



Title: Evaluation and Improvement of the Customers Satisfaction at the PSU Cafeteria

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Abstract: The team selected different parameters discussing with the actual manager of PSU cafeteria and customers to know which were critical process. Statistical analysis was chosen. The team surveyed 75 customers in order to evaluate their perception of the quality of the food of the cafeteria. Moreover, we compute data regarding the number of people waiting on line at rush hours. The rush hours were indicated by the cafeteria personnel to be at lunch time and dinner time.

**Evaluation and Improvement of the
Customers Satisfaction at the PSU
Cafeteria**

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EMP-P9410

EMGT - 510

TOTAL QUALITY MANAGEMENT II

TERM PROJECT

**EVALUATION AND IMPROVEMENT OF THE
CUSTOMERS SATISFACTION
AT THE PSU CAFETERIA.**

PRESENTED TO : DR RICHARD DECKRO

JUNE 3, 1994.

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INTRODUCTION

The PSU cafeteria offers a diversity of food from 7:00 AM to 8:30 PM and serves more than 4,000 customers every day. Quality has become a major concern to satisfy every customer's needs. The meals are either prepared by the cafeteria personnel or bought outside and resold. The food is either hot, and therefore prepared in front of the customer or cold and on a self-serve basis. The cafeteria will be managed by a private company at the beginning of Fall 1994. In order to give this company an overview of the quality of the cafeteria (food, cleanness, friendliness, speed), for a better satisfaction of the customers, we analyzed the needs and desires of the customers.

We selected different parameters discussing with the actual manager and customers to know which were critical.

We chose to use a statistical analysis. We surveyed 75 customers in order to evaluate their perception of the quality of the food of the cafeteria. Moreover, we compute data regarding the number of people waiting on line at rush hours. The rush hours were indicated by the cafeteria personnel to be at lunch time and dinner time.

OBJECTIVE

We are to examine the quality of the customer's satisfaction with the PSU cafeteria, identify the specific areas where improvement is needed, and specify to the management which elements are required to be improved, and recommend methods of implementation.

DESCRIPTION OF THE PROCESS

We have divided the customer's satisfaction associated with the quality of the cafeteria operation into two segments. The first segment represent the quality of the food and the service. The second segment is the flow of the customers through the cashiers lines. This segment is critical because students, who are the major customers of the cafeteria, have limited time to buy and consume their food. Therefore, fast service is one of the most important factor which the cafeteria must performed.

Process Definition to measure the people in line:

The number of people in line at any given time is the measure of the process in this case. For instance, if four people are in line, then the person at the end of the line has a total of three people in front of him. Even though the process has a significant number of variables (as with many processes), this indicator is still real. That is, no matter what the variables, that individual at the end of the line still has three people in front of him.

Some of the large variables are:

1) After the number of people in line reaches a certain number, an additional cashier begins collecting money, lowering the maximum number of people in line instantaneously.

2) Class schedules; That is, certain times during the evenings, more classes are letting out, starting, or on break, causing surges in the number of people being served by the cafeteria.

3) Human variability; That is, it became obvious early on that different operators collected money at significantly differing speeds, causing variation in the process.

The number of people in line was defined as: At the time of sample, what was the number of people waiting to have their money collected, in the longest line, including the person paying at that time.

Goal:

The goal of monitoring the process at the cash register was to determine the capability of the process, as it is presently designed, to meet customer expectations.

This was done in several steps:

- 1) Conduct a study of the process using control charting techniques.
- 2) Determine the specification through customer interviews.
- 3) Determine whether or not the process is in statistical control.
- 4) Calculate the capability index of the process.

Description of the sampling process to measure the number of people in line:

We selected two periods considered as rush hours to get our data. The number of cashiers varies according to the number of employees available and the time period so we wrote down the number of people waiting in the longest

line at the busiest cashier. Because we want to improve the waiting time, we voluntarily selected the worst scenario.

The test intervals are described below:

Lunch Time	{	11:30 a.m.	Every minute for 5 minutes (5 data points).		
		11:45 a.m.	"	"	"
		12:00 noon.	"	"	"
		12:15 p.m.	"	"	"
		12:30 p.m.	"	"	"
		12:45 p.m.	"	"	"
		1:00 p.m.	"	"	"

Dinner Time	{	5:30 p.m.	Every minute for 5 minutes (5 data points).		
		5:45 p.m.	"	"	"
		6:00 p.m.	"	"	"
		6:15 p.m.	"	"	"
		6:30 p.m.	"	"	"
		6:45 p.m.	"	"	"
		7:00 p.m.	"	"	"

The data were then recorded on control chart. Five data points (5 minute period) per column. Three sampling were performed for each time period, so we finally came up with 21 observations (with a sample size of 5) for each meal.

Process Definition to measure the quality of the food :

The quality characteristics used to measure the customer's satisfaction are as the following :

- Freshness of the food
- Availability of the food
- Prices
- Variety
- Taste

Was the food as expected. (for example, expected hot food ... was hot, etc.)

Quality of the service

Cleanness of the premises.

The survey form we used is shown on figure 1.

Method of sampling.

The cafeteria receives an average of 4000 customers per day. We surveyed 75 customers to collect data to measure their satisfaction with the quality characteristics mentioned above. We interviewed 75 people who were sitting in the cafeteria at lunch and dinner time. There was no specific plan in selecting the sample. Thus, data was collected using convenience sampling method.

The people being surveyed were asked to rank each of the quality characteristics from very bad, bad, okay, good and very good. All of the characteristic were considered of the same level of importance. The sheet used for collecting the data is attached.

OUTPUT AND RESULTS

Number of people in line:

Noon rush:

There are large variations in each sample (fig. 2), the process was not in statistical control.

The average (number of people in line) was: 3.0

The Upper Control Limit was: 4.8

The Lower Control Limit was: 1.3

SURVEY FORM

Type	1= Very Bad	2= Bad	3= Okay	4=Good	5=Very Good
Freshness					
Price					
Taste					
Cleanness					
Service					
Variety					
Availability					
As expected					

Cashier, no. of people in front	
How many is acceptable	

7

Figure 1



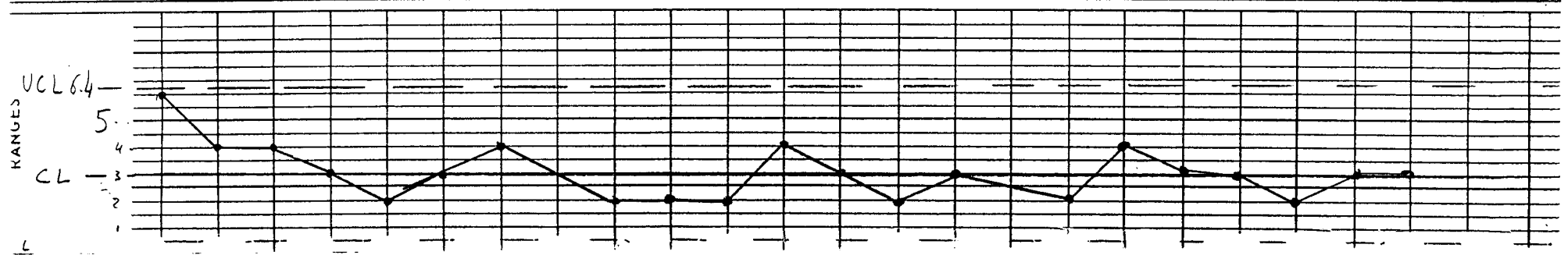
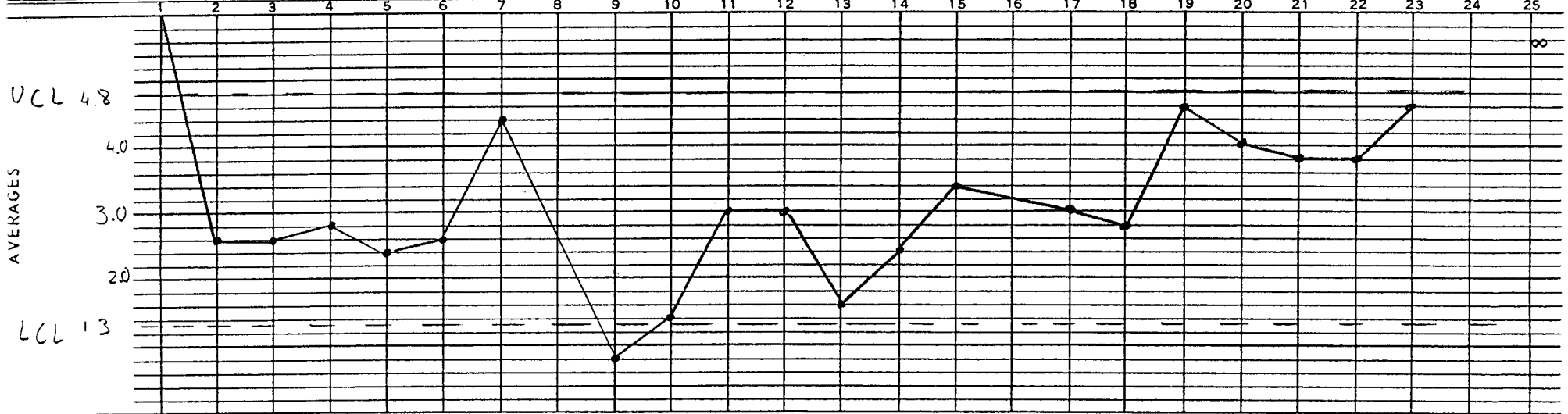
VARIABLES CONTROL CHART (\bar{X} & R)

