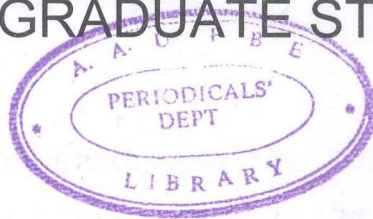


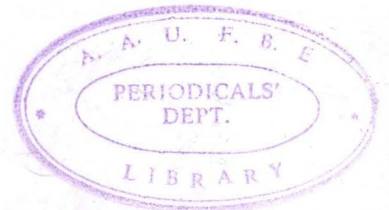
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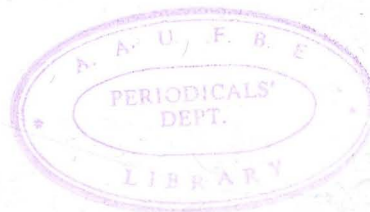


A project report submitted to the school of Graduate Studies in partial fulfillment of the requirements for the Degree of *Master of Business Administration* in department of Management

on



*“Information technology’s contribution to the improvement of product quality in manufacturing firms of Ethiopia”*



Under the supervision of Dr. Tilahun Teklu

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125

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TSE

July, 2006


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## **Acknowledgement**

*This project has become completed with the kind cooperation of several individuals. Though it is impractical to list out all of them, I am indebted to specially thank Dr. Tilahun Teklu for his continuous, constructive and valuable involvement of the work.*

*All others, who were with me throughout, also need to be addressed through my heartiest everlasting thanks.*

Pass  
Tilahun Teklu



## **Table of Contents**

	<i>Page</i>
<i>Abstract</i> .....	<i>i</i>
<b>Chapter One</b>	
2.1. <i>Introduction</i> .....	<i>1</i>
2.1. <i>Background of the Study</i> .....	<i>2</i>
2.1. <i>Objectives</i> .....	<i>3</i>
2.1. <i>Literature Review</i> .....	<i>4</i>
<b>Chapter Two</b>	
2.1. <i>Industries Consideration</i> .....	<i>7</i>
2.2. <i>Methodology</i> .....	<i>7</i>
2.3. <i>Scope</i> .....	<i>10</i>
2.4. <i>Limitations</i> .....	<i>10</i>
<b>Chapter Three</b>	
3.1. <i>Findings</i> .....	<i>11</i>
3.2. <i>Pictorial Representation of Selected Results</i> .....	<i>15</i>

## **Chapter Four**

4.1. <i>Interpretation &amp; Conclusion</i> .....	17
4.2. <i>Managerial Implication</i> .....	24
4.3. <i>Recommendation</i> .....	25
<i>Bibliography</i> .....	<i>I</i>
<i>Appendices</i>	
<i>Questionnaire</i> .....	<i>III</i>
<i>Value Table</i> .....	<i>IX</i>

## **Table of Figures & Tables**

	<i>Page</i>
1. <i>Quality measurement Variables</i> .....	9
2. <i>Result Summery</i> .....	14
3. <i>IT utilization in selected manufacturing firms</i> .....	15
4. <i>Network system presence</i> .....	15
5. <i>Network system utilization</i> .....	15
6. <i>IT support for manufacturing</i> .....	15
7. <i>Budget allocation for maintenance &amp; expansion</i> .....	16
8. <i>Management's concern about IT</i> .....	16
9. <i>With in budget production</i> .....	16
10. <i>Effect of IT on cost of production</i> .....	19
11. <i>Technical effectiveness of products</i> .....	20
12. <i>Result summery for calculation</i> .....	20
13. <i>Response of IT &amp; Quality</i> .....	22
14. <i>IT usage in manufacturing firms</i> .....	23
15. <i>Quality level of products</i> .....	23

## **Abstract**

*For the today's market competition customer's satisfaction is almost the major concern of market participants. Basically customers need to be satisfied through the products quality that they are consuming. Manufacturers to improve their product quality are now advised to implement information technology in their manufacturing process. However, since there are literatures mainly focusing on information technology's contribution to firm's overall performance and financial performance only, this project extends its scope to address the contribution that information technology has for products quality. With this aim, firms are contacted and the result found shows that the use of information technology is significantly contributing to the products quality through its involvement in manufacturing process.*

## **CHAPTER ONE**

### **1.1. INTRODUCTION**

As business managers search for strategies to improve the competitive position of their firms, information technology is playing an increasingly crucial role. Though what is considered an Information Technology varies widely in the literature, for this study we will use the general definition provided by Davis & Olson(1995): 'an integrated, user machine system for providing information to support operations, management, analysis and decision making functions in an organization'.

The term product embraces more than physical goods, for a product maybe intangible (service) or ideas. The product offered maybe in any of these three categories: goods, services, and ideas or indeed may be an amalgam of all three (J.Luck & et a, 1982, p.163-4). The product that is to be referred in this project however refers only the physical goods that can be exchanged in the market.

As O'Brain (2003), manufacturing information systems support the production function that includes all activities concerned with the planning and control of the processes for producing goods. Among the systems, computer integrated manufacturing system plays a vital role in automating manufacturing process that support them with machines, computers and robotics. Manufacturing firms can also use the material requirement planning and the manufacturing execution systems to monitor, report, and adjust the status and performance of manufacturing components to help a company achieve a flexible, high quality manufacturing process.

## 1.2. BACKGROUND OF THE STUDY

The relation-ship between the use of IT and product quality has been indicated in numerous literatures. 'A manufacturing business is devoted to the production of tangible objects that are high in quality and competitive in cost, meet customers' expectations for performance, and are delivered in a timely manner. Finding and achieving the appropriate balance among these attributes-quality, cost, performance, and time to market-challenge all manufacturing businesses. Those companies that are successful in meeting that challenge remains in business: those that are not usually disappear' (CSITMNRC, 1995). The study finally confirms that manufacturing industries need wise use of Information Technology to sustain in the market.

Lutchen, emphasizes that for success companies should develop a formal business plan that fully integrates IT with strategic business objectives of the entire organization (Lutchen, 2004, p.38). Besides the direct contribution of firms' effectiveness, IT will also have a considerable contribution for customer satisfaction, which is a base for business transformation. This can be possible through: improving the understanding of requirements, tailoring product to individual needs, providing a higher level of service, enabling a coherent customer relationship, providing informed and timely assistance and improving communication (Moreton & et al, 1997, p.79-86).

