IMPLEMENTATION OF ERP IN MUCELL TECHNOLOGY
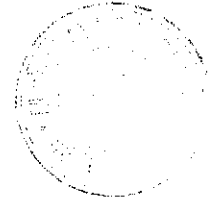
By

SUGANTHI.K

0906MBA1841

68309200388

A PROJECT REPORT

Submitted to the

FACULTY OF MANAGEMENT SCIENCES

in partial fulfillment for the award of the degree

of

MASTER OF BUSINESS ADMINISTRATION

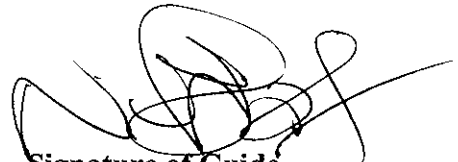**CENTRE FOR DISTANCE EDUCATION**

ANNA UNIVERSITY CHENNAI

CHENNAI 600 025

August, 2011

BONAFIDE CERTIFICATE

Certified that the Project report titled *'IMPLEMENTATION OF ERP IN MUCELL TECHNOLOGY'* is the bonafide work of Ms. SUGANTHI.K who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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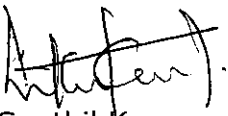Coimbatore-49.

Micro Tech Polymers

Date: 08/08/2011

Place: Coimbatore.

To whomsoever it may concern.

This is to inform you that Miss K.Suganthi of MBA student, Anna University was doing a project on **Implementation of ERP in Mucell Molding technology** and for the past four months she was in the process of collecting various data's regarding the Mucell technology from various industrial experts, from the injection molding machine suppliers and also from Rawmaterial manufacturers. She had interaction with automotive system suppliers like Visteon, TRW and Wonjin Auto products to get to know the exact use of Mucell technology in Automobile application.

She had already developed Road map for the implementation of ERP (SAP Business 1 Module for SME sector) with the guidance of Conquer InfoTech India Private Limited who are the channel partner for SAP implementation.

The process of collecting data's and analyzing data's been completed successfully.
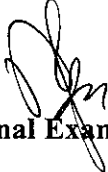
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Certificate of Viva-voce-Examination

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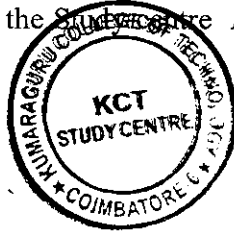
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Date:

*Note : 1. This Annexure shall be attached to the Project Report to be sent to the Director, Centre for Distance Education, Anna University, Chennai 600 025.

2. A Xerox copy of the signed certificate shall be attached to the project copy retained at the Study centre library.

ABSTRACT

ERP Deals with all type of business, it is a combination of business management practice and technology, where information technology integrates with company's core business processes to enable the achievement of specific business objectives. Whereas Mucell technology is a one used to reduce the part weight of a product so that we can save material, reduce power consumption. This Mucell technology is used in plastic injection molding industries and it is in initial stage of implementation, many technologies same as Mucell got failed during implementation phase and couldn't able to sustain in the business activities. So in order to success out the Mucell technology it is been decided to integrate with ERP.

This study of Integrating Mucell with ERP is undertaken to understand the benefits involved in meshing Mucell with ERP.

(SUGANTHI.K)

ACKNOWLEDGEMENT

Let me take this opportunity to express my gratitude to all around me who helped me in my project work. I am grateful to God Almighty for guiding me to select the topic and giving me the light to the subject without which I would have stumbled on the way.

I am indebted to the Director, Centre for Distance Education, Anna University-Chennai

I am also thankful to Prof.Dr.Vijila Kennedy, Director, KCT Business School, Cbe & Coordinator, KCT Study Centre, Coimbatore-49

I express my sincere thanks to Mr.A.Senthil Kumar, Asst Professor (Sr.Grade), KCT Business School, Cbe &Counselor - MBA programme, KCT Study Centre, Coimbatore-49

I am also thankful to Dr.N.MOHANDAS GANDHI, Professor, KCT Business School, Kumaraguru College of Technology, for his continuous support for completing this project.

I express my gratitude to all my friends who have helped and co-operated with me in the preparation and presentation of this paper.

(SUGANTHI.K)

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LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE

SYMBOLS:

% - Percentage

g-grams

s-seconds

Charts (Bar).

ABBREVATIONS

Mucell-Microcellular

ERP-Enterprise Resource Planning

IMM-Injection Moulding machines

MTP-Microtech Polymers

DOE-Design of Experiments

N2-Nitrogen

SCF-supercritical fluid

Co2-Carbon di oxide.

Information Technology (IT)

SQL-Structured Query Language.

CHAPTER 1 – INTRODUCTION

1.1 RESEARCH BACKGROUND

Plastics are "one of the innovations of the millennium". There are a myriad ways that plastic is and will be used in the years to come. The fact that plastic is lightweight, does not rust or rot, helps lower transportation costs and conserves natural resources is the reason fro which plastic has gained its much popularity. plastics are everywhere and have innumerable uses! Plastics are durable, Light weight, and reusable. The automotive industry choses plastics for their durability, corrosion resistance, ease of coloring and finishing,resiliency,energy efficiency and light weight. The automotive industries uses plastics, plastic reduces energy consumption. Plastics are certainly are a gift of these industries, and certainly cuts a chunk out of their production costs!

Process used in Injection Molding:

Injection Molding is a manufacturing process for fabrication of plastic parts. Material is fed into a heater barrel, mixed and forced into a mold cavity where it cools and hardens to the configuration of the mold cavity. After a product is designed, usually by an industrial designer or an engineer, molds are made by a mold maker from metal, usually either steel or aluminium, and precision-machined to form the features of the desired part. Injection molding is widely used for manufacturing a variety of parts, from the smallest component to entire body panels of cars. Here the thermoplastic injection molding is used.

Thermoplastic Injection Molding Process

The thermoplastic injection molding process begins by adding pelletized material to a hopper. In most cases, the material must is dried prior to molding, and frequently requires the addition of a color concentrate before loading. The material is gravity fed into a heated barrel and screw. Rotation of the screw results in shearing action on the raw pellets causing them to melt. The screw rotation also pushes the molten plastic forward in the barrel toward the mold. The material is then injected into the closed mold at high pressure through a runner system to fill all the cavities. The mold is clamped shut under enough force to keep the mold halves together while the molten plastic is flowing. On a cold runner system, the plastic in the runner solidifies and must be discarded or ground into pellets to be reused, which we refer to as "regrind." If a hot runner system is used, the plastic in the runner stays molten, and no material is wasted. When the mold cavities are filled, the part cools until rigid enough to be ejected. Part cooling within the mold is accomplished through water lines cut into the mold. At the completion of the cooling cycle, the mold opens and the part(s) are ejected for part removal.

Materials used in Thermoplastic Molding and its description and applications

Material name	Abbreviation	Trade names	Description	Applications
Acetal	POM	Celcon, Delrin, Hostaform, Lucel	Strong, rigid, excellent fatigue resistance, excellent creep resistance, chemical resistance, moisture resistance, naturally opaque white, low/medium cost	Bearings, cams, gears, handles, plumbing components, rollers, rotors, slide guides, valves
Acrylic	PMMA	Diakon, Oroglas, Lucite, Plexiglas	Rigid, brittle, scratch resistant, transparent, optical clarity, low/medium cost	Display stands, knobs, lenses, light housings, panels, reflectors, signs, shelves, trays
Acrylonitrile Butadiene Styrene	ABS	Cycolac, Magnum, Novodur, Terluran	Strong, flexible, low mold shrinkage (tight tolerances), chemical resistance, electroplating capability, naturally opaque, low/medium cost	Automotive (consoles, panels, trim, vents), boxes, gauges, housings, inhalors, toys
Cellulose Acetate	CA	Dexel, Cellidor, Setilithe	Tough, transparent, high cost	Handles, eyeglass frames
Polyamide 6 (Nylon)	PA6	Akulon, Ultramid, Grilon	High strength, fatigue resistance, chemical resistance, low creep, low friction, almost opaque/white, medium/high cost	Bearings, bushings, gears, rollers, wheels
Polyamide 6/6 (Nylon)	PA6/6	Kopa, Zytel, Radilon	High strength, fatigue resistance, chemical resistance, low creep, low friction, almost opaque/white, medium/high cost	Handles, levers, small housings, zip ties
Polyamide 11+12 (Nylon)	PA11+12	Rilsan, Grilamid	High strength, fatigue resistance, chemical resistance, low creep, low friction, almost opaque to clear, very high cost	Air filters, eyeglass frames, safety masks

Material name	Abbreviation	Trade names	Description	Applications
Polycarbonate	PC	Calibre, Lexan, Makrolon	Very tough, temperature resistance, dimensional stability, transparent, high cost	Automotive (panels, lenses, consoles), bottles, containers, housings, light covers, reflectors, safety helmets and shields
Polyester - Thermoplastic	PBT, PET	Celanex, Crastin, Lupox, Rynite, Valox	Rigid, heat resistance, chemical resistance, medium/high cost	Automotive (filters, handles, pumps), bearings, cams, electrical components (connectors, sensors), gears, housings, rollers, switches, valves
Polyetheretherketone	PEEKEEK		Strong, thermal stability, chemical resistance, abrasion resistance, low moisture absorption	Aircraft components, electrical connectors, pump impellers, seals
Polyethylene - Low Density	LDPE	Alkathene, Escorene, Novex	Lightweight, tough and flexible, excellent chemical resistance, natural waxy appearance, low cost	Kitchenware, housings, covers, and containers
Polyethylene - High Density	HDPE	Eraclene, Hostalen, Stamylan	Tough and stiff, excellent chemical resistance, natural waxy appearance, low cost	Chair seats, housings, covers, and containers
Polyphenylene Oxide	PPO	Noryl, Thermocomp, Vamporan	Tough, heat resistance, flame resistance, dimensional stability, low water absorption, electroplating capability, high cost	Automotive (housings, panels), electrical components, housings, plumbing components
Polypropylene	PP	Novolen, Appryl, Escorene	Lightweight, heat resistance, high chemical resistance, scratch resistance, natural waxy appearance, tough and stiff, low cost.	Automotive (bumpers, covers, trim), bottles, caps, crates, handles, housings

Material name	Abbreviation	Trade names	Description	Applications
Polystyrene - General purpose	GPPS	Lacqrene, Styron, Solarene	Brittle, transparent, low cost	Cosmetics packaging, pens
Polystyrene - High impact	HIPS	Polystyrol, Kostil, Polystar	Impact strength, rigidity, toughness, dimensional stability, naturally translucent, low cost	Electronic housings, food containers, toys
Polyvinyl Chloride - Plasticised	PVC	Welvic, Varlan	Tough, flexible, flame resistance, transparent or opaque, low cost	Electrical insulation, housewares, medical tubing, shoe soles, toys
Styrene Acrylonitrile	SAN	Luran, Arpylene, Starex	Stiff, brittle, chemical resistance, heat resistance, hydrolytically stable, transparent, low cost	Housewares, knobs, syringes
Thermoplastic Elastomer/Rubber	TPE/R	Hytrel, Santoprene, Sarlink	Tough, flexible, high cost	Bushings, electrical components, seals, washers

Defects and its causes in injection molding

Defect	Causes
Flash	Injection pressure too high
	Clamp force too low
Warping	Non-uniform cooling rate
Bubbles	Injection temperature too high
	Too much moisture in material
	Non-uniform cooling rate
Unfilled sections	Insufficient shot volume
	Flow rate of material too low
Sink marks	Injection pressure too low
	Non-uniform cooling rate

Defect	Causes
Ejector marks	Cooling time too short
	Ejection force too high

So in order to reduce warpage,sink marks,injection pressure,and to increase the flow rate we going for Mucell technology

Process involved in Mucell Technology

- The Mucell procedure devised by Trexel Inc., Woburn (USA) is a Physical foaming process for producing microcellular structure in the molded parts.
- It includes injecting a supercritical fluid (SCF) of an atmospheric gas such as Nitrogen (N2) or Carbon dioxide (Co2) via suitable injector, in to the melt stream on the injection cylinder.
- Gases in supercritical state behave in a similar way to liquids, allowing precise dosage in terms of volume and uniform distribution of the into the molten polymer.
- The rapid drop in pressure as the mold is filled because a change of aggregate state in the gas released into the molten mass, from liquid into gas form. As gas expands this creates a large number of minute (5-100 micron) cell structure.
- The pressure of the gas in the subsequent cooling phase causes the growth of the cell, thereby supporting the shaping of the molded part in the cavity.

