity improvement efforts and reducing potential resistance to change.
b) Clearly distinguish between production defects and product defects.
c) Pay close attention to quality control of raw materials.
d) Collect data, stratify and perform process analysis.
e) Find out the causes of process variation, streamline all material flows and reduce in-process idle stocks.
f) Institute comprehensive controls of everything from raw material through production, packaging and outgoing inspection to distribution and strengthen the problem solving function.
g) Promptly identify the causes of customer complaints and take permanent countermeasures to prevent their recurrence.
h) Identify customer's requirements. Market research must be undertaken to determine the needs and expectations of customers.

In response to the above recommendations, the following goals were set:

Goals

Over the next 2 years,

- reduce the variation quality to 3% of its present value and increase the yield by 5%.
- reduce production defects and completely eliminate in-process idle stocks.
- reduce the number of correction operations required in the mixing process to one.

3.3 *Improvement Sequence*

Approximately 30 different Graphic Arts chemicals were made in the plant. Pareto diagrams showing the number of customers' complaint and the financial losses sustained for each product for the year from January 1995 through January 1996 gave the result shown in Figure 1 and 2.

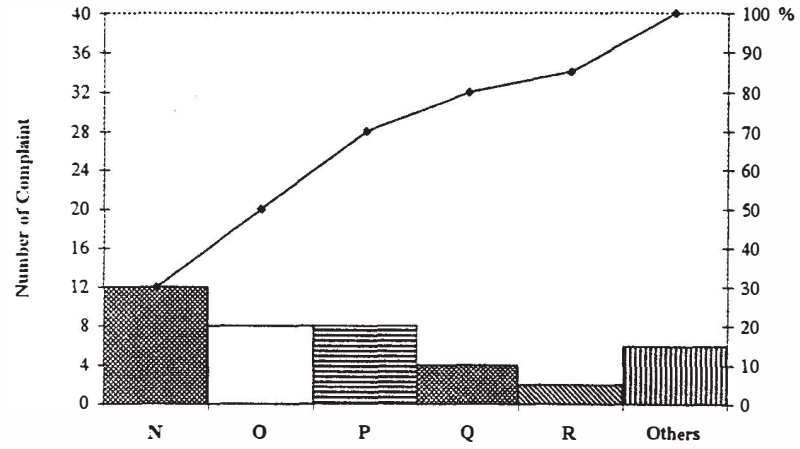


Figure 1 : Occurrence of Production Problems

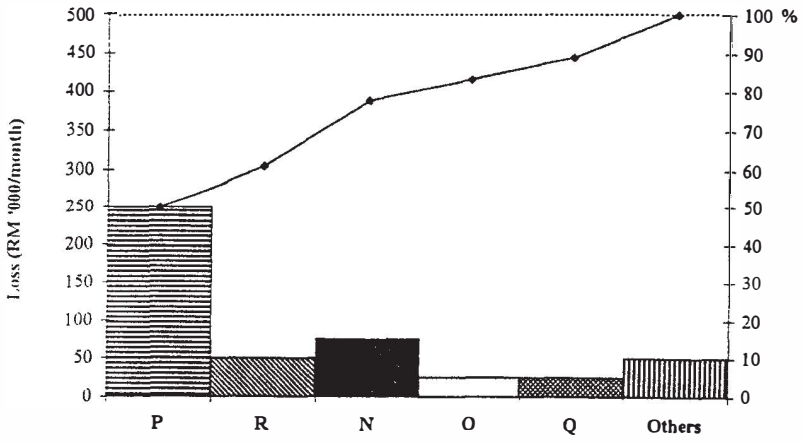


Figure 2 : Financial Losses Due To Production Problems

The figures show that Product Q was facing the biggest losses, and it was therefore picked out as target for improvement.

3.4 Production of Product Q

Figure 3 is a production flow diagram for Product Q. A reduction reaction is carried out using the bought-in raw material RM_1 and RM_2, and an addition reaction is then performed with the addition of reactant RM_3 and yielding intermediate An Antiflocculant RM_4 is then added and the product is ground to an ultrafine powder in a wet type mill. The fine-ground intermediate A is then added together with an additive RM_5 to fix quantities of other intermediates X, Y and Z obtained by similar processes to give a mixed product with the required powder characteristics (flow properties, etc).