Again, IT's contribution towards financial performance has been studied by Anandhis & et al, and their study in different organizations for five years shows that the inclusion of IT expenditure variable in the model increased the variance significantly. This indicates that the presence of IT variable in the

system provides a better performance in the financial activities of the organization.

There has been also a controversial idea as has been cited on Dan Remenyi & et al (1995) that 'There is in fact no correlation between the amount invested on IT and the return earned on the investment. Hence 70% of users declared that their system was not returning their company's investment; how ever the authors also state 'it is estimated that as many as 90% of organizations didn't have a systematic approach to evaluate their IT investment'.

Finally, as we can see from the above literature, there is a direct relationship between the use of IT and organization's performance, with the exception of Anandhi's study, that shows the direct relationship of IT with financial performance of firms. Hence, this study aims to specify the general view of the studies by narrowing the scope towards relationship between the use of IT and Product's quality of manufacturing firms.

### **1.3. OBJECTIVES**

With the above idea as a base, this project is initiated mainly to asses the extents to which manufacturing firms are utilizing information technology in their manufacturing process. The project aims to provide answers to questions such as: are they controlling their product's quality manually? mechanically? through IT's component? or how? The study process attempts to answer the above and related questions that possibly contribute to position the manufacturing firm's IT utilization status in relation to quality control and help us to reach on proper conclusion and recommendations which will contribute for the firm's further effort of quality improvement. The result from this study is expected to

serve as input for manufacturing firms to utilize the information system (whether already available or not) as one input to improve the product quality that firms are producing.

This action will help almost everyone in the system: **producers** to produce a better quality product to satisfy customers and win the market competition, the **customers** to get better quality products and also the **government** to give emphasis on introducing the system to its manufacturing firms.

In general, the objective of this study can be summarized as:

*-To identify Information technology's contribution to the improvement of product quality in manufacturing firms in Ethiopia.*

#### **1.4. LITERATURE REVIEW**

Information technology is a basic component of information system, which utilizes hardware, software, networks, data resource and other internet based technologies (O'Brain, 2000); or as Remenyi & et al (1995, p.250) pointed, it is a wide range term to describe the use of computers and telecommunications. C. Laudon & et al (2002, p.47) emphasizes that information technology infrastructure includes computer hardware, soft wares, data, and storage technology and networks providing a portfolio of shared information technology resources for the organization. The three components of information technology, computers, databases and communication networks are transforming organizations performance. (C. Lucas, 1999).

Fletcher, (1995) summarizes the different opinions about information technology as: - the acquisition, processing, storage,

presentation and transmission of information in all its form. Information technology thus includes computers, information networks, video tex, online database and software as well as fax machines, mobile telephones, cable televisions and other forms of personal and mass communication (Ibid).

For a product, quality concerns consistently meeting customer's expectations. This in turn embodies decisions around specifying expectations and then consistently meeting these specifications for the product and service involved. (Hill, 2000, p.304), and for a customer, quality provision combines both product specification and consistent provision (Ibid). Caplen (1988) defines quality in terms of fitness for purpose, satisfactory-ness to the purpose, lower price attached and on time delivery.

Hill (2000, p.311-2) suggests the quality principles of a product to: meet customer requirement, be error free, managed by prevention (quality must be built in to work) and measure by the cost of quality (reduce cost by eliminating error). Further, quality characteristics have been discussed as its availability, cost, technical effectiveness, timeliness, produce-ability, operational effectiveness and parameters (range, speed, and accuracy).

←(www.ams.mod.uk)

We are new in an information age and our society is very dependent on information technology utilization (Doyle, 1999, Kern & et al 2000). J. Fox (1995), Pike & et al (1994), E. Sower & et al (1999), Moreton & et al (1997), Anandhis & et al (2000), Lutchen (2004) all assure that information technology utilization is important for manufacturing firms to survive and continue in the modern technology era with their products quality and better performance. Fletcher (1995, p.90) points out that information system help in quality production of products.

The use of computers is essential to ensure a consistently good quality product (Caplen, 1988,p.327) and manufacturing and production process, in general can be supported by information systems like machine control, aiding in design, production planning and facilitating location for better performance ( C. Laudon & et al, 2002).

From the above literature review, I have summarized that:

➤ **IT involvement measuring variables**

1. Presence of computers and other hardware,
2. Availability of software related with design and manufacturing,
3. Computer literacy level of the employee,
4. Proper training given for the employee,
5. Updating the employee's skill with recent software innovation,
6. Management's concern for the ITs system,
7. Proper budget allocation.

➤ **Product Quality measuring variables**

1. Easiness for manufacturing,
2. Within schedule production,
3. Within budget production,
4. On time delivery for customers,
5. Less rate of error occurrence,
6. Proper sealing and packaging,
7. Sales volume increment,

## **CHAPTER TWO**

### **2.1. INDUSTRIES CONSIDERATION**

For countries on stage of development, the contribution of small and large scale industries is highly significant. Manufacturing firms are among these inputs for a country's development. For this study, firms are considered regardless of their level and contribution but mainly considering that the product they are producing is a commodity that is to be consumed frequently on a relatively short usage life. Hence, Gullele Soap Factory, Addis Ababa Foam Sun, Tikur Abay Shoes Factory, National Tobacco Enterprise, Highland Spring Water, Moha Soft Drinks Factory, KOJJ Food Complex, Natran Plastic, Yekatit Paper Works and Mathador Addis Tyre are selected as the sample manufacturing firms. These firms are selected in a sense of addressing various sectors of manufacturings as per their convenience from their group. For example, from the food industry, KOJJ Food Complex is selected only because the management is willing to cooperate, where as other food industries were not. Similarly other firms are selected in such a manner with the exception of National Tobacco Enterprise and Mathador Addis Tyre, which are the only one in their industries.

### **2.2. METHODOLOGY**

The study is conducted at the organizational level to asses the systems flexibility to incorporate IT's components. Manufacturing firms are selected from their respective industries as per their convenience and willingness to provide information and; their area of expertise selected randomly on a quota base. It has been tried to

address different expertise of firms and effort has been made not to contact two firms with in similar field of expertise (Industries). Individuals at a middle or top level management position are contacted to collect information which reflects the situation of the firm and the effort towards product quality and hence the questionnaire has incorporated some technical questions which make it a must to contact individuals of a managerial position.