- Fig 2 -

PART NO. _____	CHART NO. 1
SPECIFICATION LIMITS	

PART NAME (PRODUCT) # People in line (PSU cafeteria)								OPERATION (PROCESS) Waiting time at the PSU's Cafeteria's Cashier											
OPERATOR Nicolas RENAUD				MACHINE				GAGE				UNIT OF MEASURE Nb of People				ZERO EQUALS ∅			

DATE	5/13/94							5/16/94							5/17/94							
TIME	11:30	11:45	12:00	12:15	12:30	12:45	1:00	11:30	11:45	12:00	12:15	12:30	12:45	13:00	11:30	11:45	12:00	12:15	12:30	12:45	1:00	
SAMPLE MEASUREMENTS	1	6 1/2	5 1/2	5 3/4	3 3/4	2 3/4	1 1/2	3 1/2	1 1/2	2 1/2	3 3/4	1 1/2	2 1/2	3 1/2	3 1/2	4 1/2	5 1/2	6 3/4	3 1/2	3 1/2	1 1/2	5 1/2
	2	6	1	1	3	3	1	3	0	2	3	4	1	2	4	3	2	3	5	2	4	4
	3	12	3	1	4	3	4	5	1	0	4	5	0	3	2	2	1	5	2	2	3	5
	4	6 1/2	3	2	3	1	3	4	2	1	3	3	3	1	5	3	4	5	2	4	2	3
	5	6	1	4	1	2	4	7	0	2	2	2	2	3	3	3	2	4	3	3	4	6
SUM	36	13	13	14	12	13	22	4	7	15	15	8	12	17	15	14	23	15	14	14	23	
AVERAGE, \bar{X}	7.2	2.6	2.6	2.8	2.4	2.6	4.4	.8	1.4	3	3	1.6	2.4	3.4	3	2.8	4.6	3	2.8	2.8	4.6	
RANGE, R	6	4	4	3	2	3	4	2	2	2	4	3	2	3	2	4	3	3	2	3	3	
NOTES																						



Evening rush:

Although there are large variations in each sample (fig. 3), the process was determined to be in statistical control.

The average (number of people in line) was: 2.35

The Upper Control Limit was: 4.52

The Lower Control Limit was: 0.18

Specifications obtained through customer interviews:

Customer interviews were conducted and the specification for the maximum number of people in line was determined. According to the data, only 3 out of 75 people interviewed (4%), said that 2 or more people in line in front of them was the maximum acceptable. Based on this data, the maximum number of people in line acceptable was determined to be 3, since the person at the end of the line would add an additional person to an outside monitor.

Result of the survey:

How many people is acceptable before you at the cashier	1	2	3	4	5	6	7	8	9	10
Frequency of the answer	3	19	26	15	6	3	1	1	0	1



VARIABLES CONTROL CHART (\bar{X} & R)

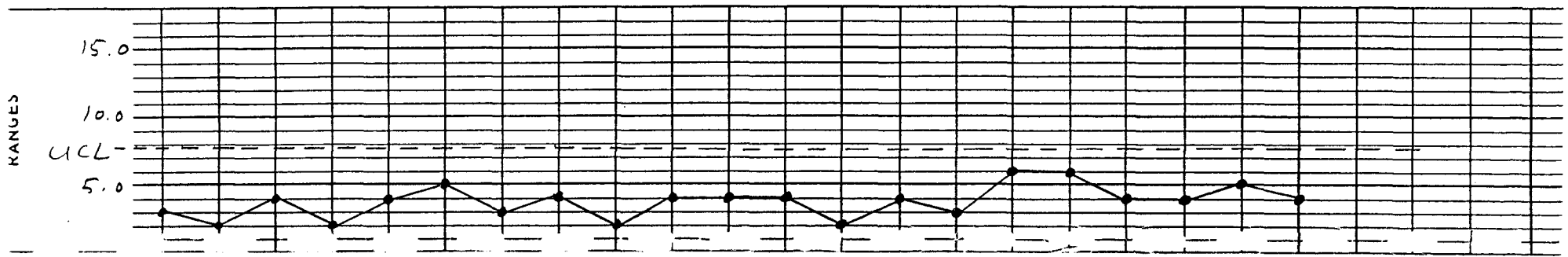
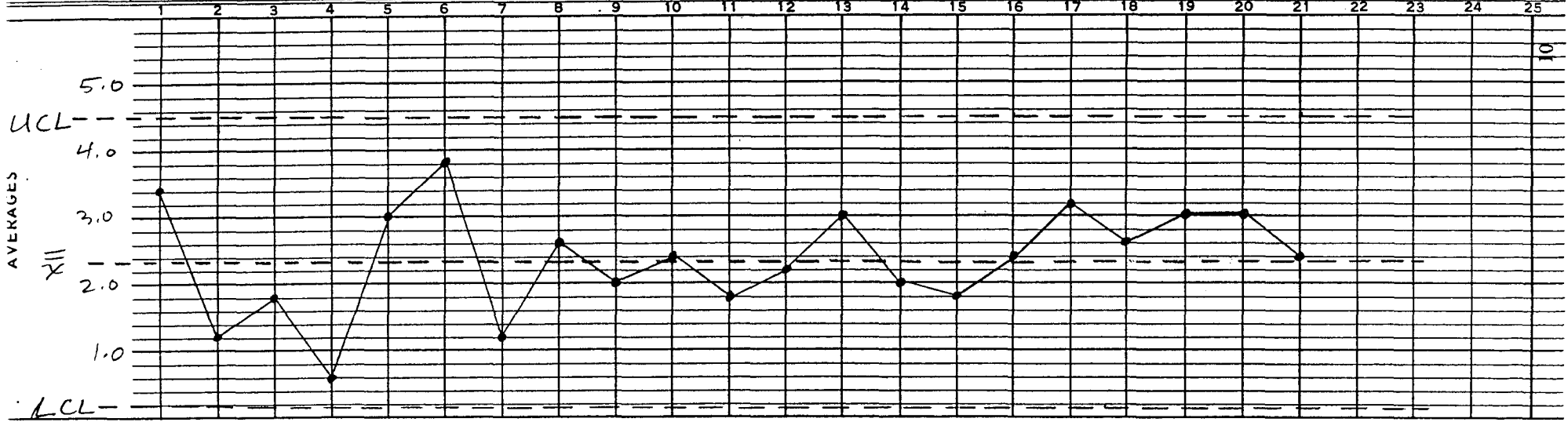
- Fig 3 -