The mixing is adjusted by adding A in small amounts, and the product thus obtained is weighed into 2.5kg batches by an automatic filling machine, packed into vinyl-lined cardboard cartons and shipped as Product Q.

During the first round of improvement programs, the members were to concentrate on the following items:

(a) Improving the productivity of intermediate A in the reaction process. (A flow diagram of reaction process is as shown in Figure 4).

(i) Improving the quality and productivity (Yield Y_1) in the reduction reaction.

Existing Problems

- From January 1995 to January 1996, there had been 8 cases of customer complaints that the chemical strength of product Q was

Production of Product Q

	Section	Production Block Diagram
Raw Material	Purchasing	RM_1 RM_2 RM_3 RM_4 RM_5
Intermediates Production	Production Section 1	Reduction Reaction
	Production Section 2	Addition Reaction
Conversion to Final Product	Production Section 3	Intermediate Product A; Wet Type Milling; X Y Z; Mixing
	Production Section 4	Weighing Filling & Packing; Product Q
	REMARKS	In the production process for Product Q, (i) there were many production problems (ii) the yield was low and very variable

Figure 3 : Production Flow Diagram for Product Q

The Reaction Process *(Reduction and Addition Reaction)*

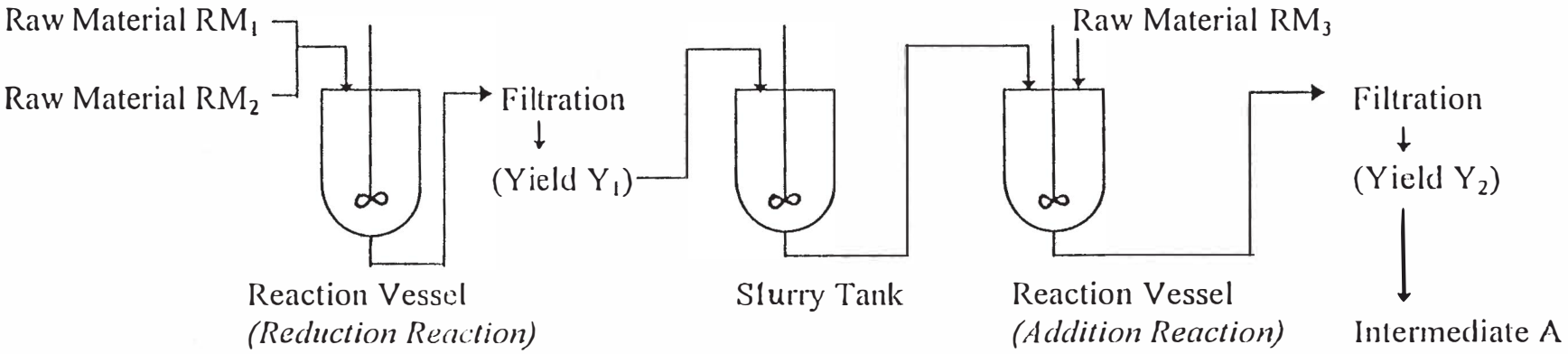


Figure 4 : Flow Diagram of Reaction Process

poor compared to previous years. According to their feedback, the chemical strength of product Q had been decreased by about 20%.

- From the trend in productivity of Yield Y_1 from April 1995 to March 1996 (as Figure 5), it shows that Yield Y_1 exhibited a tendency to decrease when the manufacturer of raw material RM_1 was switched from K_2Co_3 to Na_2Co_3 in July 1995. (Cost saving of RM25.00/kg on RM_1 raw material).

(ii) Improving the quality and productivity (Yield Y_1) in the reduction reaction.

Existing Problems

- There was a large variation in the addition reaction Yield Y2 from September 1995 to March 1996. (See Figure 6).

(b) Reducing of the pulverization time (A flow diagram of pulverization process is as shown in Figure 7).