The project has been supposed to study the relationship of incorporating information technology, beyond the physical equipment availability, with that of expected product's quality. The quality of products has been assessed mainly focusing on the customers satisfaction because of expectations met. Points like cost effectiveness, technical effectiveness, timeliness and others shown in the graph below are also indicators of product quality under production ([www.ams.mod.uk](http://www.ams.mod.uk)).

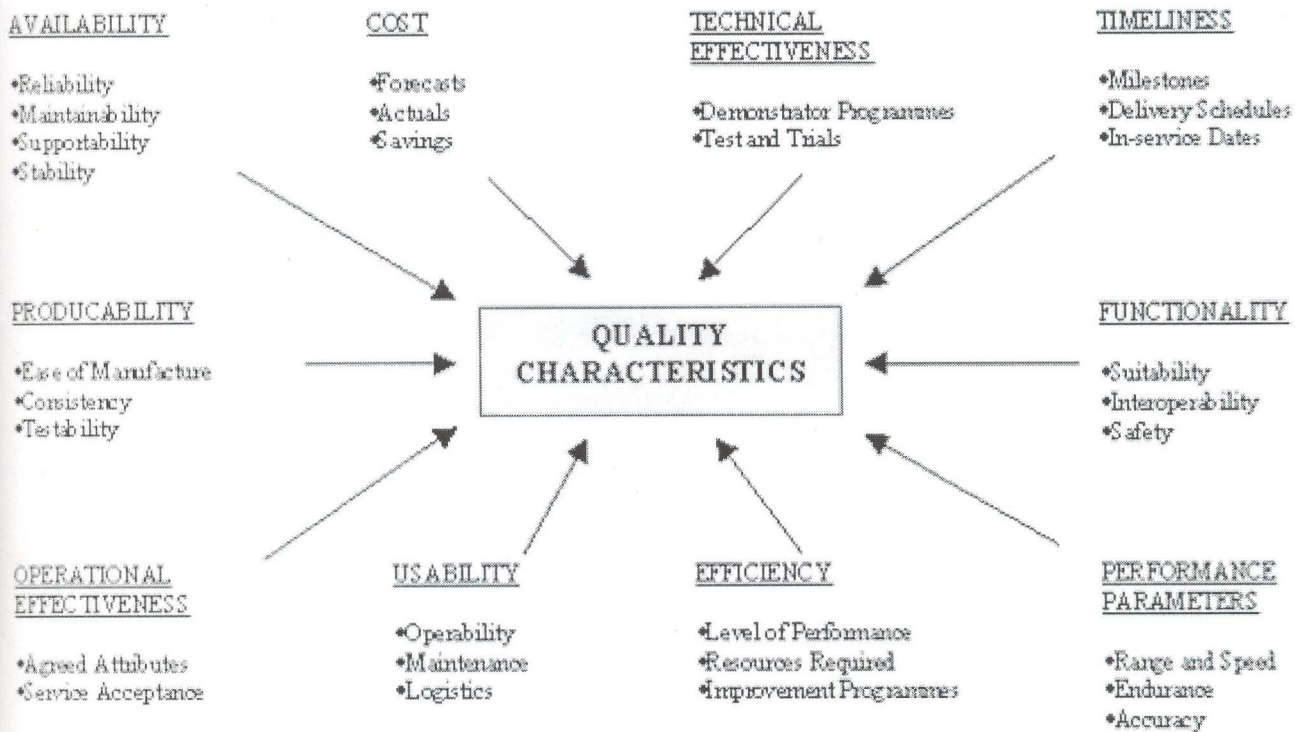


Fig. 1- Quality measurement Variables

To evaluate these points, in relation with customer satisfaction, I have considered the sales volume increment by comparing the difference before and after the systems implementation. Towards this point, the contribution of IT in the manufacturing process has been checked by identifying the use of any manufacturing aid software, like CAD, CAM, final quality composition approving, proper sealing and packaging; and also the use of networking system to share resources and raw materials. Delivering of goods on time, operating within the budget, meeting objective and having a clearly understood role in the firm also indicates IT's contribution for production process (Remenyi & etal, 1995,p.116-7) To attain the above stated goal, no prior assessment has been made in selecting firms about their usage of IT components for their manufacturing process. Among the structured questions,

proper questions (Ordinally assigned) have been selected to analyze the relationship of the variables and other questions are used for discussion.

### **2.3. SCOPE**

Though the concept of information technology and product quality is not as easy to be defined, this project is trying to cover the use of computers and related accessories in the manufacturing process only. By doing so, the main concern is to show the contribution that one has to the other.

### **2.4. LIMITATION**

The above stated idea has a basic limitation that product quality improvement may not necessarily come as result of IT usage. In addition organizations are not willing to speak out questions that are related with budget and hence it creates a problem in interpreting the results found. The case where only few firms have been contacted may not be sufficient for generalized conclusion and the project is focusing to asses only the contribution, not its level and amount.

## CHAPTER THREE

### 3.1. FINDINGS

The first part of the questionnaire that has been designed to assess the utilization of IT for manufacturing processes has resulted in two major categories: whether the manufacturing firms are using information technology component or not in their manufacturing process. Among the selected organizations Addis Ababa Foam Sun, National Tobacco Enterprise, Highland Spring Water, Moha Soft Drinks Factory, KOJJ Food Complex, Natran Plastic, Yekatit Paper Works and Mathador Addis Tyre have responded as they are using computers and Addis Ababa Foam Sun restricts the computers for secretarial service only. In general, the results found show that:

1. Among the questioned manufacturing firms, only 20% of them have responded as they have no computers and related appliances in their organization. The rest (80% of the organization) have had computers in their manufacturing firms. The number of computer varies between 2 & 60. I have encountered an organization with 11 computers, where all used only for secretarial service, and another organization with only two computers, one for manufacturing support.
2. Among the firms using computers, only 25% utilizes the networking system to facilitate their manufacturing process. Others, with only one or two computers in manufacturing support, seem giving less concern for the networking system of computers.
3. All of the firms which don't utilize computer in their entire task have shown interest to use computers and other IT components in the near future because they have understood that the use of these elements could possibly increase their manufacturing capacity. Among them one organization has reported as it has faced a

problem in the manufacturing process in consequence of the absence of computers and other IT components.