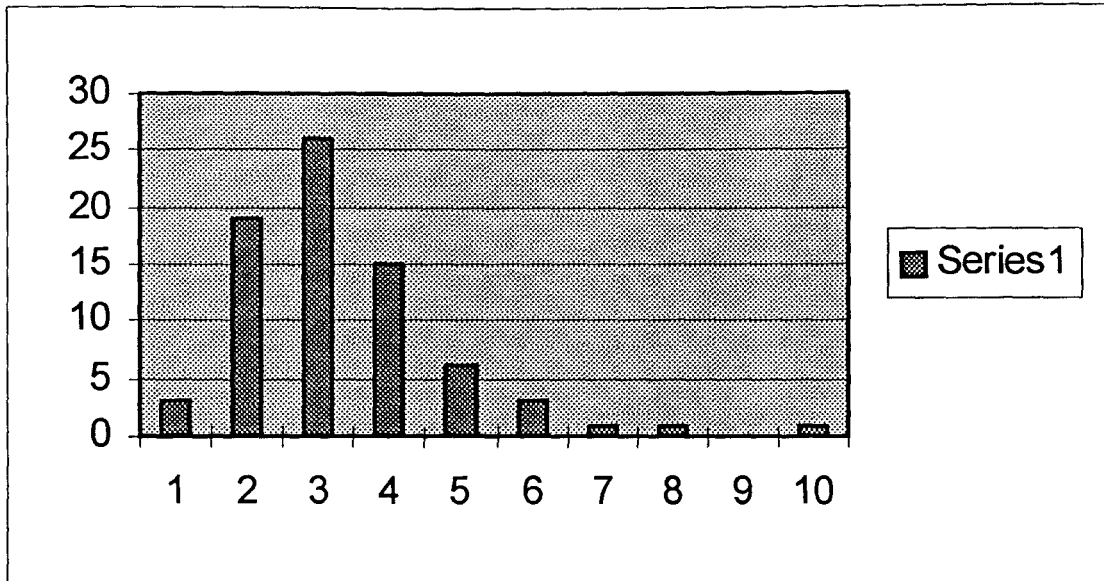
PART NO. _____ CHART NO. 11

PART NAME (PRODUCT) # People in Line (PSU Cafeteria) OPERATION (PROCESS) Cash Register SPECIFICATION LIMITS _____

OPERATOR _____ MACHINE _____ GAGE Count UNIT OF MEASURE # People ZERO EQUALS \emptyset

DATE	5/4	5/4	5/4	5/4	5/4	5/4	5/4	5/11	5/11	5/11	5/11	5/11	5/11	5/11	5/16	5/16	5/16	5/16	5/16	5/16	5/16	
TIME	17:30	17:45	18:00	18:15	18:30	18:45	19:00	17:30	17:45	18:00	18:15	18:30	18:45	19:00	17:30	17:45	18:00	18:15	18:30	18:45	19:00	
SAMPLE MEASUREMENTS																						
1	5	1	0	2	2	5	0	4	3	2	0	4	2	1	2	6	3	4	5	1	3	
2	3	2	0	0	3	7	2	3	2	4	3	3	4	0	2	2	2	4	1	1	3	
3	4	2	4	0	2	2	1	4	3	4	0	0	3	4	3	3	7	0	3	6	4	
4	2	1	2	0	6	2	3	2	1	2	2	1	3	2	0	0	1	2	4	4	0	
5	3	0	3	1	2	3	0	0	1	0	4	3	3	3	2	1	3	3	2	3	2	
SUM	17	6	9	3	15	19	6	13	10	12	9	11	15	10	9	12	16	13	15	15	12	
AVERAGE, \bar{X}	3.4	1.2	1.8	0.6	3.0	3.8	1.2	2.6	2.0	2.4	1.8	2.2	3.0	2.0	1.8	2.4	3.2	2.6	3.0	3.0	2.4	
RANGE, R	3	2	4	2	4	5	3	4	2	4	4	4	2	4	3	6	6	4	4	5	4	
NOTES																						





Capability index of the process:

Noon rush:

From x-bar & R Chart:

Average number of people in line: **3.0**

3 sigma $(3/d_2) * R\text{-bar} = 1.290 * 3 = 3.87$

From customer study:

Average maximum number of people acceptable in front of patrons = **3.36**

Average maximum number of people in line (add 1) = **4.36**

Capability Index:

$x\text{-bar-bar} + 3 \text{ sigma} = 3 + 3.87 = 6.87$

For satisfaction of half the patrons, maximum is 4.36

$C_{pk} = (USL - x\text{-bar-bar}) / 3 \text{ sigma} = (4.36 - 3) / 3.87 = 0.35$

However, this would only satisfy half of the patrons.

In order to satisfy the majority of the patrons (96%), from the survey:

Maximum number of people acceptable in front of patrons = **2**

Maximum number of people acceptable in line (add 1) = 3

However, this would only satisfy half of the patrons.

$$C_{pk} = (USL - \bar{x}) / 3 \sigma = (3 - 3) / 3.87 = 0.$$

However, this is only one side of the distribution. On the low side, the process is very capable, and its $C_{pk} = 1$. So **$C_{pk} = 0.5$**

Evening rush:

From x-bar & R Chart:

Average number of people in line: **2.35**

$$3 \sigma (3/d_2) * R\text{-bar} = 1.290 * 3.76 = \mathbf{4.85}$$

From customer study:

Average maximum number of people acceptable in front of patrons = **3.36**

Average maximum number of people in line (add 1) = **4.36**

Capability Index:

$$\bar{x} + 3 \sigma = 2.35 + 4.85 = \mathbf{7.2}$$

For satisfaction of half the patrons, maximum is 4.36

$$C_{pk} = (USL - \bar{x}) / 3 \sigma = (4.36 - 2.35) / 4.85 = \mathbf{0.41}$$

However, this would only satisfy half of the patrons.

In order to satisfy the majority of the patrons (96%), from the survey:

Maximum number of people acceptable in front of patrons = **2**

Maximum number of people acceptable in line (add 1) = **3**

However, this would only satisfy half of the patrons.

$$C_{pk} = (USL - \bar{x}) / 3 \sigma = (3 - 2.35) / 4.85 = \mathbf{0.13}$$

However, this is only one side of the distribution. On the low side, the process is very capable, and its $C_{pk} = 1$. So $C_{pk} = 0.57$

Food quality survey result:

The outcomes of the survey of the quality characteristics are graphically presented in histograms which are on the following pages.

(figure 4, 5, 6, 7, 8, 9, 10, 11).