The MuCell Microcellular Foam injection molding technology is a complete process and equipment technology which facilitates extremely high quality and greatly reduces production costs. The MuCell Process involves the controlled use of gas in its supercritical state to create a foamed part (Foaming Process: Mixing, Nucleation, Expansion, Cell Opening, Gelanation and Curing). The MuCell Technology is targeted at precision and engineered plastic components with maximum wall thicknesses of less than 3mm.

The MuCell Process generally offers a 50-75% improvement in key quality measures, such as flatness, roundness, and warpage, also eliminating all sink marks. These improvements result from the fact that relatively uniform stress patterns are created in the molded part rather than non uniform stress characteristic of solid molding.

As a direct result of the uniform stress and shrinkage associated with the MuCell Process (which occurs because the pack and hold phase of the molding cycle is eliminated), the parts that are produced tend to comply far more closely with the mold shape and, presumably, the dimensional specifications of the part itself. This means that when using the MuCell Process, fewer mold iterations are needed to produce a compliant part, saving time and cost.

The quality advantages of the MuCell Process are complemented by certain direct economic advantages, including the ability to produce 20-33% more parts per hour on a given molded machine, and the ability to mold parts on lower tonnage machines as a result of the viscosity reduction and the elimination of the packing requirement that accompanies the use of supercritical gas.

Benefits of Mucell Technology

- Reduced Wall Thickness
- Improved Physical Properties
- Standard Polymer Grades
- Environmentally Friendly
- Blowing Agents
- Improved Recyclability.

In Mucell technology, it could be very difficult to predict the percentage of gas to be allowed for components based on its properties and even though it reduces the part weight, once if we failed to monitor the wastages consumed and rectify it could not be able to withstand in this field for long period of time. Peoples working in Shop floor works without any standard pathway. They just work on some assumption and predict the percentage of gases to be added to standard technology and keep working towards it. So in order to change the attitude of employees working in industries using Mucell technology and for the benefits of the organization and to withstand the Mucell technology in this field for long time, meshing of Mucell with ERP is the best solution and ERP helps in all types of business activities. Once when the property of materials is been fed accurately, it gives out the exact information.

Limitations

- Since this technology is on the implementation stage in India so the data's will be obtained only through the technology implementer in USA and not with the user directly. So the implementation phase takes more time.

Enterprise Resource Planning(ERP)

Enterprise resource planning integrates internal and external management information across an entire organization. An enterprise with ERP according to its needs can find many kinds of software that allow interaction, and that cannot be customized. They are able to optimize the organizational business activities. For example, the engineering design of the software will be needed in order to improve the product, and to follow the client's behavior and choices since the first contact is quite important.

ERP systems typically include the following characteristics:

- An integrated system that operates in real time (or next to real time), without relying on periodic updates.
- A common database, which supports all applications.
- A consistent look and feel throughout each module.
- Installation of the system without elaborate application/data integration by the Information Technology (IT) department.

Modules in ERP

- Sales and marketing Module

- Inventory Management Module.

- Supply chain management
- Purchase Module

- Manufacturing Module

- Customer relationship management

- Data services
- ERP Financial Module.

Databases

- SQL Databases is used

When coding an application, the decision to use a SQL server is a requirement for dynamic content. Microsoft SQL Server is a database application that can be used by large or small businesses. It can also be used by the individual for online applications. There are several advantages of using SQL Server over inline SQL commands.

- Stored Procedures

- Scalability

- Security

- Transaction Logs

- Automatic Backup

ERP application on Mucell

Sales and marketing Module

Sales and marketing module is used to record data related to sales department of the organization. Data recorded in this module are sales order processing includes sales order, picking, orders shipping, sales invoice and sales returns.Based on orders placed, ERP manipulate with the feeded data it calculates the material required for particular order.

Inventory Management Module

ERP Inventory Management module facilitates recording of data in the inventory department. Activities of the Inventory department such as receipt of goods, delivery of goods, maintenance of material in the stock sections, classifying all the materials, issuing of materials to the manufacturing department, rejections from the suppliers are recorded with full details. Based on materials requirements calculated from orders raised is compared with the inventory level and raw materials indent must be passed.

Supply chain management

Order to cash, inventory, order entry, purchasing, product configurator, supply chain planning, supplier scheduling, inspection of goods, claim processing, commissions

Purchase Module

ERP Purchasing module streamline procurement of required raw materials. Based on indent passed, It automates the processes of identifying potential suppliers, negotiating price, awarding purchase order to the supplier, and billing processes. Purchase module is tightly integrated with the inventory control and production planning modules. Purchasing module is often integrated with supply chain management software.

Manufacturing Module

Properties of materials is collected from the Mucell technology implementer. Datas regarding the properties and the details about the product say weight of the product, basic raw material used for particular part and percentage of wastage is to be allowed based on its material properties is to be recorded in this module when Bill of materials have to be Created, Work Orders have to be created and WIP receipts are to be created for recording completed work orders. Based on the Data Feeded the ERP manipulate and gives complete information of how much percentage of fluid is to be added to particular product based on its weight and raw material properties and gives the output and if wastage percentage exceeds the fixed level it highlights and alerts to take necessary steps. It helps to complete the schedule intime based on work orders raised.

Customer relationship management

Sales and marketing, commissions, service, customer contact, call center support

Data services

Various "self–service" interfaces for customers, suppliers and/or employees.

ERP Financial Module

Both for-profit organizations and non-profit organizations benefit from the implementation of ERP financial module. The financial module is the core of many ERP software systems. It can gather financial data from various functional departments, and generates valuable financial reports such balance sheet, general ledger, trail balance, and quarterly financial statements.

Implementation of ERP in Mucell Technology helps the organization in various activities namely

- It helps to monitor the wastages consumed and operational cost to produce a particular product and if exceeds the estimated level, italerts the management and other related peoples to take necessary actions.
- It helps in Lean Manufacturing
- It helps to the predict the Reorder Level, so that we can able to meet customer demands in time and satisfy them.

1.2. IDENTIFIED PROBLEM

The existing standard technology has problems like

- Wastages consumed could not be monitored and recorded during each process and to control it, through which the profit can be retained.

- No Lean Manufacturing is followed.

- No proper scheduling, due to which dissatisfaction of customer occurs.

- Manual error occurs in calculating the percentage of fluid to be added to the raw material based on its properties in order to reduce the weight.

1.3. NEED FOR THE STUDY

Implementing ERP in Mucell is considered as a solution for the above discussed problems. Its use is credited towards the success enjoyed by those who work on Plastic Molding Parts.

- This study is undertaken to monitor the wastages consumed and helps the organization to take necessary steps.

- To create lean manufacturing, which is achieved by means of easy access to previous datas.

- This implementation of ERP in Mucell technology, will helps the management peoples to plan and work towards it to satisfy customer needs in time through proper scheduling.
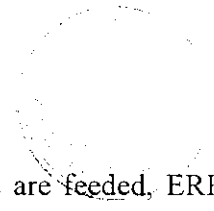
- This will avoid Manual error occurrence because once the exact datas are feeded, ERP will manipulate the datas and gives out the exact percentage of fluid to be added to particular raw material to be used.

- This study will help the organization in identifying the benefits involved in implementing ERP on Mucell technology.

- This study with various analysis provides the wide idea for emerging organization on implementing the technology.

1.4. OBJECTIVES AND SCOPE

A Study on integrating Mucell with ERP with special reference to microtech polymers is taken on the following objective.

PRIMARY OBJECTIVE:

To Study the potential costs & benefits involved in integrating Mucell with ERP

SECONDARY OBJECTIVE:

- To study the ways to reduce operational cost.

- To Study about how the implementation have changed the attitude of the peoples who works in the organization.

- To study about how peoples get adopted to changes made

- To study about have the implementation changed the way of doing a work.

SCOPE OF THE STUDY:

- This Study helps in identifying whether the attitude of employees towards the way of doing related work is changed.

- This Study is most helpful in identifying the employees and management expectations and requirements.

- This Study helps to get opinion from the employees regarding the training and development programme conducted related to ERP.
- The study will help the organization to understand the present scenario. It aims to analyze and understand the factors that o be incorporated and improved in order have cost benefits.
- This Study will be very useful and also help to identify the strength weakness of the present working condition.
- This study helps to identify the ways to reduce the operational cost.
- The study will helps in disclosing their opinions and views about this implementation

To the Researcher

The study helps the researcher to have a practical exposure in the field of Injection Molding operations. It enables the researcher to identify the factors, which influence the objective of reducing the cost and benefits involved in meshing ERP with Mucell

To the Organization   .

The study will help the company to understand the present scenario in the organizations.
It aims to analyze and understand the factors that need to be incorporated and improved in order to have effective technology that satisfies employers and customers.

To the Respondents

The study will help the respondents to disclose their opinions and views about the this implementation and also the impacts of the same.

1.5. DELIVERABLES

- Reducing the wastages consumed by taking necessary steps from the data's monitored during each process and through which cost saving occurs.

- Statistical report which describe the technology in all extent.
- Impact created in the business world by using this study.
- Satisfying customer's needs and expectations.
- Ideas and Concepts for innovative & emerging organizations to adopt Mucell   technology mesh with ERP with effective analysis.
  It creates lean manufacturing.

CHAPTER 2 - LITERATURE SURVEY

2.1. REVIEW OF LITERATURE

➢ **John T. Tester, Northern Arizona University College of Engineering and Technology, Flagstaff, Arizona, Ty HargroderOliver Engineering, Inc.Portland, Oregon in their Study on "REDUCING DISTORTION IN SIMULATED INJECTION-MOLDED WIND TURBINE BLADES."** The small wind turbine commercial market is very competitive and has small profit margins. Injection molding (IM) of plastic turbine blades is one means by which a higher cost component can be produced efficiently in large production volumes. However, establishing IM process parameters for the turbine blades is not an easy task; the long, thin shape of the blades tends to result in warped parts. Research conducted by Northern Arizona University Sustainable Energy Solutions group demonstrates how to reduce the amount of warp in the part through a combination of simulation and Design of Experiments (DOE) methodology. Two measures of warp were used: Tip deflection and an average warp parameter developed by the researchers. Based upon typical molding research the governing parameters that affect the amount of warp are the mold temperature, melt temperature, injection pressure, and packing pressure. The results for a generic, small wind turbine blade show that overall warp in a blade can be minimized by seeking optimal IM parameters. Simulations were organized for a Central Composite Design; the resulting response surface was optimized for minimum warp, yielding the optimal process settings. For this particular blade shape and material, injection pressure was discovered not to be a major factor in warp. The maximum settings for packing pressure, melt temperature, and mold temperature were found to minimize warp.