4. 12.5% of the organizations among those which uses computers in their organization have shown a strong resistance to utilize IT elements for manufacturing process.
5. From those which are utilizing IT for manufacturing process, 42.80% of them strongly agrees that the manufacturing process is fully supported by these IT components, where as 57.20% of them only shows the sense of agreement for the idea.
6. About 51% of these organizations have strong agreement for the utilization of appropriate software packages for their manufacturing process.
7. Only 28.57% of organizations have assigned skilled personnel to utilize the IT components & software packages in the firm.
8. 14.28% of the organization utilizes a networking system to facilitate manufacturing process and 50% of them use the networking system for resource sharing.
9. 28.57% of the organizations have given attention to familiarize their employees with the basics of information technology, 57.14% of them shows less effort, and the rest none.
10. 28.57% of the organization are again working hard to upgrade their employees competence with the newly developed manufacturing support soft wares, 42.86% in a relatively less pattern, and 28.57% have not included in their action plan.
11. 71.43% organizations are alert for recent software and/or programs that contribute for their manufacturing process.
12. All of the organizations have trained individuals for the safeguarding of their IT system as the firm's management has allocated sufficient budget for the IT section. This is mainly due to the firm's management feeling that the information technology utilization will definitely affect their production positively.

When we came to the second part of the questionnaire, which tries to assess the information technology's contribution towards the product quality:

13. 71.43% firms show their agreement on the cost of productions reduction since the IT system has been implemented. However, 14.28% of organizations have shown strong opposition for this idea as the use of IT requires additional investment and brings no change for their production cost. The other firms also results in dilemma to say that the cost of production has been lowered as the IT system is introduced.
14. 100% of the questioned manufacturing firms agreed that their product's technical effectiveness has been improved since the use of IT for their manufacturing process.
15. Most of the firms (about 85.71%) feel that the IT utilization in their manufacturing firm has enabled them to produce within the allocated budget and scheduled time; where as the rest of them have no idea about their relation.
16. As 71.42% of the organizations, the use of IT has eliminated reprocessing of products due to miscellaneous defects by ensuring proper sealing (85.71%), uniform final product composition (85.71%) and product's reliability (100%).
17. All of the firms have given their witness that the use of information technology and its components has reduced human effort for better quality.
18. 57.14% of organizations believe that their sales volume has shown remarkable increment since their period of information technology utilization, while 28.57% shows moderate agreement and 14.29% less for the idea. Similar result has been also registered for the market share improvement a product is

experiencing since the information technology's utilization for manufacturing support process.

The result obtained can be summarized as:

Organization	Value for IT usage	IT usage rank	Value for Quality rank	Quality level rank
Org. 1	3.636	3.5	4.625	2
Org. 2	3.272	7	2.875	7
Org. 3	3.545	5	4.000	3
Org. 4	3.454	6	3.125	6
Org. 5	5.000	1	5.000	1
Org. 6	4.000	2	3.875	4
Org. 7	3.636	3.5	3.312	5

*Table 1- Result Summery*

N.B.

*The ranking for both IT usage and quality level showe that priority is given for high ranking (One is the best) and proceeds in assigning its rank among the organizations. In the IT usage ranking, organizations 1 & 7 have scored similar value and the average value  $\{(3 + 4)/2 = 3.5\}$  is given as a rank next to the second highest value, and the next lowest value is assigned 5<sup>th</sup>.*