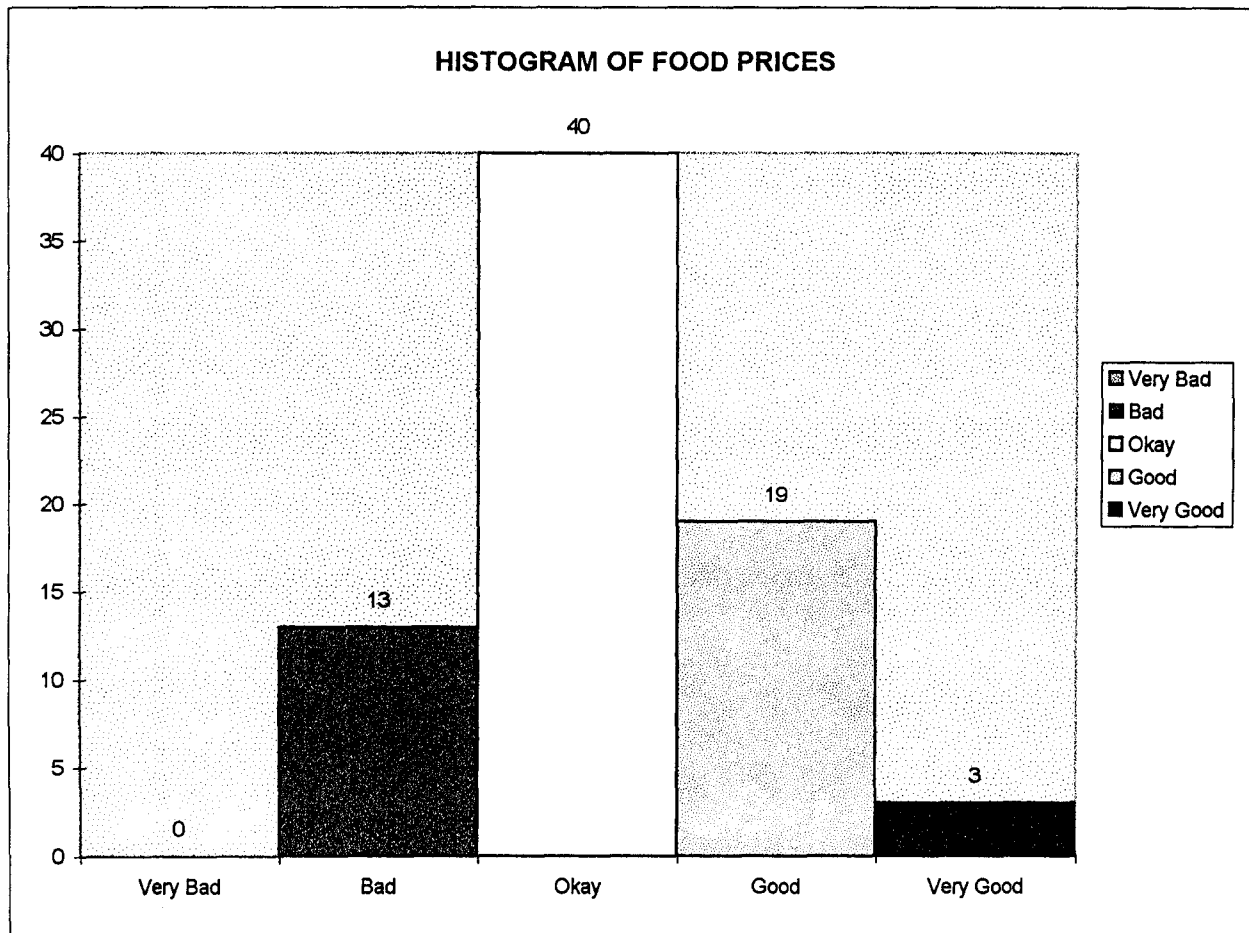


Figure 5

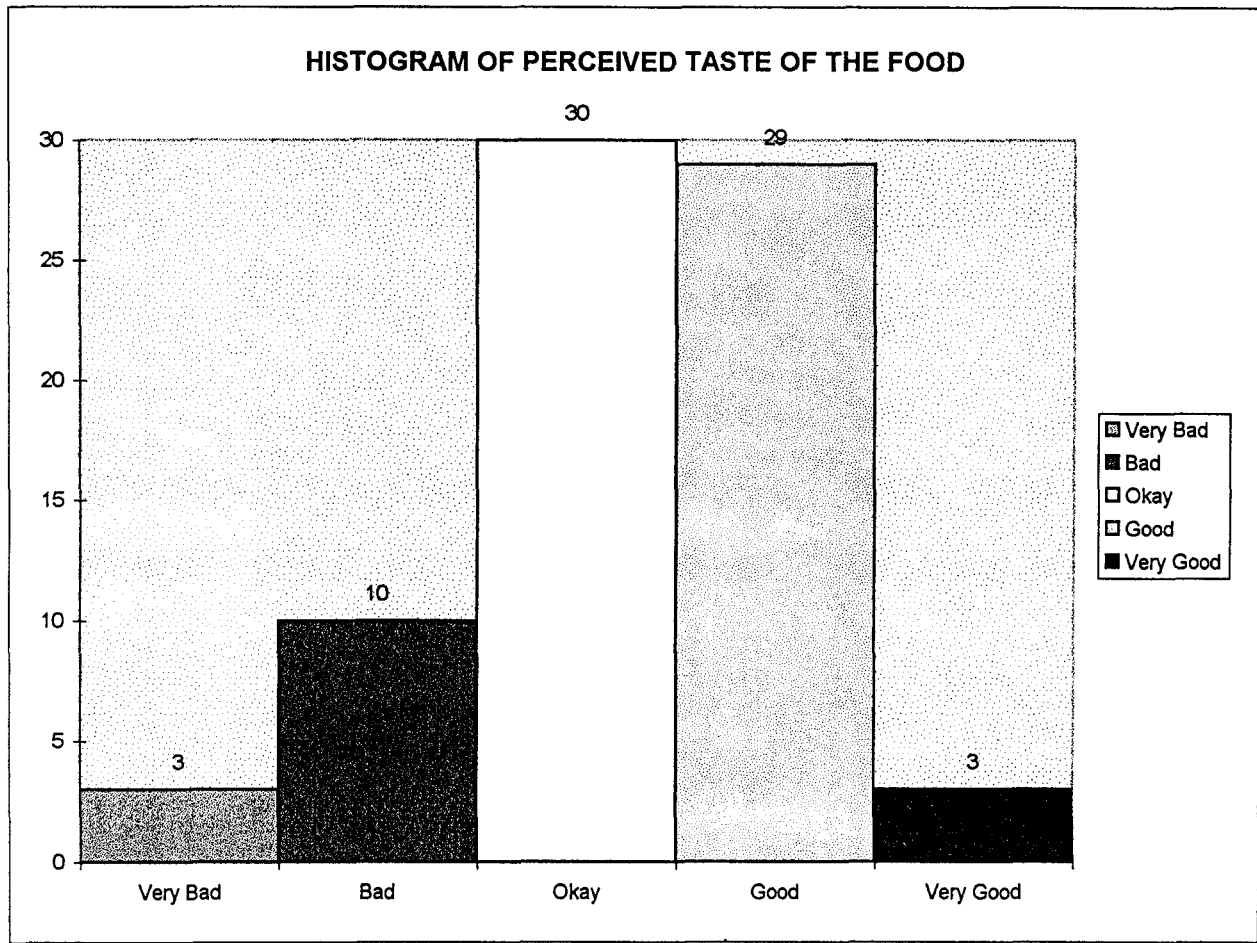


Figure 6

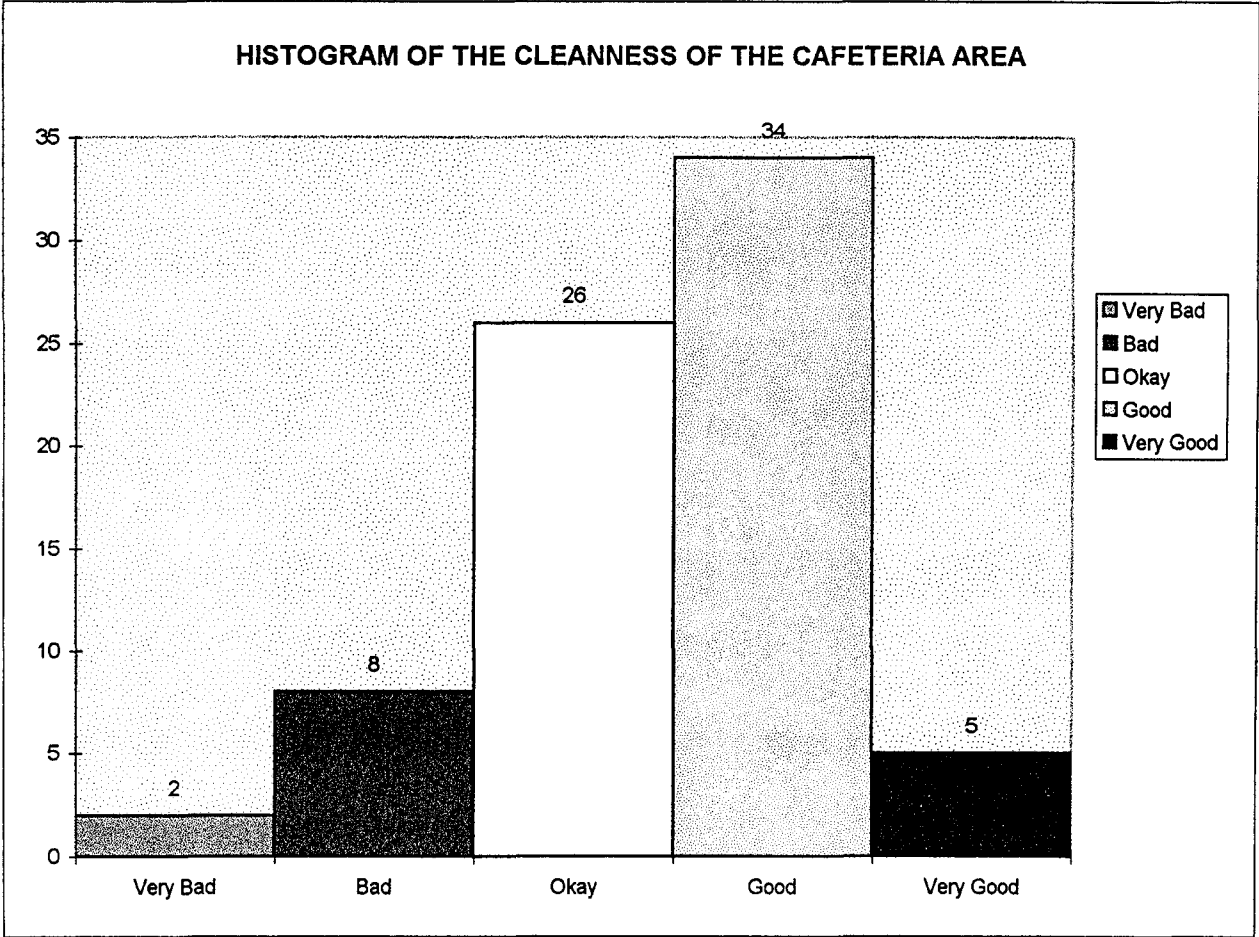


Figure 7

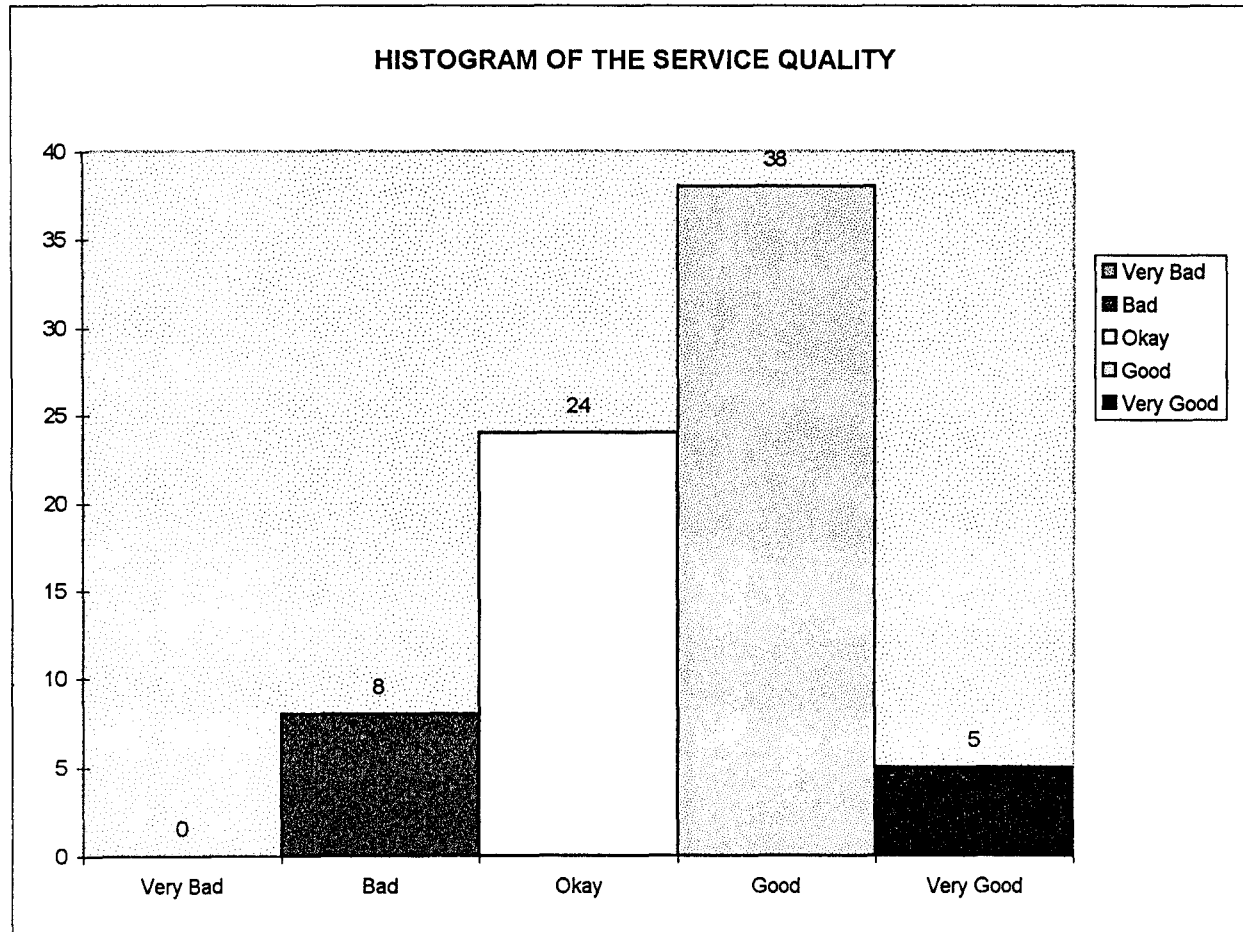


Figure 8

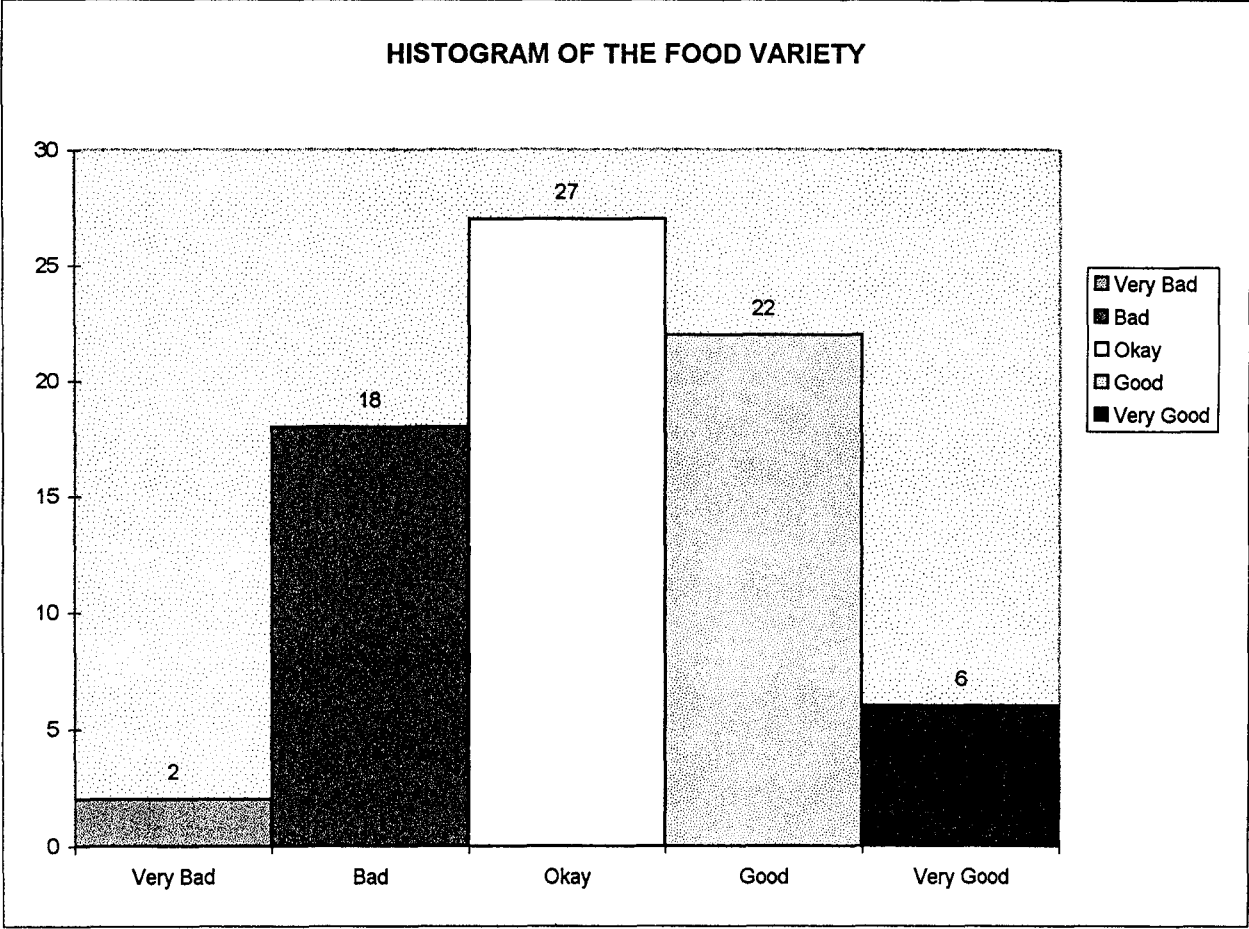


Figure 9

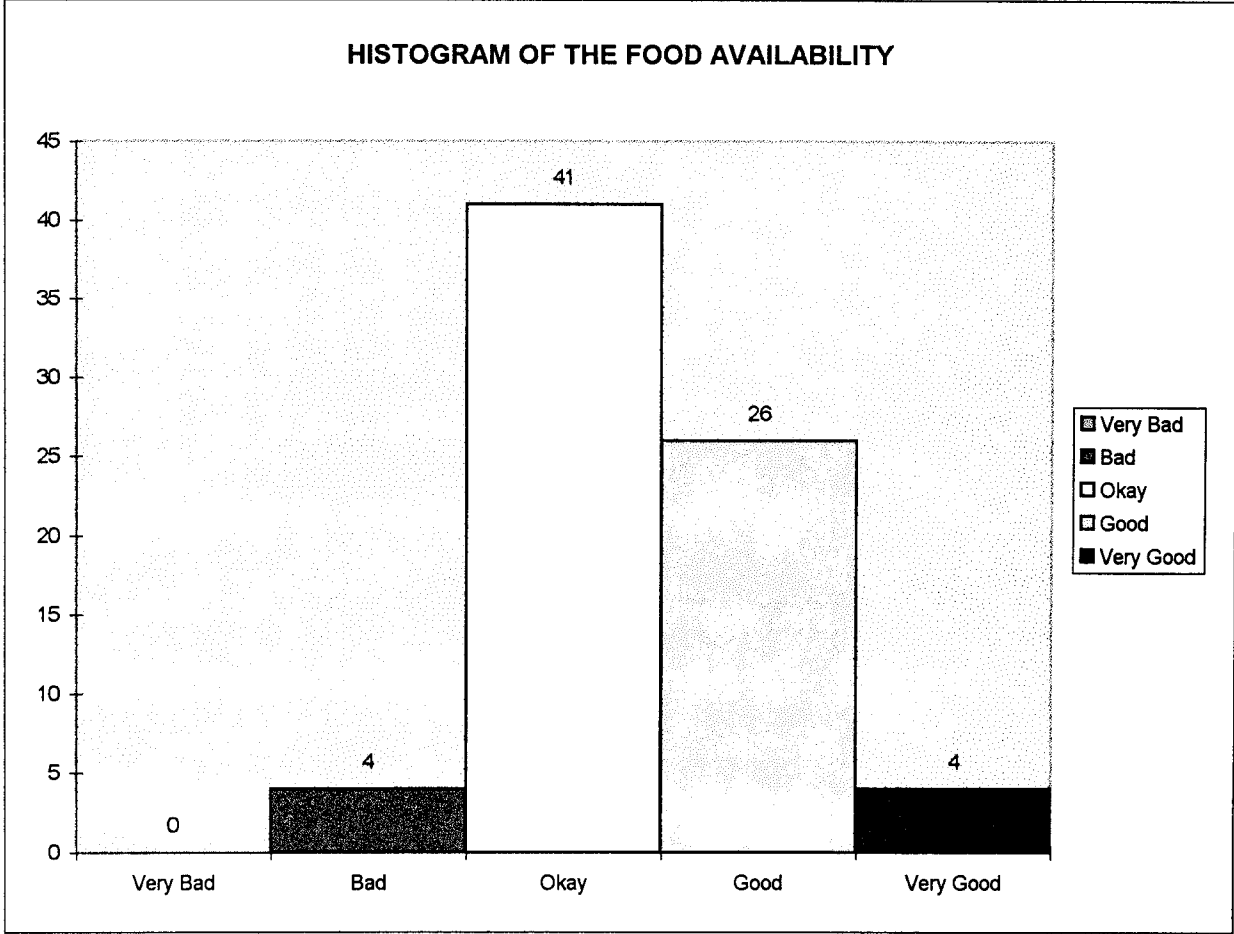


Figure 10

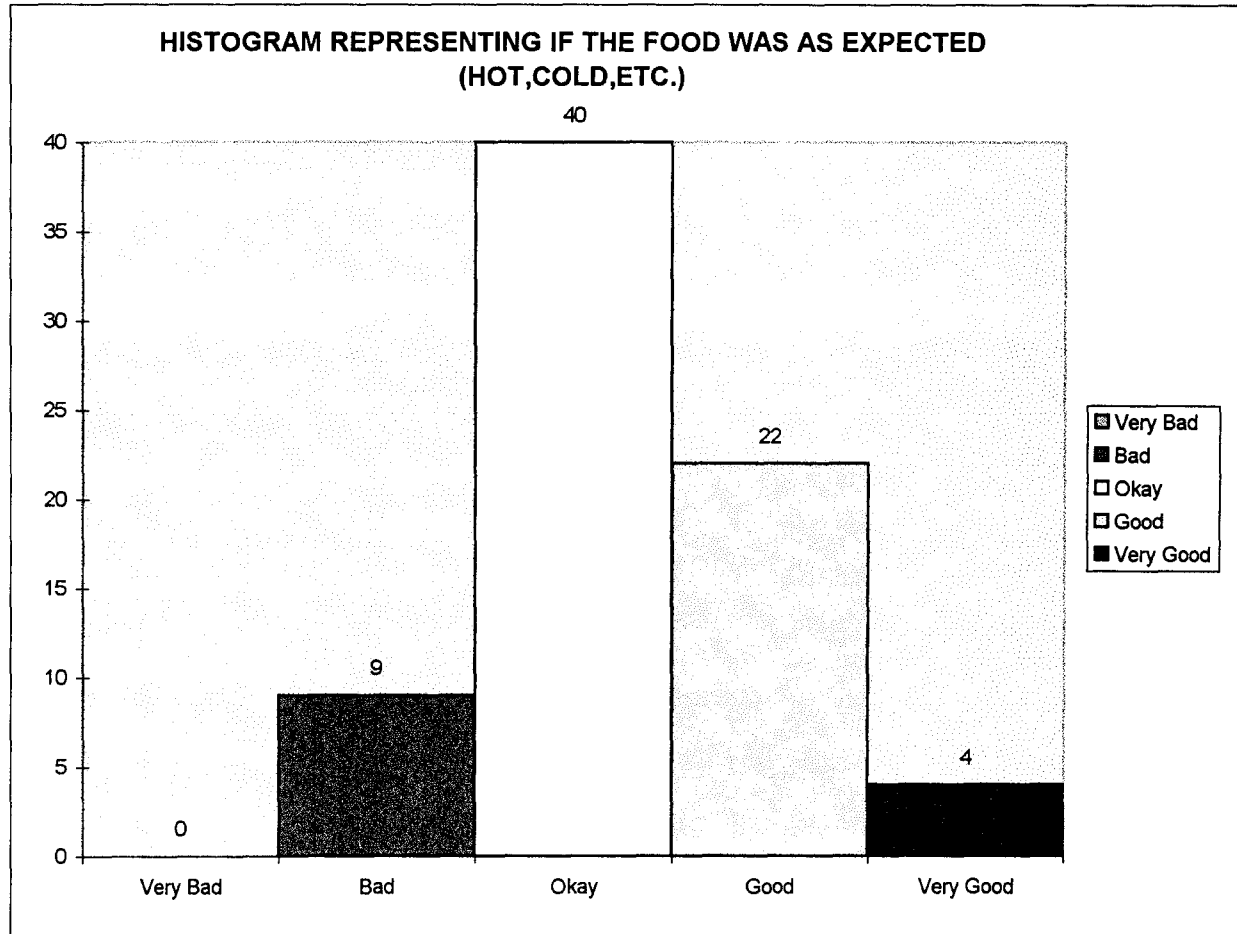


Figure 11

ANALYSIS OF THE RESULTS

Number of people in line:

The Cpk we have obtained is very poor. A set of recommendations to management for the improvement of customer satisfaction should assuredly contain recommendations for improving this process capability index. A fishbone diagram analyses the potential causes of the slow flow (figure 12).

Food quality analysis:

We observe that customer's satisfaction with three of the quality characteristics are resulted to be most dissatisfying. These characteristics are taste, price and variety. Investigation of the possible causes behind the perceived bad quality of these characteristics is performed using fishbone diagrams on the attached sheets (figure 13,14,15).