We demonstrated a method by which a small wind turbine blade can be optimized for injection molding in order to minimize warp. RSM is used in combination with injection molding simulation to fit a statistically valid math model which represents warp as a factor of injection pressure, packing pressure, melt temperature and mold temperature. The results of this analysis showed that, for these simulation experiments, injection pressure had no effect on the warp results. The optimal settings for the injection molding process of the turbine blade shape match that of IM general practice: Run the process at maximum melt and mold temperature, with a high packing pressure. However, it is noted that such a process scenario **can increase cycle times of the parts. Thus this technology leads to increase in cycle time so we going for Mucell Technology with ERP Implementation in order to control the process effectively and satisfy the customer.**

> **Ford Technology: 'Honeycomb' Plastic Saves Weight**

By **COLOGNE, Germany** – In their never-ending quest to reduce weight and therefore emissions and fuel use, Ford's engineers are producing lighter plastic parts by injecting gas bubbles during manufacturing.

MuCell brings a host of other benefits with lower pressures used to mould the plastic and up to 33 per cent more parts per hour than a conventional process. This increase in speed and efficiency reduces energy consumption, manufacturing emissions and cost for parts produced using the innovative technique.

MuCell technology expert Carsten Starke is excited by the potential of the new process. He says: "The first time I saw this plastic under the microscope I thought to myself it looks like an Aero chocolate bar! The bubbles in the chocolate change the taste, but in our plastics they save weight and making cars lighter reduces emissions and fuel consumption significantly. But they failed to conduct research on how to satisfy customers on long term basis & to withstand the competition.

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- John T. Tester Northern Arizona University College of Engineering and Technology Flagstaff, Arizona,Ty Hargroder Oliver Engineering, Inc. Portland, Oregon REDUCING DISTORTION IN SIMULATED INJECTION-MOLDED WIND TURBINE BLADES
- J. Xu, Morphology study for microcellular injection molding, **ANTEC, SPE**, 2009.

2.2. RESEARCH GAP

This study or research is mainly targeting only Plastic Injection Molding organizations.
Since this is an emerging technology, it's impossible to collect practically proven results. Study is undertaken based on the current implementation and predicted/projected targets.

CHAPTER 3 – METHODOLOGIES

3.1. TYPE OF PROJECT:

This study is Exploratory & Descriptive in nature. The study has been conducted in the form of survey, so that the inputs can be received from the respondents. This study will help the organization in identifying the factors that involved in adopting the integrating ERP with Mucell technology. This study with various analysis provides the wide idea for emerging organization on implementing the technology.

3.2. TARGET RESPONDENTS

- Peoples who knows Plastic Molding operations and ERP.
- Peoples who own Plastic Injection Molding Companies and interested to implement new technologies mesh with ERP.

3.3. ASSUMPTIONS, CONSTRAINTS AND LIMITATIONS

The study was conduced among 100 respondents in Microtech polymers. The limitations that can be a restriction to the accuracy of the research findings are.

- Since this technology is on the implementation stage in India so the data's will be obtained only through the technology implementer in USA and not with the user directly. So the implementation phase takes more time.

- This technology is mainly targeting on plastic molding organizations.

3.4 RESEARCH APPROACH

Research can be defined as a systematic and scientific search for pertinent information. It is the manipulation of things, concept or symbols for the purpose of generalizing to extend or verify knowledge aids in construction of theory or in the practice of an art. Research methodology is the method by which a research is conducted. It is a way to systematically solve a problem. In research methodology the researcher studies the various steps that are generally adopted in studying a research problem along with the logic behind them.

Research design

A research design is the arrangement of conditions for collections and analysis of data in

manner that aims to combine relevance to the research purpose with economy in procedure. The research design is the conceptual structure within which research is conducted it constitutes the blueprint for the collection, measurement and analysis of data.

Descriptive research design is used for this study where the pilot study was conducted among the employees and with that knowledge, questionnaires were given to the respondents.

Research design includes:

➢ Formulating the objectives of the study.

➢ Designing the methods of data collection.

➢ Selecting the sample.

➢ Collecting the data.

➢ Processing and analyzing the data.

➢ Reporting the findings.

Sources of data

The task of data collection begins after a research problem has been defined and research design plan chalked out. The primary data are those, which are collected afresh and for the first time, and thus happen to be original in character. The secondary data are those which have already existing collected data by some other else and which have already been passed through the statistical process.

Primary Data:

In the study the primary data is being collected from the Employees of Microtech polymers. Primary data was collected through survey. The data collecting instrument used for obtaining the desired information is a questionnaire. The questionnaires were structured and direct as to make the respondents to understand it easily.

Secondary Data:

Secondary data are those data that already exists. Secondary data are collected through company profile, magazines, and previous projects done..

Sample design

A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample. Sampling design, which deals with the method of selecting items to be observed for the given study? The researcher conducted field survey and used questionnaire as the instrument for collecting data.

Sampling unit

A decision has to be taken concerning a sampling unit before selecting sample. Those who work on Molding Operations at Microtech Polymers are taken as sampling unit.

Sample size

The size refers to the number of items or the units to be selected from the population or the universe to constitute a sample. The sample size must not be too large or too small it should be optimum. The sample size for the study includes 100 respondents.

Sampling procedure

The researcher must decide about the technique to be used in selecting the items for the sample. Since the entire population is taken for the study, the method is considered as sensex.

Sampling Method

- **Method:** Non-Probability
- **Technique:** Convenience
- **Sample size:** 100 respondents who works or own the organization related to plastic molding operation.

3.5. DATA PROCESSING

- **Type of Data:** Primary Source
- **Instrument:** Structured Questionnaire

The data thus gathered were appropriately summarized and analyzed using the following methods:

3.6. TOOLS FOR ANALYSIS

Chi-Square Test

The Chi-Square test is one of the simplest and most widely used nonparametric tests in statistical work. The quantity Chi-square describes the magnitude of the discrepancy between theory and observation. A chi-square test allows us to test whether the observed proportions for a categorical variable differ from hypothesized proportions. A chi-square test is used when you want to see if there is a relationship between two categorical variables.

It is used as a test statistic in testing a hypothesis that provides a set of theoretical frequencies with which observed frequencies are compared.

$$\Psi^2 = \sum (O- E)^2 / E$$

Where, O= Observed frequency

E= Expected frequency

The measure of Chi- Square enables us to find out the degree of discrepancy between observed frequencies and theoretical frequencies and thus to determine whether the discrepancy so obtained between observed

Percentage

Percentage analysis was mainly used by the research to analyze and interpret the data. The percentage refers to special kinds of ratio. Percentage is used in making comparison between two or more series of frequencies and theoretical frequencies is due to error of sampling or due to chance.   data. The percentage Analysis X   of a given series of values say X1, X2...n is defined as the sum of these values divided by their total number: as

No. of Responses

------------------------------   X 100

Total No. of Respondents

Weighted Average Mean:

If values X1, X2.... Xn be an values of a variable X and of f1, f2 ... fn be their respective weights or their respective frequencies, then the weighted average is defined as,

Weighted average mean = $\dfrac{\sum W_i X_i}{\sum W_i}$.

Where W_i = Weight of ith item X

X_i = value of the ith item X

Graphical Representation:

The graphs used in this study are following

• Bar.

CHAPTER 4 – DATA ANALYSIS & INTERPRETATION

4.1. ANALYSIS AND INTERPRETATION

Analysis means the computation of certain indices or measures along with searching for Patterns of relationship that exist among the data groups. Analysis, particularly in case of Survey or experimental data, involves estimating the values of unknown parameters of the Population.

Interpretation refers to the task of drawing inferences from the collected facts after an Analytical and/or experimental study. It is essential for the simple reason that the Usefulness and utility of research finds lie in proper interpretation.

The data after collected has been processed and analyzed in accordance with the outline Laid down for the purpose at the time of developing the research plan. This is essential For a study and for ensuring that we have all the relevant data for making comparisons and analysis.

The analysis is based on the following tools

- Simple Percentage Analysis
- Weighted Average Mean
- Chi-square test.

4.2. MUCELL TECHNOLOGY ANALYSIS IN ERP :

Mucell Technology analysis is done on the part "Packing Plate" which is used in automobiles and the Variation of Mucell technology when compared with Standard Technology is tabulated below where the data is retrieved through ERP implementation.

PACKING PLATE MADE OUT OF Mucell technology.
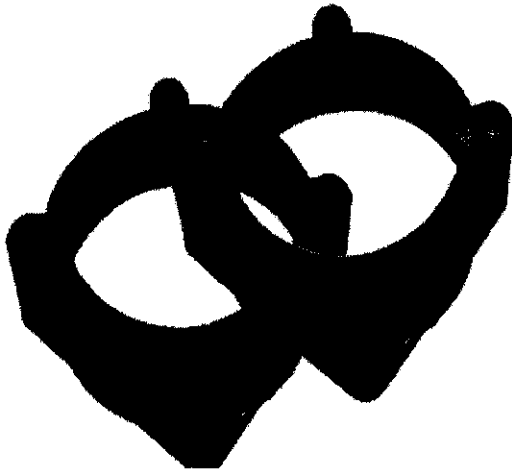
Courtesy:ARBURG

Part Analysed using Mucell technology integrated with ERP

PART DISCRIPTION   : BACKING PLATE (Injection molded)

GEOMETRY   : FIXING DEVICE

                             Wall Thickness 3-10 m.m

                             Dimension 72 x 72 x 25 m.m (approx)

MATERIAL   : POLYAMIDE66 33% G/F

MOULD   : 1 IMPRESSION AUTO MOLD

MACHINE   : ARBURG 320C 600-250

PART WEIGHT   : 21.7 Grams.

Raw material consumed/part : 8grams.

Raw material Name   : Zytel 801 ST Natural

Material cost   : Rs.823/kgs

Cost saved/part   : 6paise/part

No of cavity   : 2 cavities.

12 hrs production using   : 2160 nos

standard raw material

12 hrs production using   : 2880 nos

Mucell Technology

Percentage of SCF fluid   : 1.8 %(predicted based on the properties of raw material
to be added   the standard norms is fixed by technology implementer

                                       the technology inventor.

Table 4.2 Comparison of Mucell with Standard Technology

Parameter	Standard	Mucell	Improvement
Cycle time	40s	30s	25%
Injection Pressure	2000bar	1400bar	30%
Part Weight	29,7g	21,7g	27%
Distortion	High	Low	

So from the above table, we infer that

When Cycle time gets reduced - Productivity increases. So Operational cost decreases.

When Part weight gets reduced we could able to save material, Injection pressure gets reduced – Power Saving occurs i.e. operational cost gets reduced.

Wastages also can be reduced through proper monitoring and we could able to satisfy customer expectations and achieve the goal. Thus we going to integrate Mucell with ERP to increase the profit and reduce the wastage,time,attitude of employees.