### 3.2. PICTORIAL REPRESENTATION OF SELECTED RESULTS

Fig. 1. IT utilization in selected Manufacturing firms

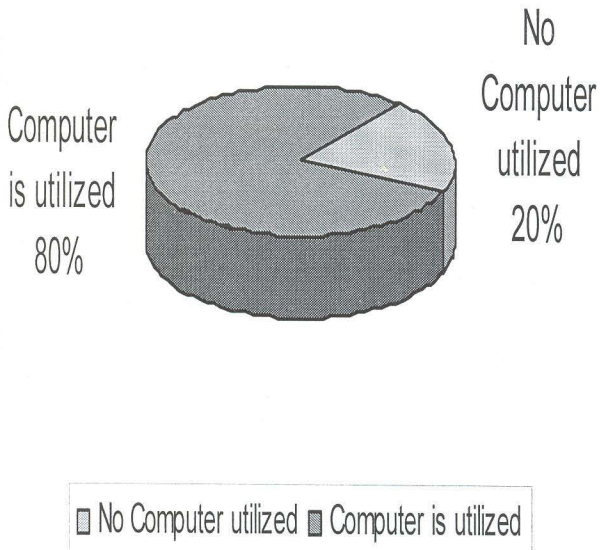


Fig. 2. Network system presence in Manufacturing firms that use IT

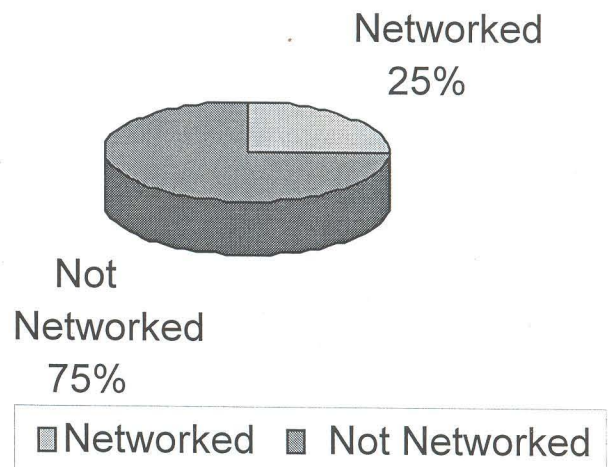


Fig. 3. Network system utilization

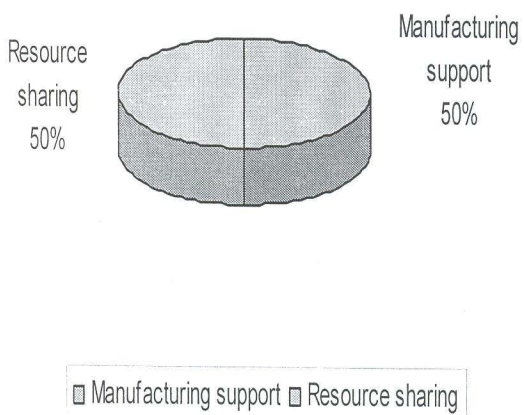


Fig. 4. IT support for Manufacturing

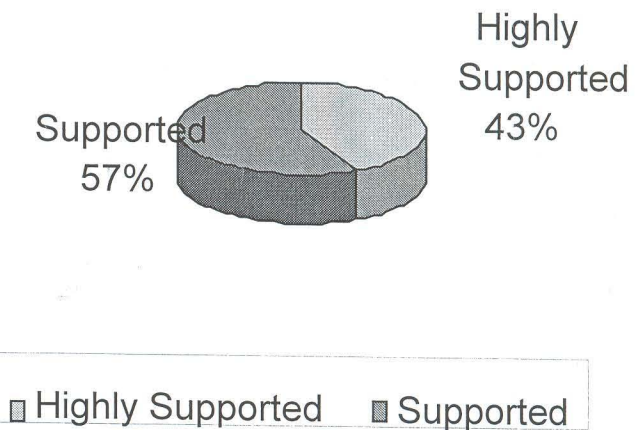


Fig. 5. Budget allocation for maintenance & expansion

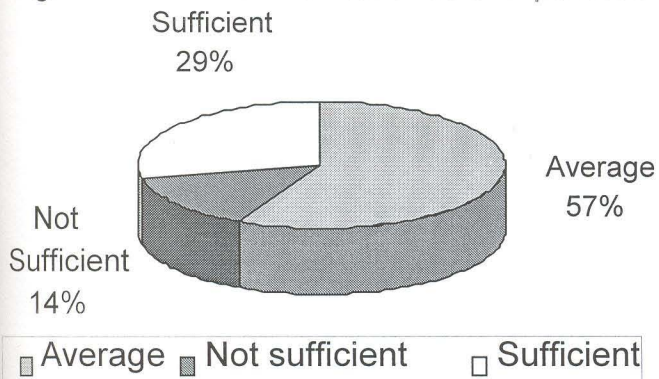


Fig. 6. Management's concern about IT

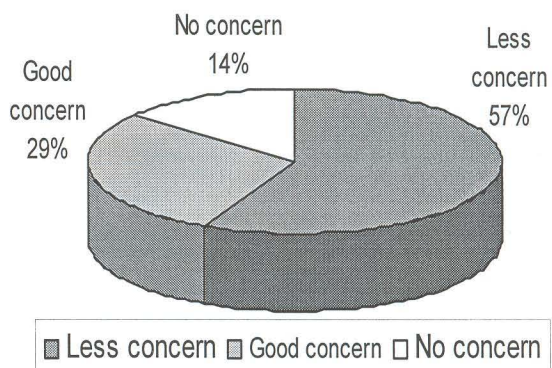
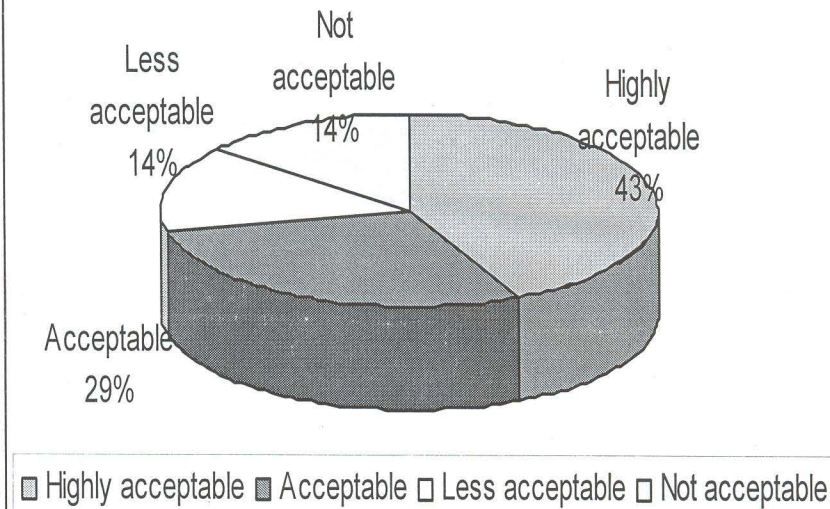


fig. 7. Within budget production



## CHAPTER FOUR

### 4.1. INTERPRETATION & CONCLUSION

In a country like ours, the low level of technological advancement might be the major problem for manufacturing firms' expansion & development. Manufacturing firms, to be competent with the product that is coming from abroad, need to have the superior quality in the field with major components of quality measurements. The customers need to have a product with affordable price, better effectiveness, superior reliability, uniform composition and so on. These quality measurement variables are believed to be met through the use of information technology ([www.ams.mod.uk](http://www.ams.mod.uk)) throughout the manufacturing process. As the data collected from sample manufacturing firms, the awareness level of managers to use IT for their manufacturing firms is promising. Though majority of the sampled firms are using at least some part of the information technology, it is still important for all of the firms to use it. However, the trend that firms which are not utilizing information technology in the organization have a plan of immediate IT implementation for their manufacturing process is a good beginning in transforming the current manual production system into automated, computer aided & fascinated system.

This idea can be more witnessed by the cases of organizations with two computers, one for manufacturing aiding process. This shows a high commitment of organization's management to support the production process.

The cases where some organizations (12.50%) show a strong resistance to utilize IT components for their manufacturing process is of a questionable one as S.Bharadwaj & etal(1999)says that for better

competition in the market information technology support production system is important.

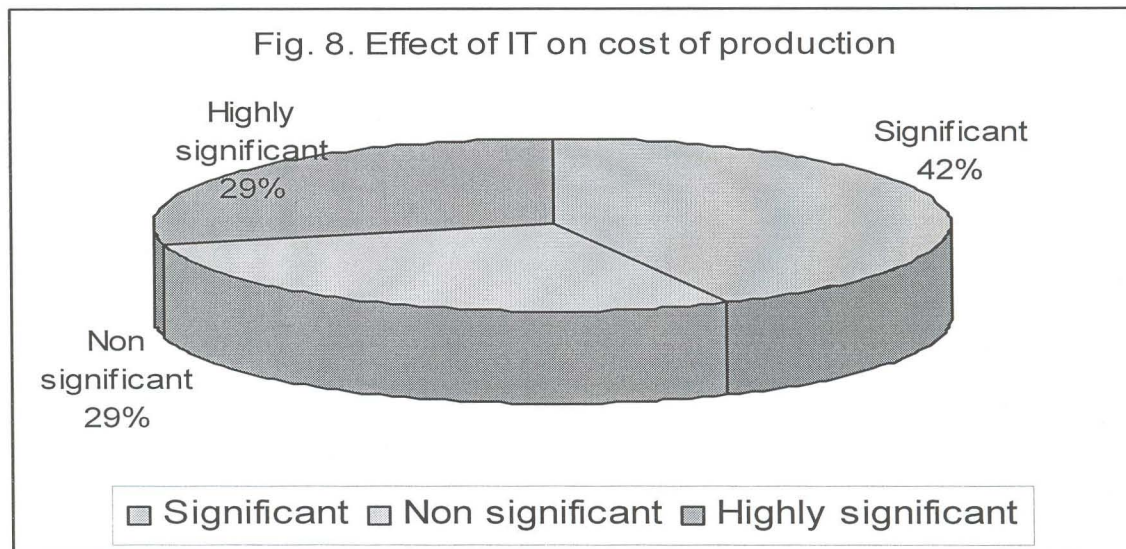
The current awareness level of employees engaged in manufacturing process also matters. Almost half of the firms have responded as they are supporting their manufacturing process with the available IT components because they believe that doing so will help to perform better in the market.