Fishbone Diagram of Potential Causes Behind Slow Customers Flow Through The Cashiers Lines

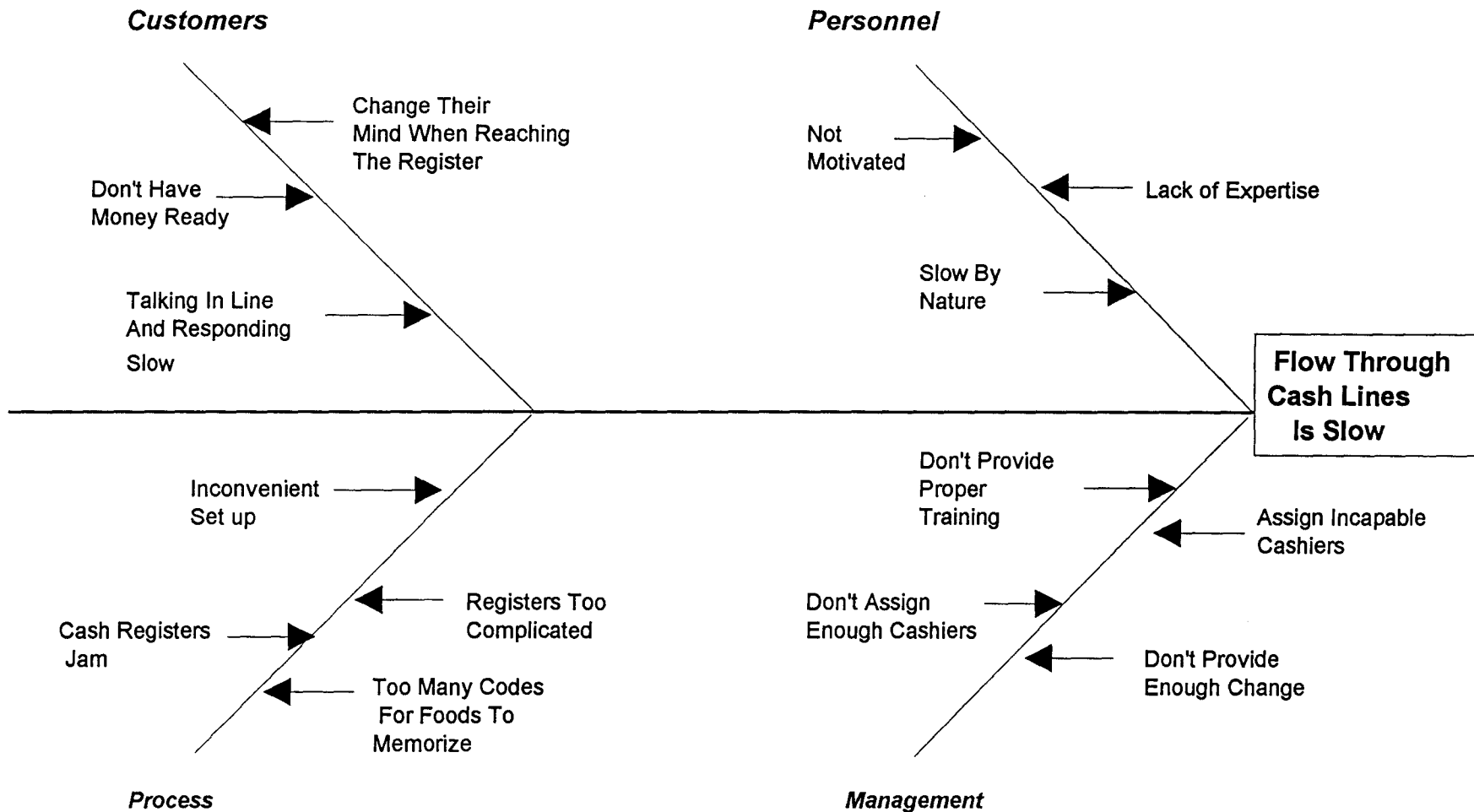


Figure 12

Fishbone Diagram of Potential Causes Behind High Prices

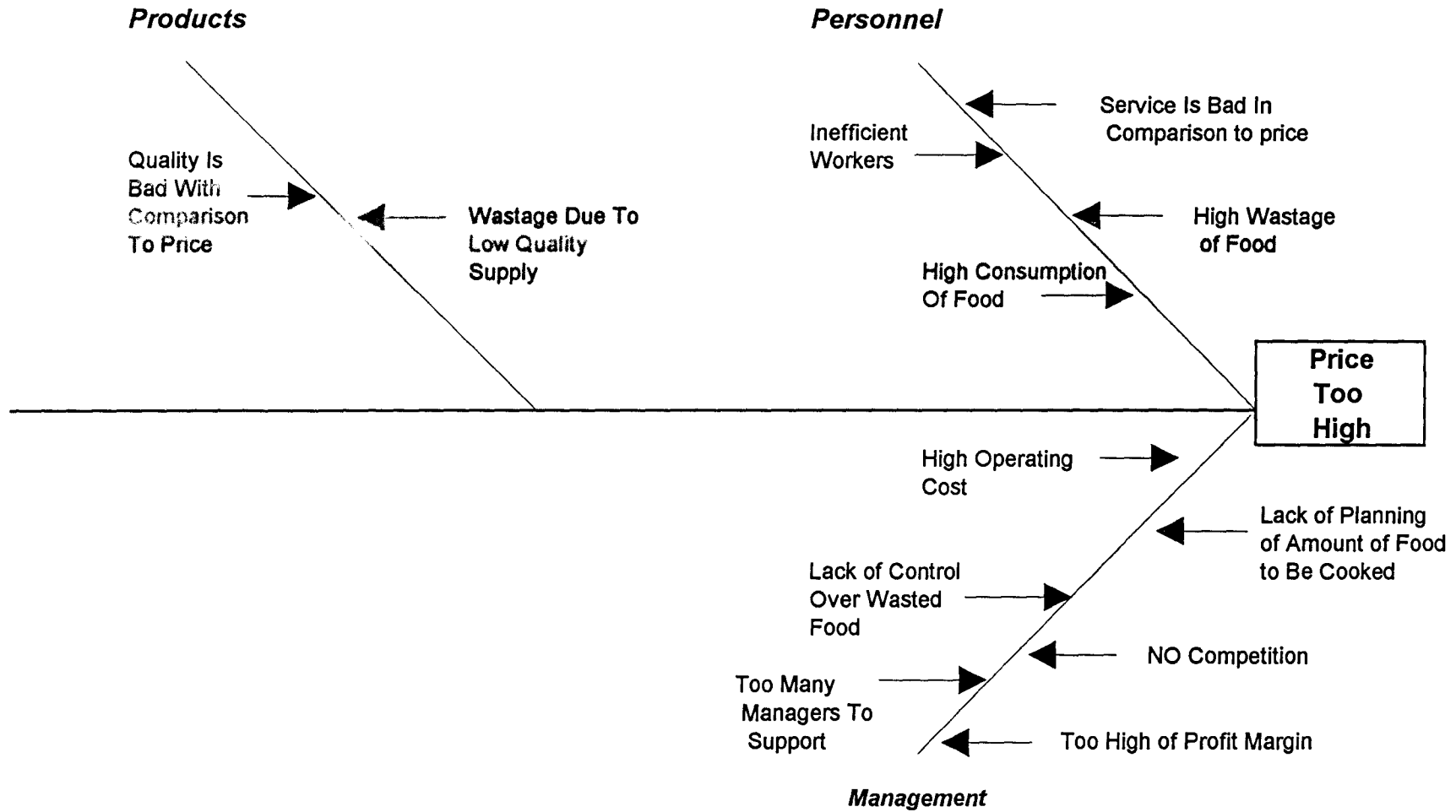


Figure 13

Fishbone Diagram of Potential Causes Behind Perceived Bad Taste of Food

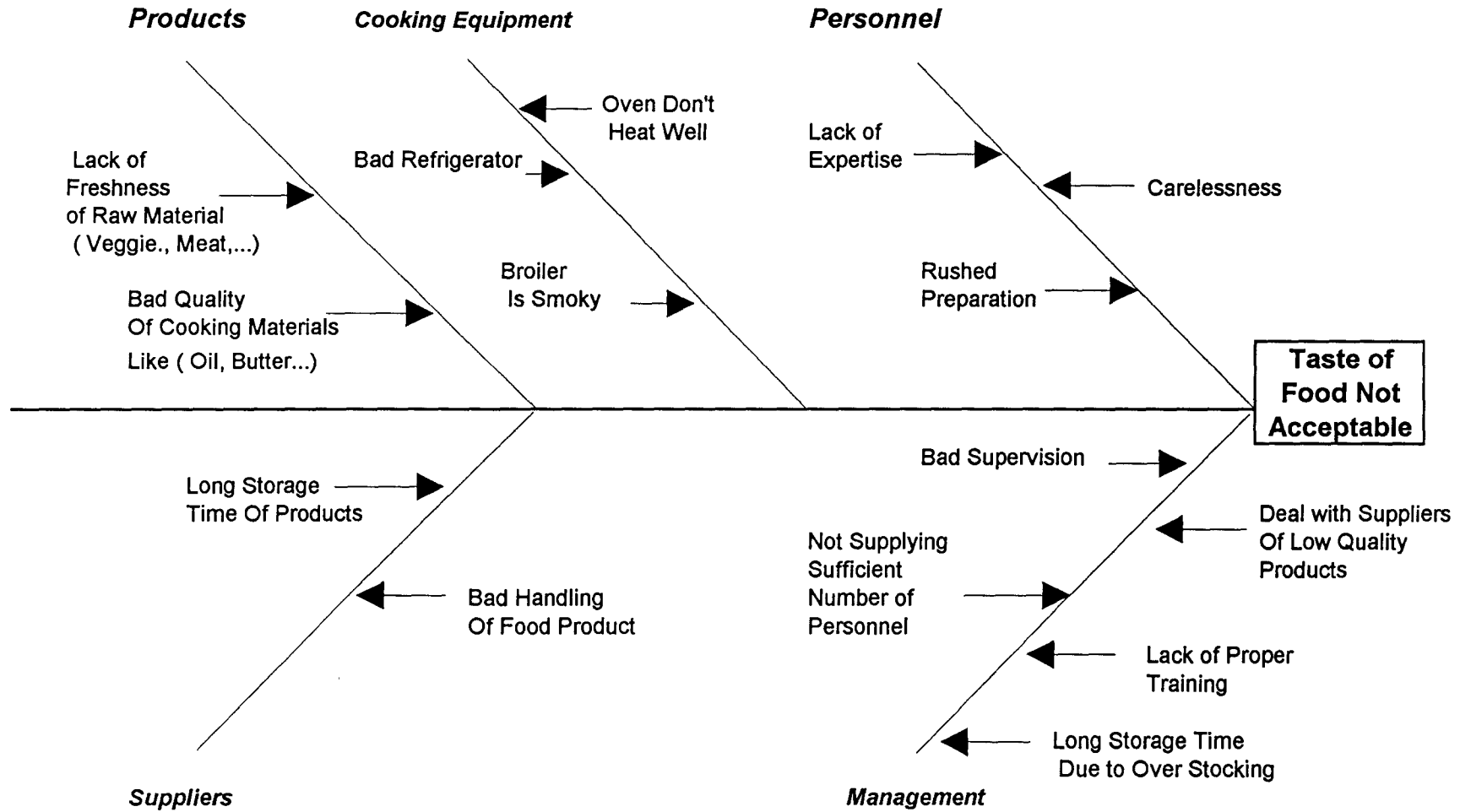


Figure 14

Fishbone Diagram of Potential Causes Behind Lack of Variety

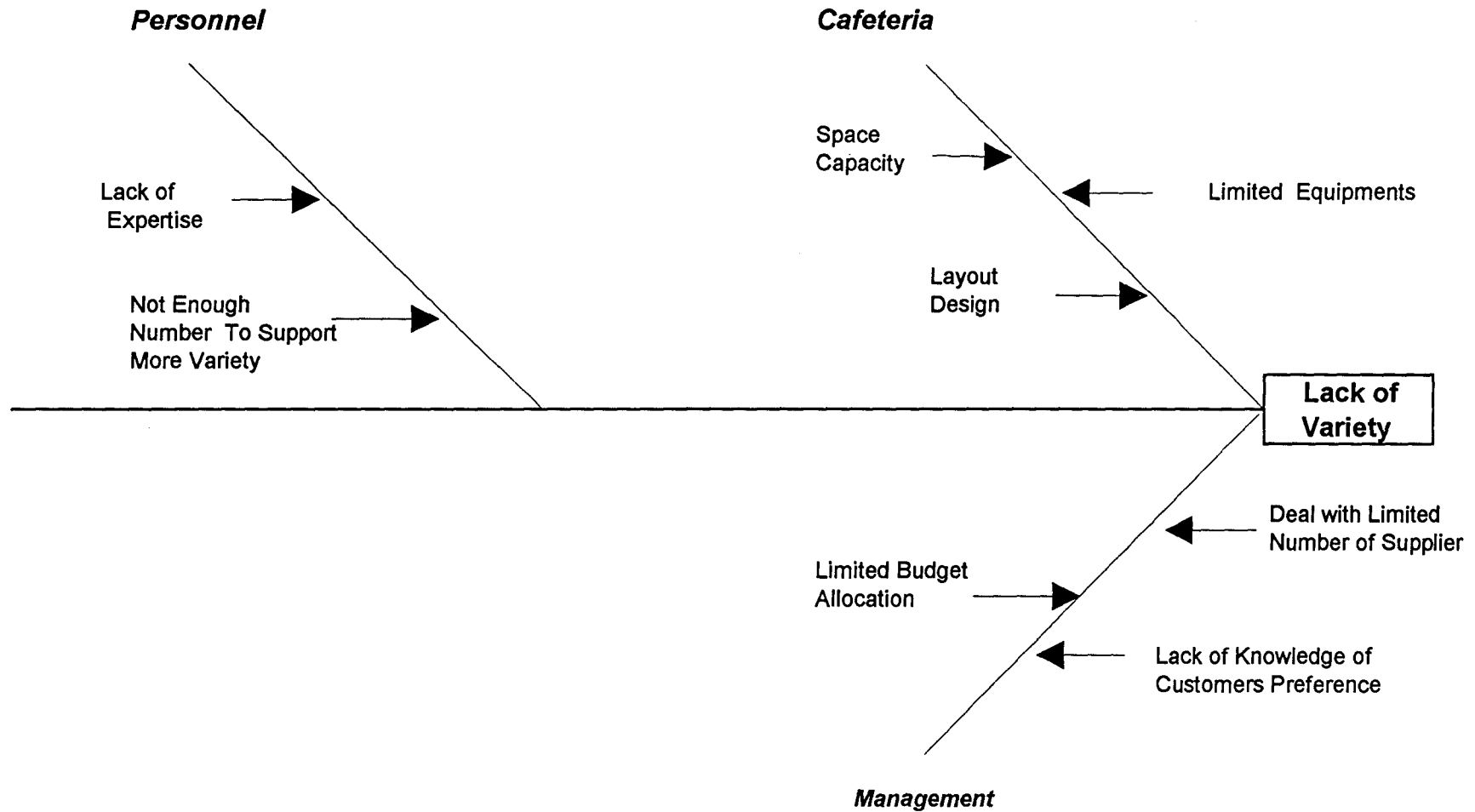


Figure 15

2. Get input from customer on what type of food the cafeteria lack, and any changes which can be done to the present menu.
3. Deal with a wider range of suppliers.
4. Benchmark against the surrounding food operations where students can select to their food from.
5. Alternate the present menu more frequently

Improving the taste of the food

1. Cook food according to demand so customers can have freshly cooked meal.
2. Provide adequate training for personnel on how food should be prepared.
3. Specify the maximum shelving time for food such as burger, fries etc.
4. Get input from customer on what the general perception of good taste of some common item in the cafeteria.
5. Compare taste of similar food sold in other premises.
6. Standardize cooking methods such as time to cook burger, fries, frequency of changing cooking oil.
7. Use fresh raw cooking material.

8. Incoming inspection, inspect the quality of the product that supply by the supplier.

Improving the Price.

1. Control and monitor amount of food cooked to decrease internal waste.
2. Increase quality of food and service so the perception of high price may change.
3. Select competitive supplier in the market place.
4. Offer a special packages so people feel that they are getting a good deal.