ERP is framed based on the requirements and a study is conducted and analyzed how the organization and employees gets benefited out of this mesh.
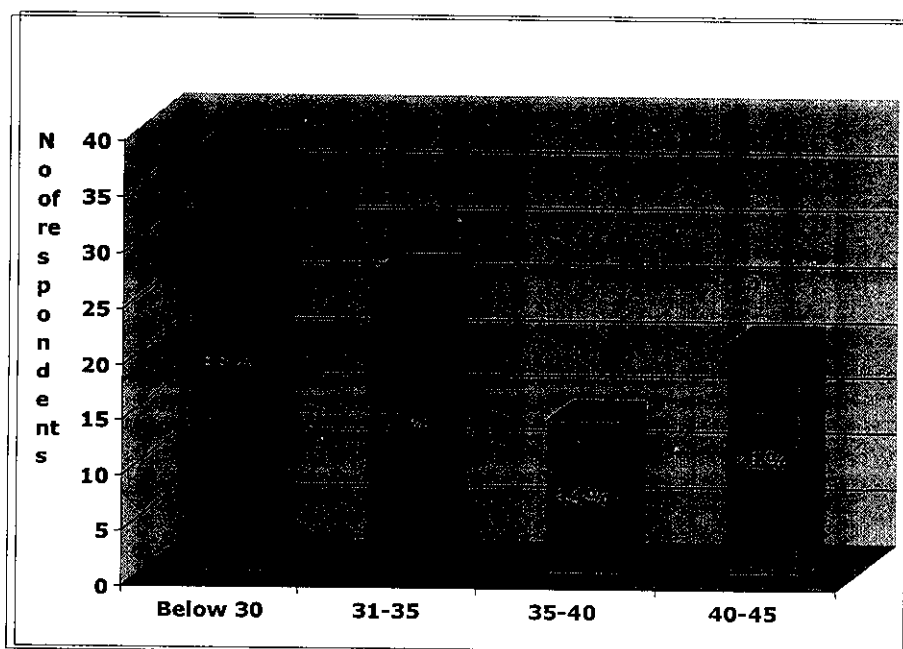
Table 4.2.1 Respondent's classification on the basis of age

Age	No.of.respondents	Percentage
Below 30	38	38
31-35	27	27
35-40	14	14
41-45	21	21
Total	100	100

Source: Primary Data

INTERPRETATION:

The Above table reveals that 38% of the respondents belong to the age group Below 30 and 27% of the respondents belong to the age group of 31-35 and 14% of the respondents belong to the age group of 35-40 and 21% of the respondents belong to the age group of 41-45 and above. Thus, we could infer from the table that nearly half of the total respondents are belonging to the younger generation.

**Chart No 4.2.1. Respondents Classification on the Basis of Age.**

Table 4.2.2 Distribution of Respondent's based on their Experience

| Experience	No.of.respondents	Percentage
Below 5 yrs	31	31
5-10 yrs	45	45
11-15yrs	16	16
15+yrs	8	8
Total	100	100

Source: Primary Data

INTERPRETATION:

The Above mentioned table reveals that 31% of the population is having below 5 years experience and 45% are having 5-10 years experience and 16% are having experience of 11-15 years and 8% of the population is having experience of 15 yrs above .

Chart 4.2.2 Distribution of Respondent's based on their Experience

57%

43%

No of
respond
ents

60

40

20

0

Male
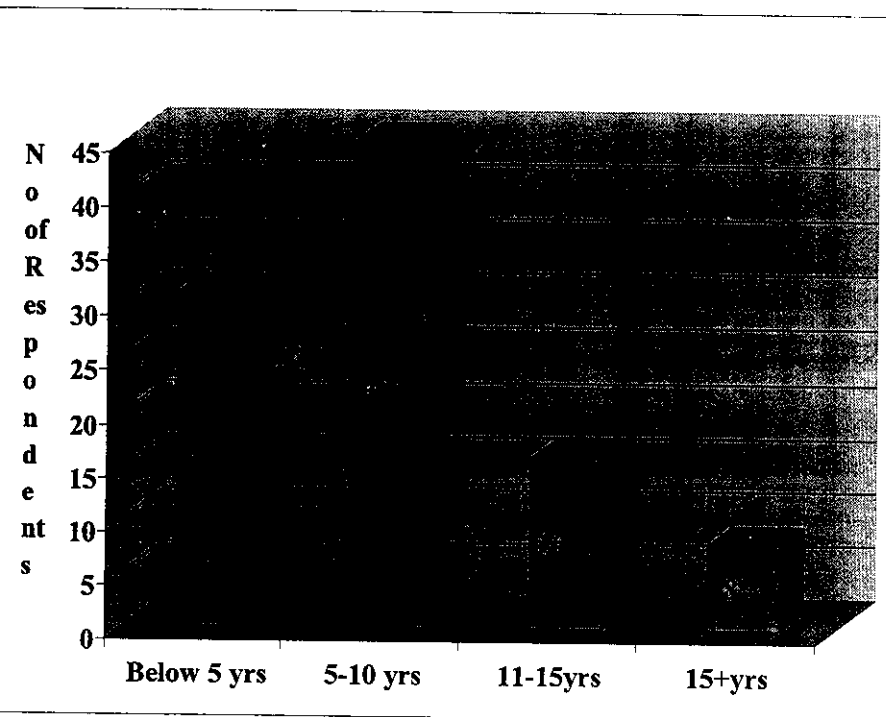
Female
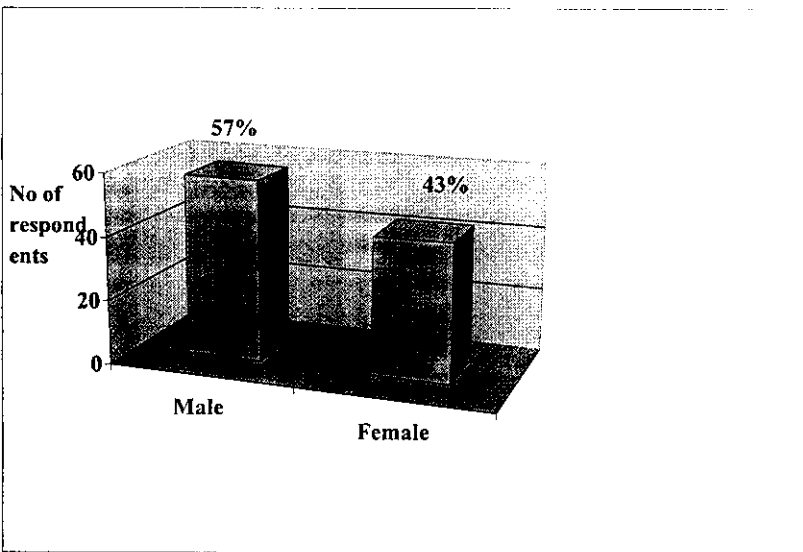
Chart 4.2.3 Distribution of Respondent's based on the Gender

Source: Primary Data

INTERPRETATION:

The Above chart reveals that majority of the total respondent's i.e., 57% of them are belonging to Male category and only 43% of them are belonging to Female category.

a.Married,
56%

Single, 44%

No
of
res
po
nd
ent
s

60

40

20

0

Married

Single
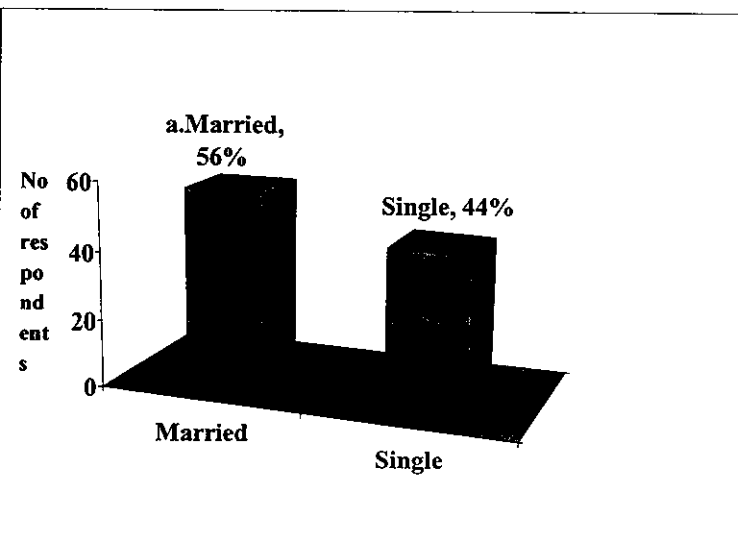
Chart 4.2.4 Distribution of Respondent's on the basis of their marital status

INTERPRETATION:

The Above chart reveals that half of the total respondent's i.e., 56 % of them are falling under married category and Remaining 44% of them are Un-married.

Table 4.2.5 Distribution of Respondent's and their Income Level

Income Level	No.of.respondents	Percentage
Below 15000	25	25
15000-30000	50	50
31000-45000	21	21
Above 45000	4	4
Total	100	100

INTERPRETATION:

The Above mentioned table reveals that 25% respondents having their income level Below 15000 , 50% of them are having their income level around 15000-30000, 21% of them are having their income level around 31000-45000 and only 4% of the respondents are having their income level about 45000&above.
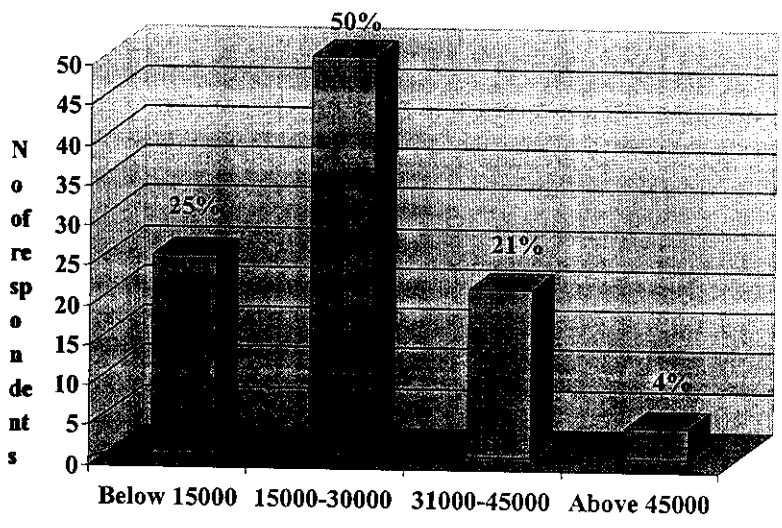
Chart 4.2.5 Distribution of Respondent's and their Income Level

Table 4.2.6 Respondent's interest on implementing ERP

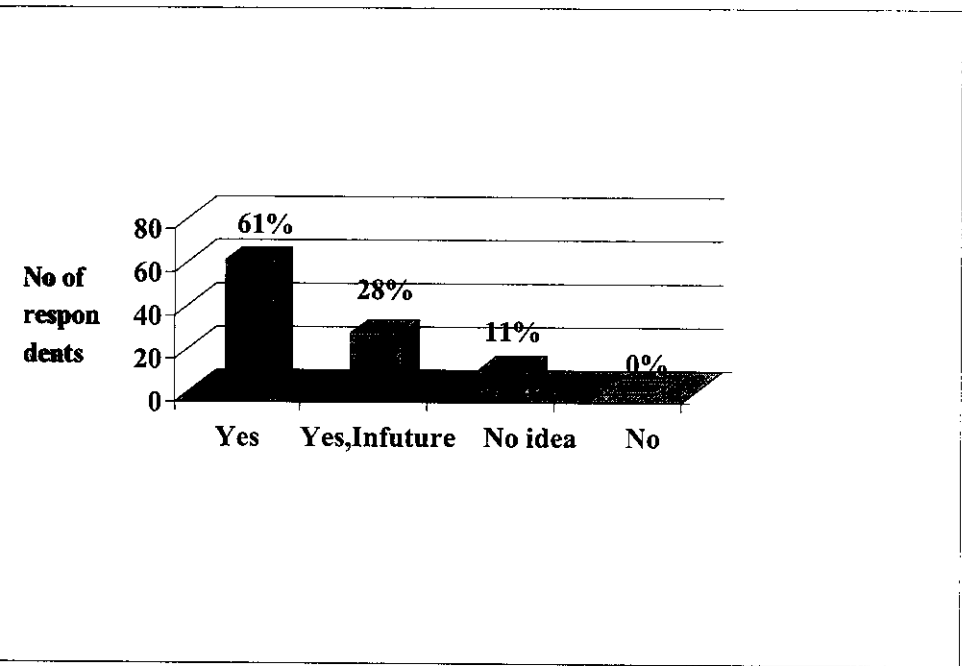| Interest on implementing ERP	No of respondents	Percentage
Yes	61	61
Yes,Infuture	28	28
No idea	11	11
No	0	0
Total	100	100

INTERPRETATION:

The Above table indicates that majority 61% of the respondents were interested on implementing ERP , 28% of the respondent stated that they are interested to implement in future, 11 % of the respondents stated that they have no idea & none of them said No.