The measure of IT utilization is not only the presence of computers and/or other hard ware elements. Hence, to fulfill the meaning the hardware available should be supported with proper software packages. But in our case only 57.14% of the manufacturing firms are properly utilizing software in direct relation with their manufacturing process. This shows that though it is of better performance, there is about 42.86% loss of investing in IT components.

Then, a lower effort is registered regarding the utilization of available IT components in an organization due to lack of available trained personnels. Only 28.57% of the questioned firms show motivation to train their employees for the system implemented. This enable the organization to use best of the system established and hence the investment for IT will be properly addressed. (Ramanyi & etal, 1995). However, 75.43% of organizations show poor utilization of their available IT system in varying degree for better performance & even better quality production.

The result that shows positive attitude towards the usage of information technology in their manufacturing process in response to cost of production reduction is a promising one. 71.43% of the firms agree that their cost of production has been lowered as a result of human labor minimization, error free production, uniform status of products and technical effectiveness of the products. This is the major area of focus for manufactures to be concerned as minimizing

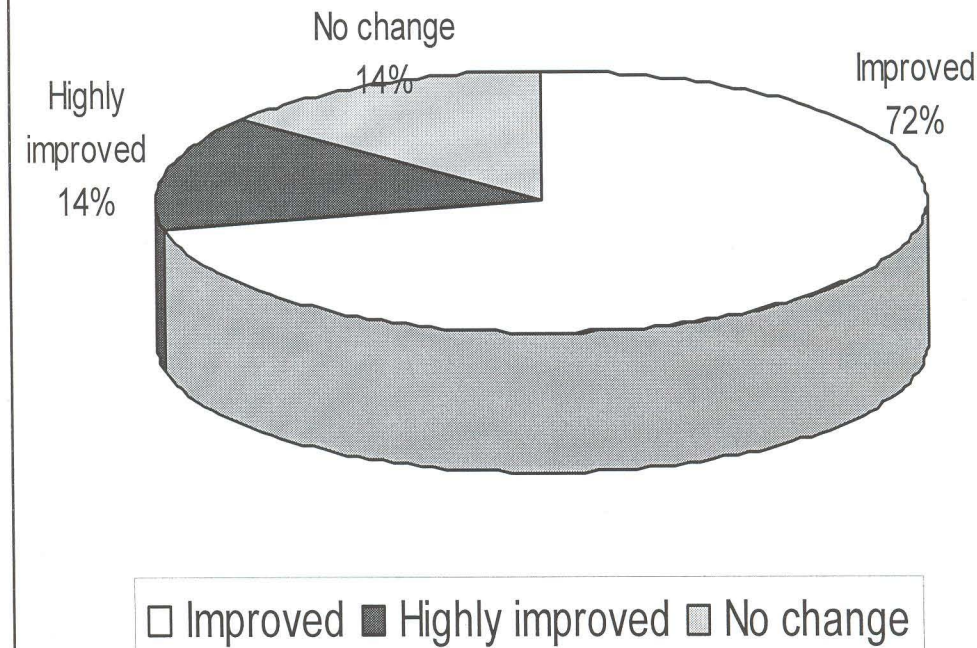
the price of a product with competent quality status will help to satisfy the current customers and help to attract new customers in the market. However, as we can see below, there are firms who still feel that there is no positive relation between the two variables.



Actually, these firms are not on the proper track of competition because Ramanyi & etal, (1995) and C.Lucas (1999) says that proper information technology utilization has a contribution to reduce the cost of production. The non-significant portion of the figure tells us that there are firms still implementing information technology but not clearly aware of its contribution for products cost minimization.

One major criteria of products quality, which is the technical effectiveness of the product has been also studied and the result shows that only 14.28% of the organizations have good feeling of improved technical effectiveness of their product. Where as the same amount of organizations think that there is no relationship at all in between. The rest of the manufacturing firms feel a significant relation.

Fig. 9. Technical Effectiveness of products



In a collective approach, the quality variables of a product are acceptable in majority of the firms which shows that there is a better response of IT contribution in the manufacturing process.

Basing on the previous table of results, we can see the relationship of these two variables by using the Spearman's correlation approach.

Organization	IT usage rank	Quality level rank	Difference (D)	(D) <sup>2</sup>
Org. 1	3.5	2	0.5	2.25
Org. 2	7	7	0	0
Org. 3	5	3	2	4
Org. 4	6	6	0	0
Org. 5	1	1	0	0
Org. 6	2	4	2	4
Org. 7	3.3	5	1.5	2.25

Table 2- Result Summery for calculation purpose

$$\sum D^2 = 12.5$$

By using the Spearman's formula:

$$r_s = 1 - \left\{ \frac{6(\sum D^2)}{n(n^2 - 1)} \right\}$$

Where:-

$r_s$  = The correlation value to be calculated in Spearman's rank order correlation formula.

$\sum D^2$  = the sum of square of difference in value of IT and quality level.