Existing Problems

- Lumps formed during Intermediate A and Antiflocculant RM_4 reaction has caused the grinding time became extremely long and some of the products had to be discarded.
- Very time consuming to achieve the specified particle size, and the time varied from one batch to the others.

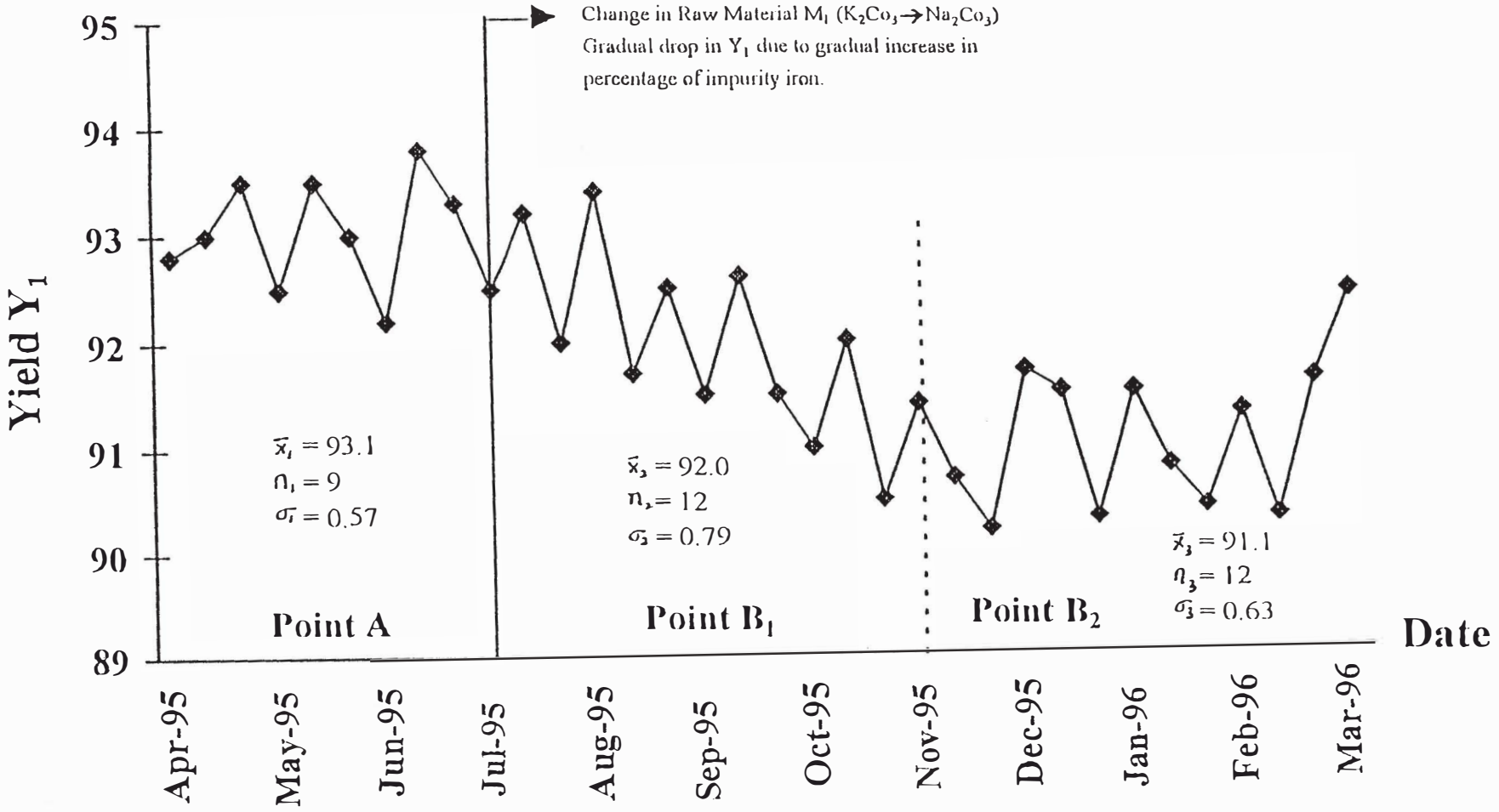


Figure 5: Tend In Yield Y_1 From April 1995 To March 1996

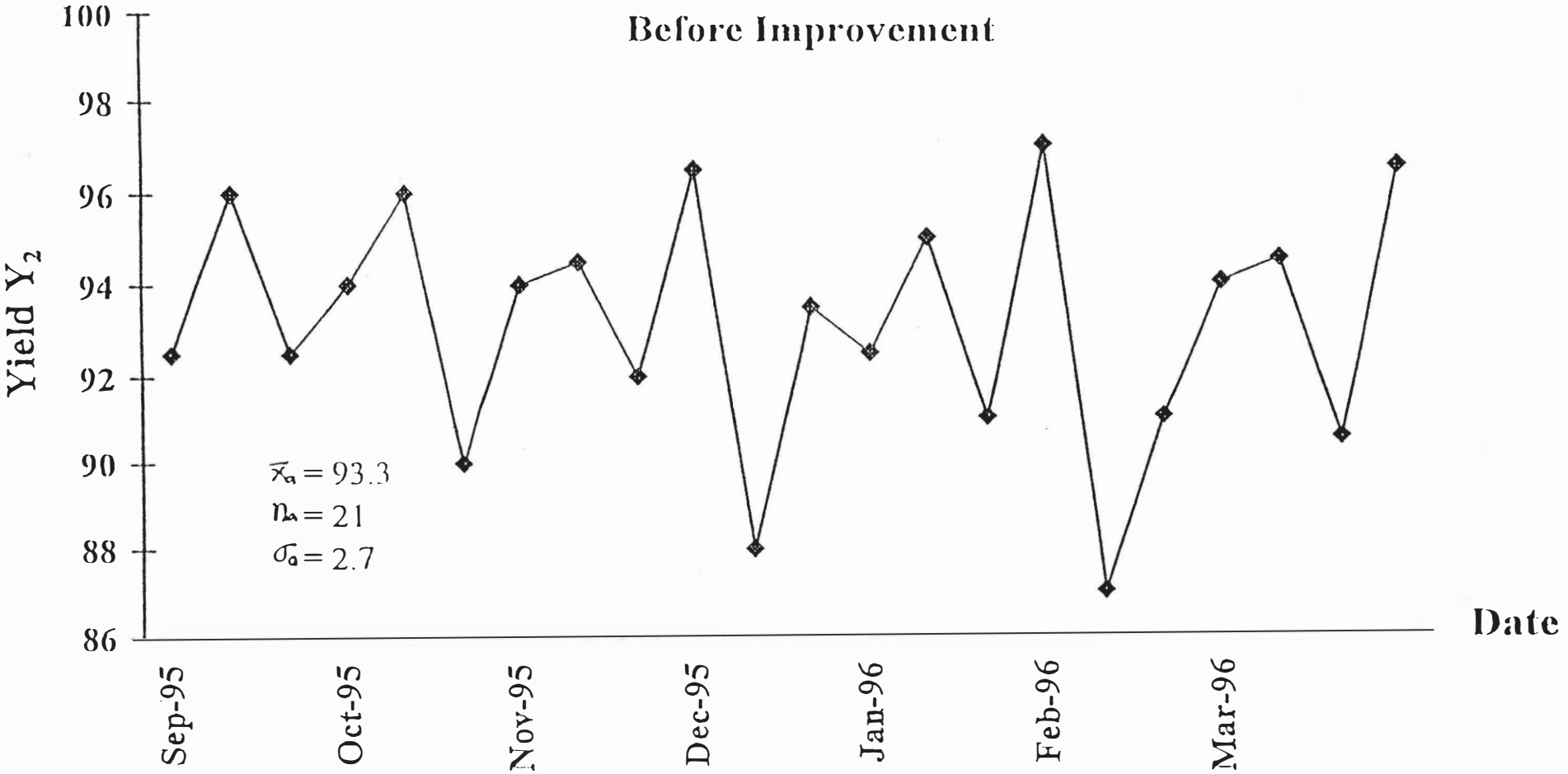


Figure 6: Tend In Yield Y_2 From September 1995 To March 1996