Chart 4.2.6 Respondent's interest on implementing ERP

Table 4.2.7 Factors motivating respondents to prefer this technology

Factors motivating to prefer this technology	No of respondents	Percentage
Service	35	35
User friendly	26	26
Flexibility	10	10
Cost	29	29
Total	**100**	**100**

INTERPRETATION:

The Above table indicates that majority 35% of the respondents stated that the Service is the motive factor to prefer this technology 26% of the respondent stated that User Friendly motivate them to prefer this technology, 10 % of the respondents stated that Flexibility is the motive factor to prefer this technology and only 29 % of them are stated that Cost is the motive factor to prefer this technology.
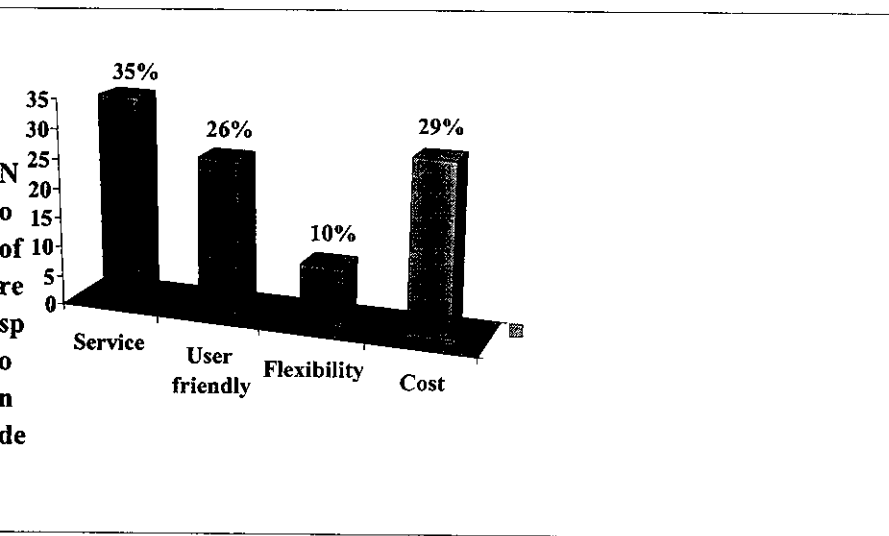
Chart 4.2.7 Factors motivating respondents to prefer this technology

Table 4.2.8 Experience on this kind of technology & reasons for technological change from existing one

Experience on this kind of technology & reasons for technological change from existing one	No of respondents	Percentage
Yes,but does not satisfied the expectations	42	42
yes,satisfied the expectations but no flexibility	25	25
No only trail packs	24	24
No	9	9
Total	**100**	**100**

INTERPRETATION:

The Above table indicates that majority 42% of the respondents stated that there was no satisfaction in the previous technology, 25% of the respondent stated that there is satisfaction but no flexibility in the exiting one, 24 % of the respondents stated that they have experienced only trail packs & 9% of them are stated that they have not experienced any such technology.
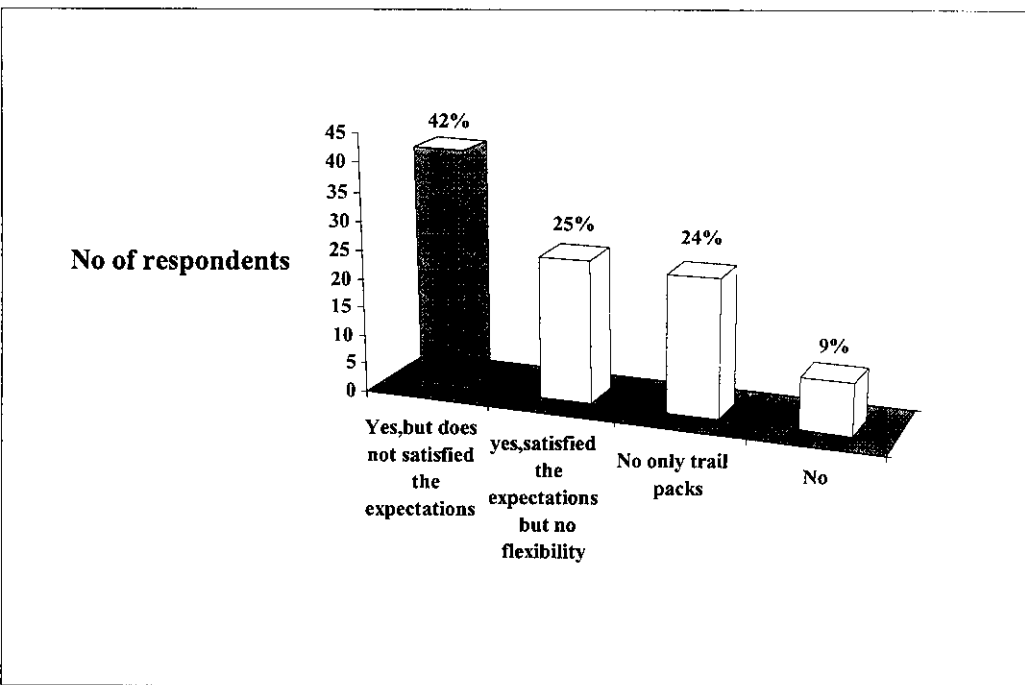
Chart 4.2.8 Experience on this kind of technology & reasons for technological change from existing one

Table 4.2.9 Source of information used to purchase this technology

Source of information used to purchase this technology	No of respondents	Percentage
Software marketing websites	39	39
Magazines	13	13
words of mouth	38	38
Newspapaer	10	10
Total	**100**	**100**

Source: Primary Data

INTERPRETATION:

The Above table indicates that majority 39% of the respondents uses Software marketing websites , 13 % of them used Magazines, 38% of them uses Words of Mouth & 10% uses Newspapers to purchase a technology.
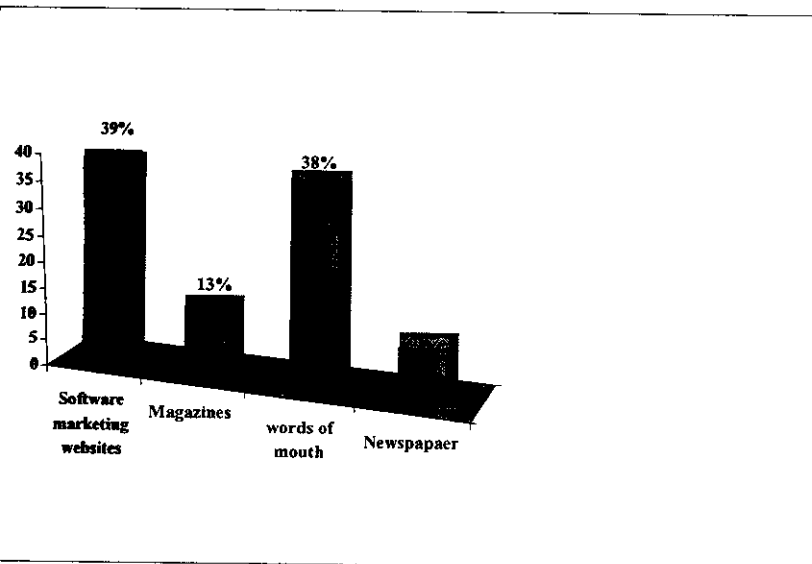
Chart 4.2.8 Source of information used to purchase this technology

Table 4.2.9 Type of Program preferred by the trainee

Type of Program preferred by the trainee	No of respondents	Percentage
experts from outside	37	37
attnding lectures	32	32
training given by their own supervisors	19	19
learning on their own	12	12
Total	100	**100**

Source: Primary Data

INTERPRETATION:

The Above table reveals that majority 37% of the respondents stated that they need training to be provided by experts on that field, 32 % of them stated that they need to attend lectures given by experts to get trained.,19% of the respondents stated that training should be given by their own supervisors and 12% of them stated that learning by their own helps to get trained well.
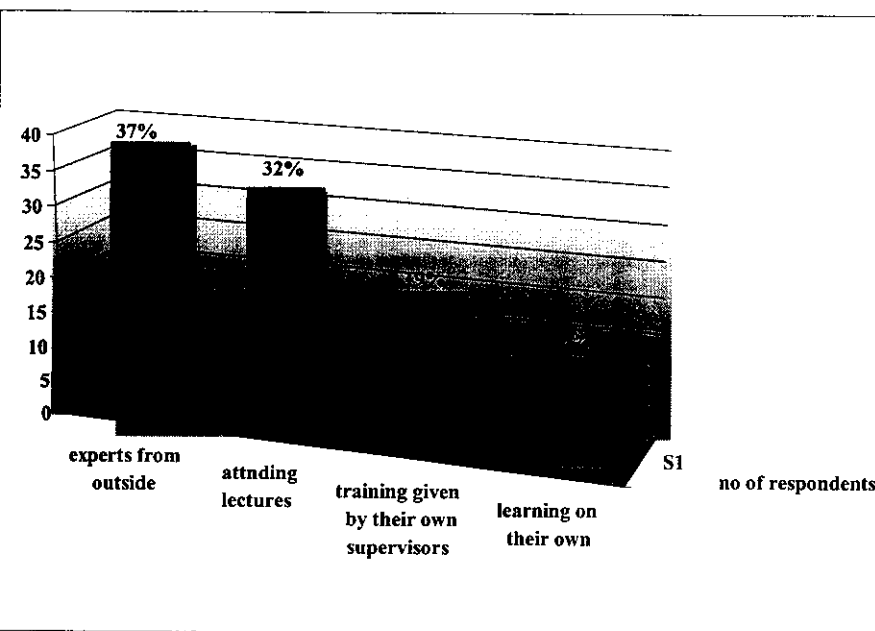
Chart 4.2.9 Type of Program preferred by the trainee

Table 4.2.10 Cross Tabulation –Age vs. Period of time respondents take to adopt a new technology

Age	How long they take to adopt a tech			Total
	<6	>6	Imm	
Below 30	6	20	12	38
31-35	8	12	7	27
35-40	2	4	8	14
40-45	4	6	11	21
Total	20	42	38	100

Source:Primary Data

Let,H0: There is no significant relationship with age and period of time to adopt a technology

H1: There is significant relationship with age and period of time to adopt a technology

Calculated Value(X^2):8.33;Table Value(X^2):12.59

DEGREES OF FREEDOM: 6; SIGNIFICANCE LEVEL: 5%

INFERENCE

Since the calculated value is less than the table value at 5% level of significance and 6 degrees of freedom we accept the null hypothesis (H_0) and infer that there is no significant relationship with age and period of time to adopt a technology.