$N$  = number of samples considered, in our case 7

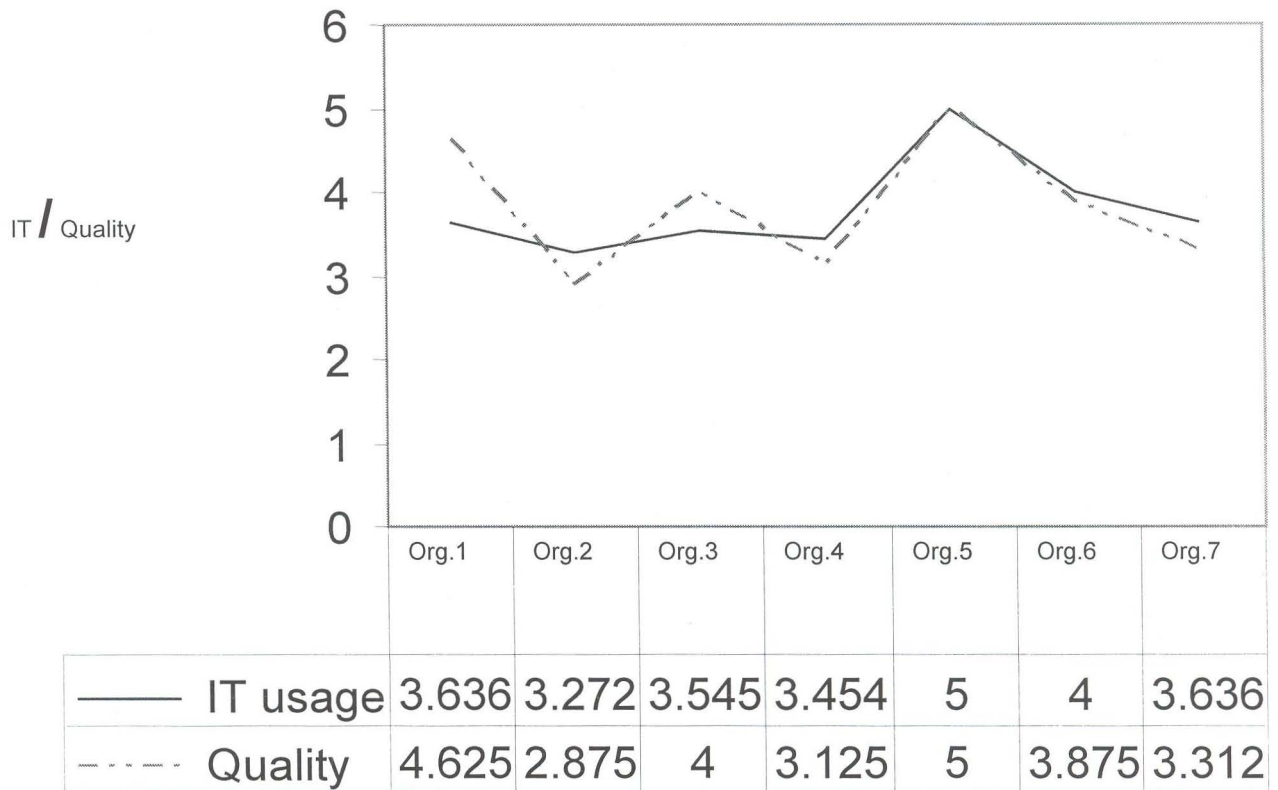
Hence, substituting values in the formula:

$$\begin{aligned} r_s &= 1 - \left\{ \frac{6(12.5)}{7(7^2 - 1)} \right\} \\ &= 1 - \left\{ \frac{75}{336} \right\} \\ &= 1 - 0.223 \\ &= 0.777 \end{aligned}$$

From table for  $N = 7$ , the tabled value of  $r_s =$  which is less than the  $r_s$  value calculated for the .05 level of significance. This number difference tells us that the relation between the two variables is statistically significantly larger than zero. Hence, the use of information technology in manufacturing process is seen to contribute for better product quality as quality is measured in different variables.

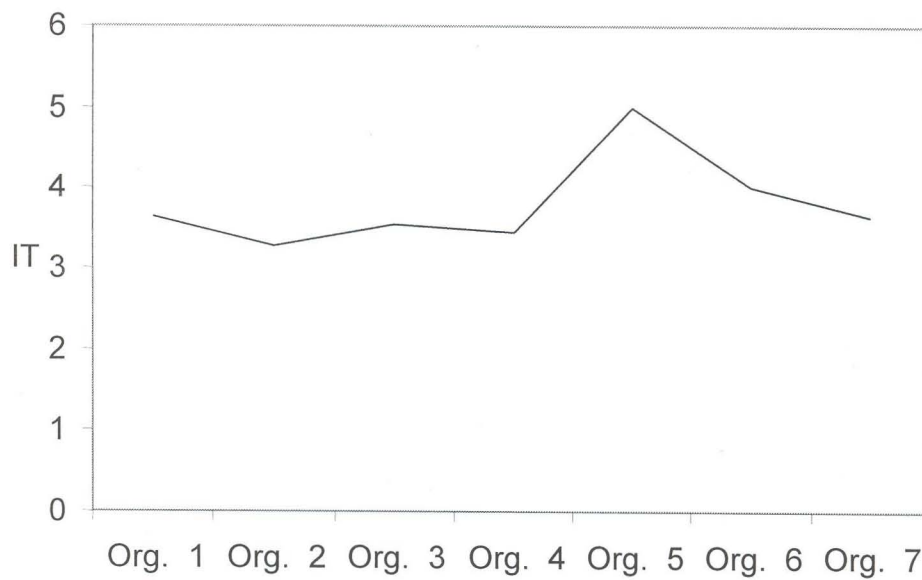
The relationship between these variables can be represented graphically for more clarification:

Fig.10. Response of IT and Quality



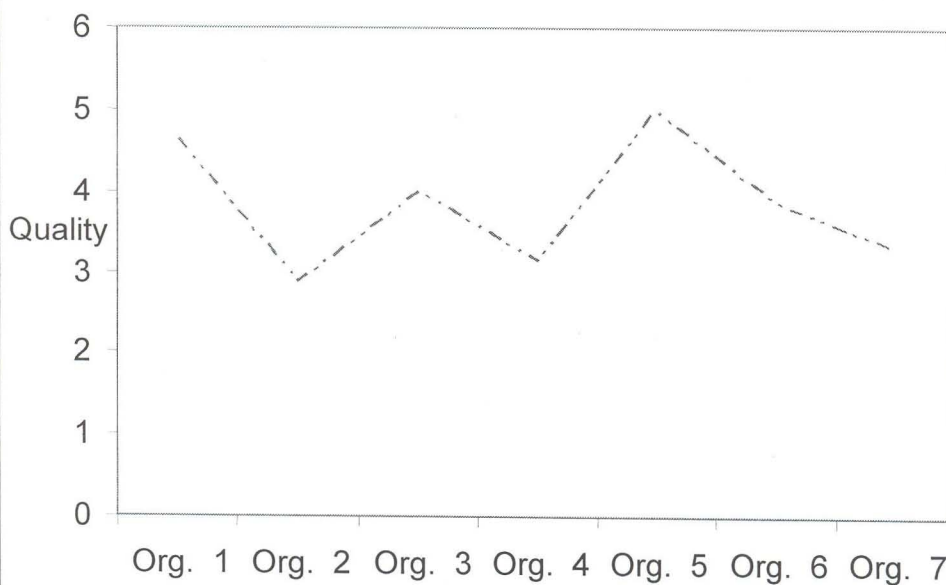
From the graph above, we can see that for some organizations the quality levels of products show a sensitive change for slight IT decline and vice versa. For some organizations, like Org 2, 4 and 7 the quality level of products is not responsive to IT usage. Again for proportional rank of IT usage, organizations show a varying level of quality improvement which is possibly due to the manpower and other related inputs utilization of the IT investment.