Table 4.2.11 Change in way of doing a work after Meshing ERP with Mucell

Change in way of doing particular work after meshing ERP with Mucell	No of respondents	Percentage
yes	63	63
yes to some extent	37	37
no	0	0
Total	100	**100**

Source: Primary Data

INTERPRETATION:

The Above table reveals that more than half of the respondents i.e., 63% of them states that yes it made a change in way of doing a work, 37% of the respondents states that Changes made only to some extent and 0% of the respondents States that No change in way o doing a work.
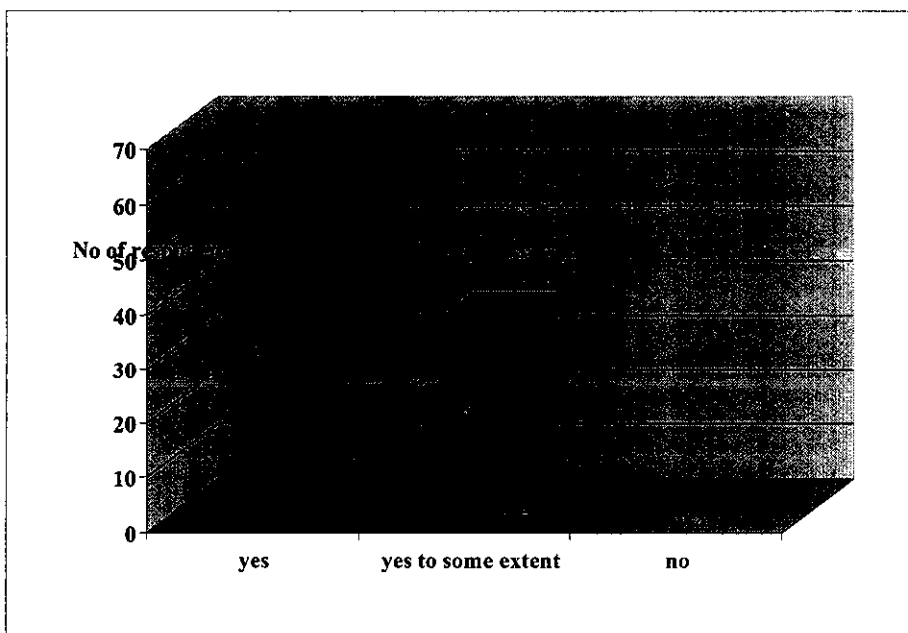
Chart 4.2.11 Change in way of doing a work after Meshing ERP with Mucell

Table 4.2.12 Features restrict to change from the existing one

Features restrict to change from the existing one	No of respondents	Percentage
service	12	12
profit	10	10
Flexibility	16	16
comfortability	8	8
performance	25	25
preferred other	29	29
Total	100	100

Source: Primary Data

INTERPRETATION:

The Above table reveals that 12% of them consider service is major factor that restrict to change from the existing one, 10% of respondents consider profit is the major factor, 16% of them consider flexibility is the major factor,8% reveals that comfortability is the major factor that restrict to change from the existing one, 25% consider performance is the major factor and 29% preferred other options.
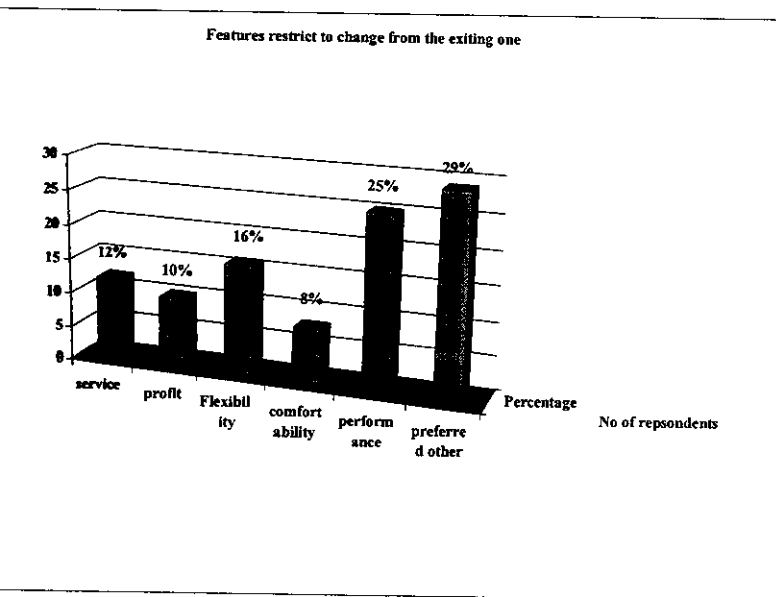
Chart 4.2.12 Features restrict to change from the existing one

Table 4.2.13 Respondents Feelings on reduction of Operational cost

Reduction in operational cost	No of respondents	Percentage
yes	57	57
yes,to some extent	22	22
no both looks similar	9	9
no idea	12	12
no	0	0
Total	100	100

Source: Primary Data

INTERPRETATION:

The Above table reveals that nearly half of the total respondents i.e., 57% of them reveals that after this mesh the operational cost got reduced, 22% of them reveals that operational cost got reduced only to some extent, 9% of them reveals that operational cost reduction looks similar the existing technology, 12% of them have no idea about this and 0% of them states no reduction in operational cost.
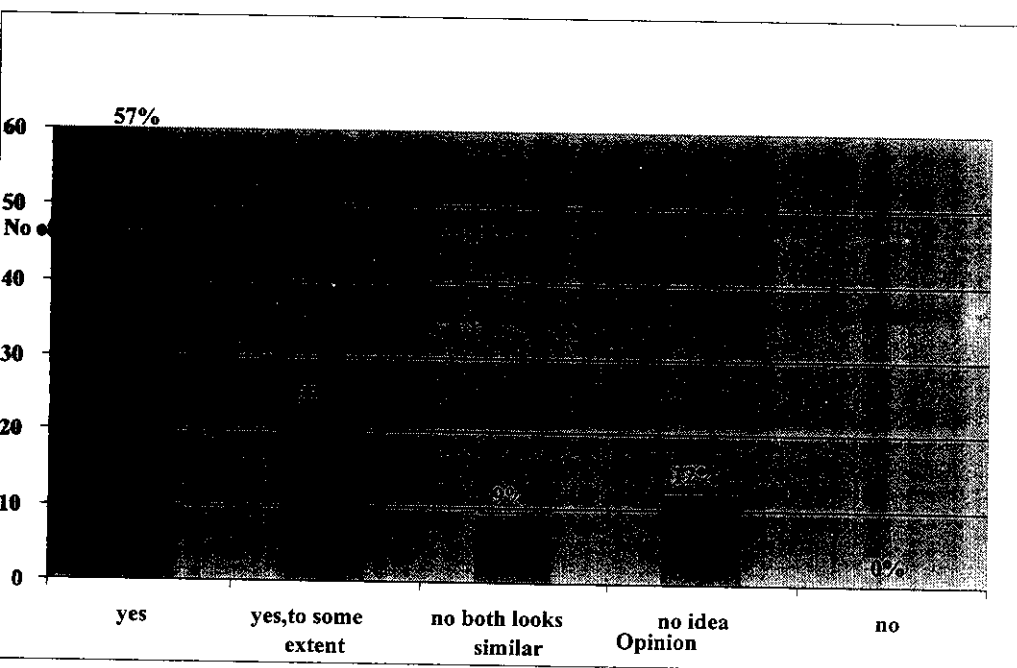
Chart 4.2.13 Respondents Feelings on reduction of operational cost

Table 4.2.14 Cross Tabulation-Experience * Opinion on profit hike

erience	Percentage of Reduction in Profit Hike				
	5 to 25	26 to 50	51 to 75	76 to 100	Total
w 5 yrs	8	9	14	0	31
yrs	9	8	19	9	45
5yrs	5	3	7	1	16
yrs	1	2	3	2	8
l	23	22	43	12	100

SOURCE: PRIMARY DATA

Let,

H0: There is no significant relationship with experience and profit hike.

H1: There is significant relationship with experience and profit hike.

CALCULATED VALUE (x^2): 10.09; TABLE VALUE (x^2): 16.92;

DEGREES OF FREEDOM: 9; SIGNIFICANCE LEVEL: 5%

INFERENCE

Since the calculated value is less than the table value at 5% level of significance and 9 degrees of freedom we accept the null hypothesis (H_0) and infer that there is no significant relationship with experience and profit hike.

Table 4.2.15 Factor influencing to mesh ERP with Mucell

ERP mesh with Mucell	No of respondents	Percentage
to make out good profit	38	38
to withstand competition	28	28
to change the attitude of peoples	26	26
not interested to mesh	8	8
no	0	0
Total	100	100

Source: Primary Data

INTERPRETATION:

The Above table reveals that majority of 38% respondents interested to mesh mucell with erp to make out a good profit, 28% of them reveals that to withstand the competition they need this mesh,26% of them states that to change the attitude of peoples, 8% of them states that they are not interested on this mesh and 0% of them states that no need of this mesh.
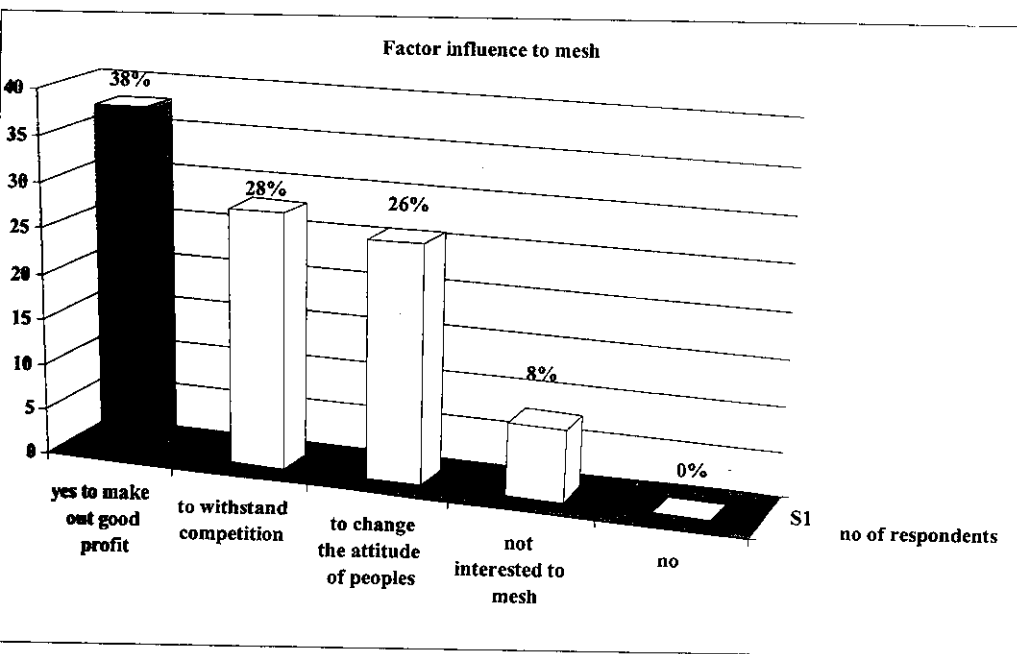
Chart 4.2.15 Factor influencing to mesh ERP with Mucell

Table 4.2.16 Respondent's feelings on ways to reduce the operational cost

Ways to reduce operational cost	No of respondents	Percentage
by means of adopting new technologies	32	32
by means of appointing well experienced people related to that field	40	40
coordination	17	17
combination all	10	10
preferred other	1	1
Total	**100**	**100**

Source: Primary Data

INTERPRETATION:

The Above table reveals that 32% respondents states by means of adopting new technologies we can reduce the operational cost,40% of respondents states that by means of appointing well experienced people,operational cost can be reduced, 17% states that by means of coordination, 10% of them states that by combination all the above we can reduce the operational cost and 1% preferred other options.
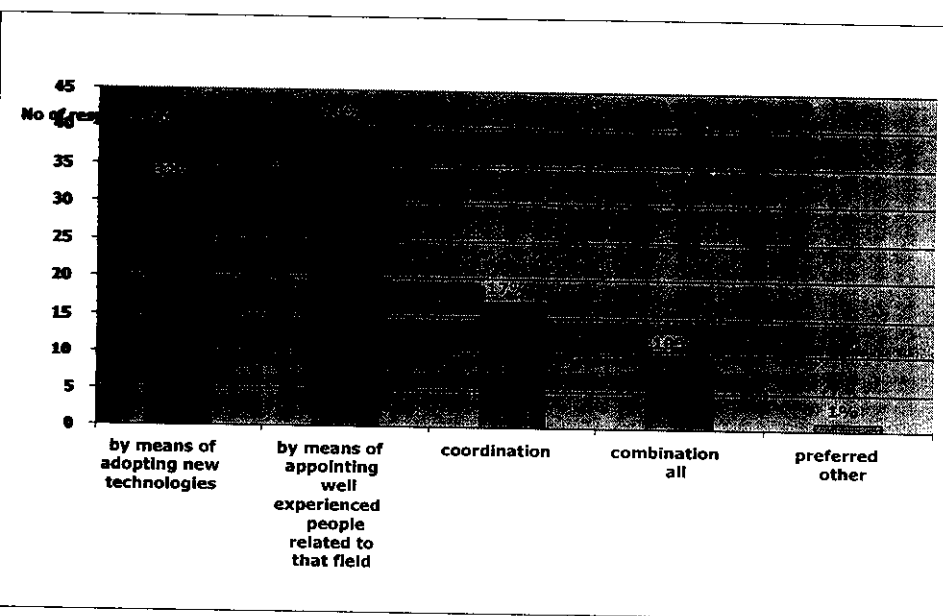
Chart 4.2.16 Respondent's feelings on ways to reduce the operational cost

Table 4.2.17 Respondent's feeling about benefits realized and will they prefer this technology

Benefits realized and will you prefer this technology	No of respondents	Percentage
yes will prefer	82	82
No idea	18	18
no	0	0
Total	**100**	**100**

Source: Primary Data

INTERPRETATION:

The Above table reveals that majority of 82% of respondents states that yes they got benefited out of this technology and they will prefer, 18% of respondents states that they have no idea on this and 0% of respondents states that they will never prefer this technology.
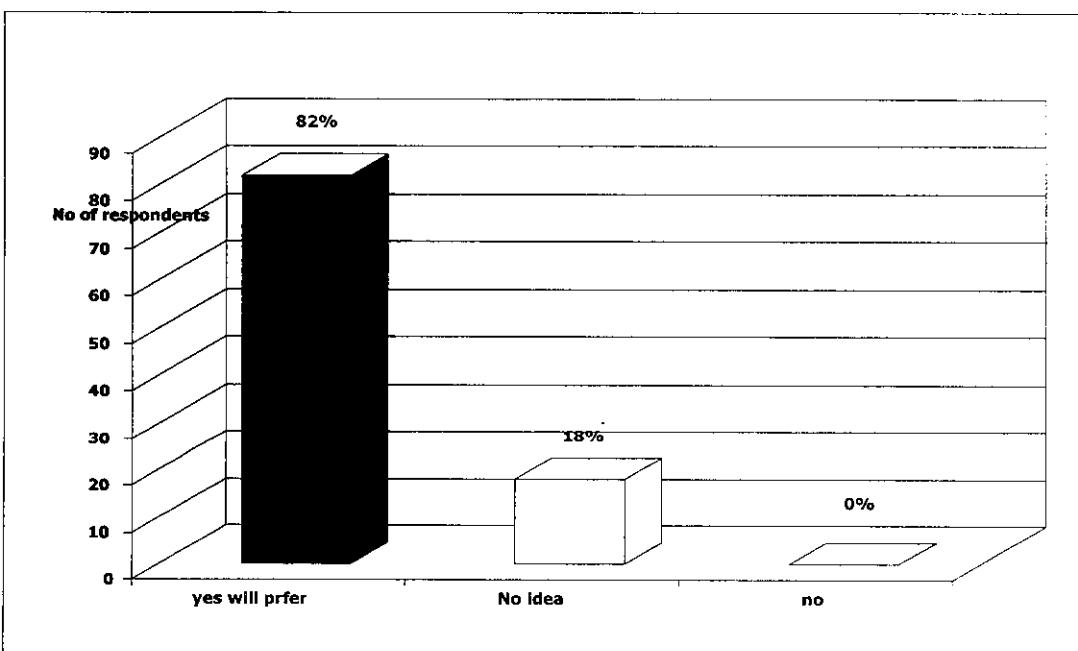
Chart 4.2.17 Respondent's feeling about benefits realized and will they prefer this technology

Table 4.2.18 Respondents feelings on ways profit got raised

Profit Hike	No of respondents	Percentage
Yes,always	28	28
yes,to some extent	15	15
yes,but not always	16	16
yes,only through operational cost	1	1
yes,through cost of wastage reduction	8	8
No idea	32	32
no	0	0
Total	100	100

Source: Primary Data

INTERPRETATION:

The Above table reveals that 28% of respondents reveals that profit hike is realized always,15% of respondents reveals that profit hike is realized only to some extent, 16% of them reveals that profit hike is not realized always, 1% of respondents reveals that only through operational cost profit hike is realized,8% of them states that they have no idea and 0 % of them states that there is no profit hike.
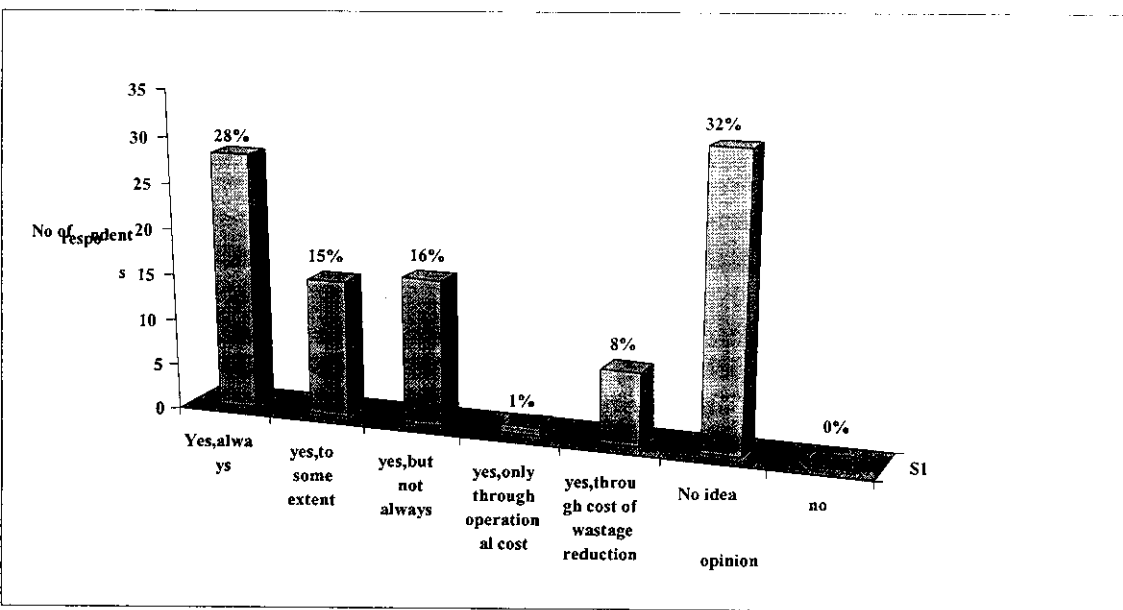
Chart 4.2.18 Respondents feelings on ways profit got raised

Table 4.2.19 Respondents feelings in reduction of wastage consumption

Wastage consumption	No of respondents	Percentage
yes	59	59
yes to some extent	21	21
no,both looks similar	17	17
No idea	3	3
Total	100	100

INTERPRETATION:

The Above table reveals that majority of 59% of respondent's states that Wastage consumption got reduced, 21% of them states that to some extent it got reduced, 17% of respondents states that no reduction in wastage consumption and it looks quite similar to the previously existing technology and 3% of them states that they have no idea on wastage consumption.
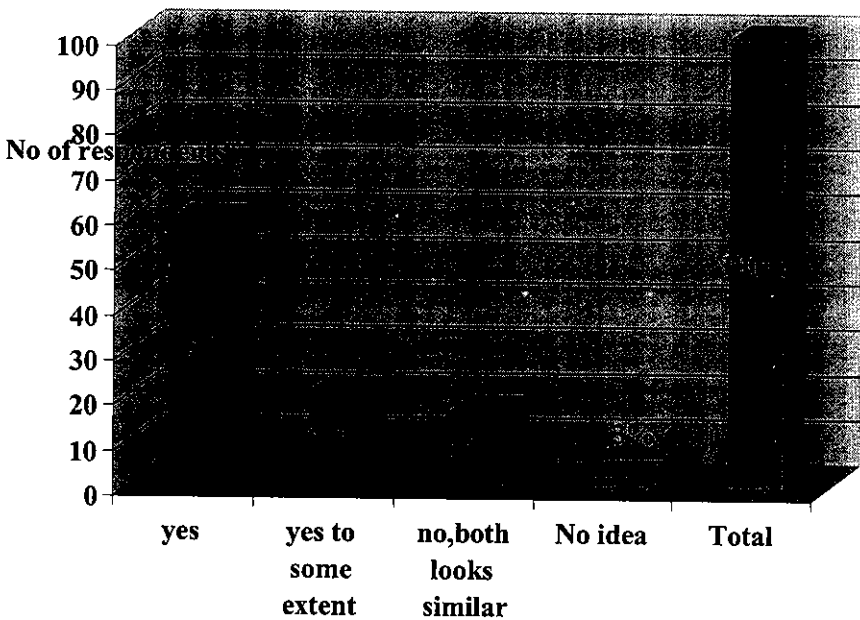
Chart 4.2.19 Respondent's feelings in reduction of wastage consumption