Fig.11. IT usage in manufacturing firms



The IT usage of organizations show a pattern to be similar for most of the organizations (Org 1,2,3,4,5,7) which means that they are at a similar level of IT usage. However the quality of product expected varies.

Fig.12. Quality level of products



## 4.2. MANAGERIAL IMPLICATION

The relationship between the usage of information technology and product's quality has been tried to prove through the project. Both the theoretical discussion and analytical approaches show that there is a definite relationship in between. For managers in the manufacturing areas, this is a concrete evidence to invest on IT for firms overall performance, which comes from products ability to satisfy customers. However, basing on the result of the project, I can say:-

Since IT's contribution to product quality is assured,

- Firms that are not utilizing information technology components for their manufacturing process need to implement it as soon as possible to cope with other firm's products.
- Firms, already using IT components to get the proper return of their investment need to have sufficient budget for the maintenance and expansion of the system. From the result found, it is seen that only 28.58% of the firms have allocated sufficient budget, but the rest didn't. This situation will limit the firm's utilization of available resources even due to in or defects which could probably to be solved easily.
- Less availability of skilled personnel's is also seen as a constraint for firms already using IT components. The presence of skilled man power is a key to utilize the resource that the firm has invested on. From the data collected, 28.57% of the firms have assigned skilled man power to utilize IT components & software packages. This & the above cases shows that the management of the manufacturing firms are not properly information technology for the objective there are sought.

In general for effective actions in organization, the plan should be consistent with every action, i.e. when a firm is planning to invest

on IT components, it is worth to plan all related actions together like human power development and maintenance.

Finally, the project has resulted in a conclusion that information technology is contributing a significant value to the improvement of product quality in manufacturing firms basing on samples taken from the firms in Ethiopia.

### **4.3. RECOMMENDATION**

Based on Lucas (1999) it is advisable for all manufacturing firms to implement information technology components in their manufacturing process. The result of the study shows a high correlation between the two variables. This means that one variable has a considerable effect on the other variable.

Hence, firms:

- Need to allocate sufficient budget to implement IT system,
- Are expected to train individuals for proper utilization of available resources,
- Should utilize the already existing IT components for better quality production,
- Should accept and properly understood the relationship between the two variables and use the concept for further growth and development.

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## Appendices – 1 QUESTIONNAIRE

Dear Sir/Madam:

Thank you in advance for your cooperation.

This questionnaire has been developed as a tool of assessing information for the project which leads in to partial fulfilling the requirements for Master of Business Administration. The information to be collected will be used to asses the current utilization of information technology in manufacturing firms in relation with its contribution to improve product quality. The questionnaire has two parts: the first to asses Information Technology's utilization in manufacturing process and, the second to see its contribution for the Product Quality.

The information gathered through this questionnaire is confidential and will be used only for the research purpose.

### **Part One-IT utilization**

The questions presented here are targeted to evaluate the extent to which IT is used in the manufacturing process.

1. Do you have Computers in your organization?  
A) Yes                      B) No
  2. If 'Yes' for Question No. 1, what is their Number? (If 'No' please pass to question No. 22) \_\_\_\_\_
  3. For what purpose are you using these computers?
    - A)        Secretarial service only
    - B)        Designing service only
    - C)        Quality control service only
    - D)        Any of the above functions in combination
    - E)        Other purpose. Please specify
-

4. If your answer for Question No. 3 is different from 'A' and 'E', how many computers are you using for non-secretarial purpose? \_\_\_\_\_
5. How far are you using these computers for these purposes (referring the above question)? \_\_\_\_\_
6. How were you doing just before that time?  
\_\_\_\_\_
7. Does the computers are connected through a network system?  
A) Yes                      B) No
8. If 'Yes' for the above question, for what purpose are you using the network system? \_\_\_\_\_
9. What is your organization's annual budget (on average)? \_\_\_\_\_
10. What amount of money does your organization have invested for computers and their related expenses (networking, training, software customization or any other)? \_\_\_\_\_
11. Manufacturing process is supported by computers and / or other IT components.
- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |
12. Manufacturing process is supported by relevant software packages.
- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |
13. There are skilled personnel to utilize software packages for manufacturing process.
- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |
14. Network system is utilized to facilitate manufacturing process.
- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |
15. Employees have good acquaintance with the basics of information technology.
- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

16. Employees have been given training on the use of information technology appliances in the company.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

17. Employees have the chance to upgrade their information technology knowledge towards the newly introducing programs.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

18. There is a way to asses the recent technological level of programs / software that help in manufacturing process.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

19. There are individuals assigned to resolve problems in the information technology appliance.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

20. The management has allocated sufficient budget for the maintenance and expansion of the system.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

21. The management feels that information technology has considerable support for the manufacturing process.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

---

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22. If your answer is 'No' for question No.1 above, what is your reason not to do so?

---

---



31. Products are being produced as per the scheduled time.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

32. Products are being produced within the allocated budget.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

33. Reprocessing/Rechecking of products become reduced or eliminated.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

34. Products are being sealed perfectly (more accurately).

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

35. Final product's composition is fairly uniform.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

36. Products are becoming more reliable.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

37. The manufacturing process becomes simplified.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

38. The manufacturing process becomes less human intensive.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

39. The sales volume of the product shows increment.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

40. The market share has shown a remarkable improvement

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

41. Products show a uniform status (size, level, quantity ...).

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

42. Number of loyal customers is increasing.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

43. Customers are coming with colleges, relatives, friends, and or families for additional purchase of our product.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |

44. The final chance of error occurrence has been eliminated.

- |                  |                     |              |
|------------------|---------------------|--------------|
| ⑤ Strongly Agree | ④ Agree             | ③ Less Agree |
| ② Disagree       | ① Strongly Disagree | ① No idea    |