Table 4.2.20 Respondents rating on this technology

Rating of technology	No of respondents	Percentage
excellent	55	55
very good	29	29
good	8	8
average	8	8
below average	0	0
Total	100	100

Source: Primary Data

INTERPRETATION:

The Above table reveals that more than half of the respondents i.e., 55% of them rates excellent about this technology, 29% of the respondents rates very good, 8% of the respondents rates good,8% of them rates average and 0% of respondents rates below average about this technology.
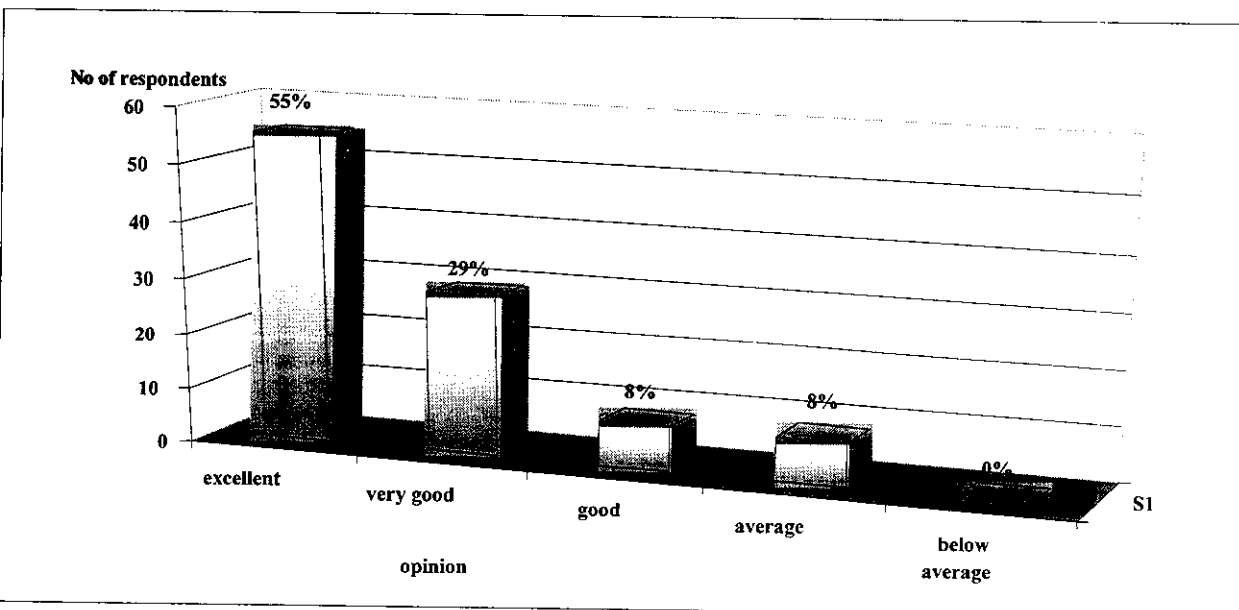
Chart 4.2.20 Respondents rating on this technology

Table 4.2.21 Respondents feelings about training period

Respondents feelings about training period	No of respondents	Percentage
yes	83	83
yes to some extent	9	9
no	8	8
Total	100	100

Source: Primary Data

INTERPRETATION:

The Above table reveals that more than half of the respondents i.e., 83% of them states that training period was very helpful to improve their skills and enhance the competency levels, 9% of them states that training period was helpful to some extent and 8% of respondents states that training period was not upto mark to improve their skills.
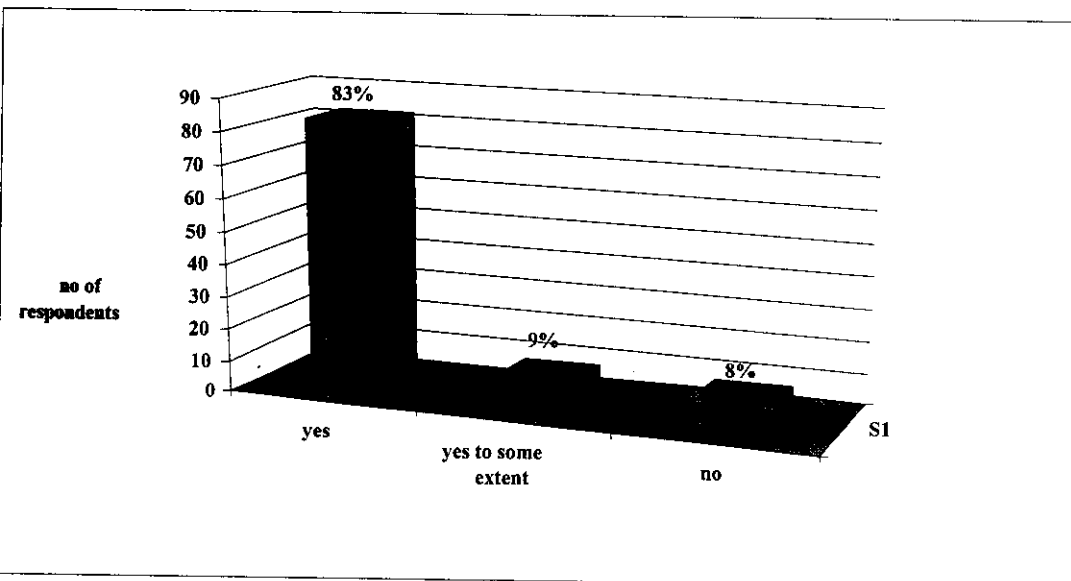
Chart 4.2.21 Respondents feelings about training period

Table 4.2.22 Respondents opinion to maintain the sustainability of technology

To maintain the sustainability	No of respondents	Percentage
same has to be continued	57	57
need support & service	32	32
updation of databases based on upgradation of technologies	6	6
preferred other	5	5
Total	100	100

Source: Primary Data

INTERPRETATION:

The Above table reveals that more than half of the respondents i.e., 57% of them states that the same work so far provided is to be continued,32% of respondents states that support and service to be provided life long, 6% of respondents states that updation of databases based on up gradation of technology is to provided and 5% preferred other options.
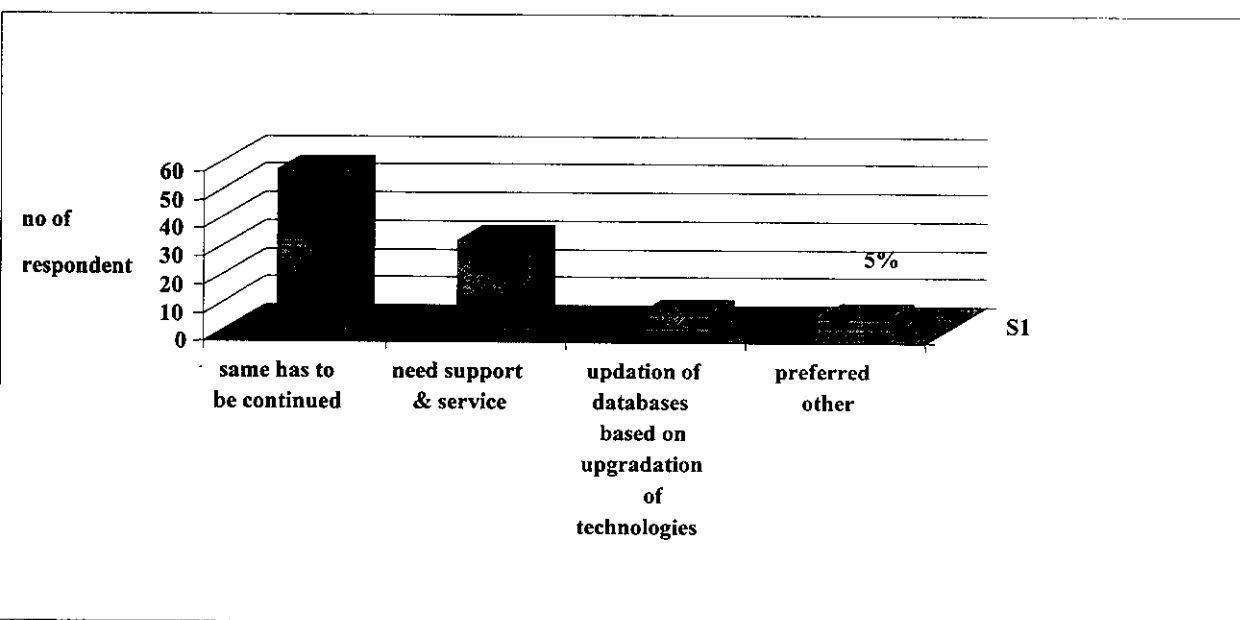
Chart 4.2.22 Respondents opinion to maintain the sustainability of technology

Table 4.2.23 Respondents feelings about the technologies flexibility towards the application of work

Flexibility towards the application of work	No of respondents	Percentage
yes always	56	56
Yes ,sometimes only	35	35
no	9	9
Total	100	100

Source: Primary Data

INTERPRETATION:

The Above table reveals that 56% of respondents states that this technology has more flexibility towards the application of works, 35% of respondents states that only during sometimes and 9% of respondents states that there is no flexibility towards the application of work.
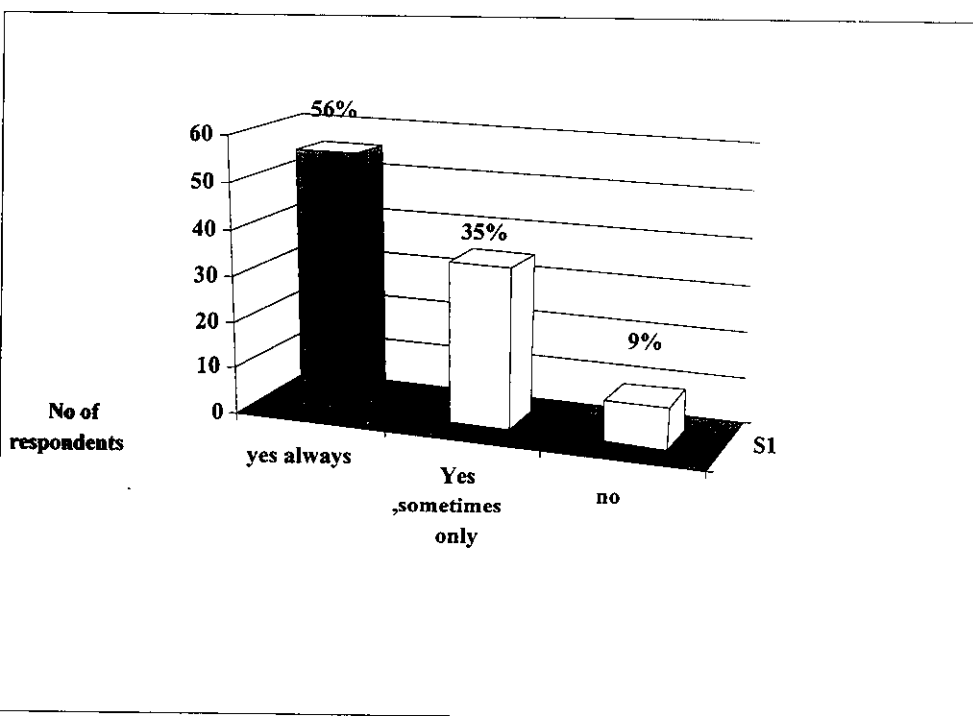
Chart 4.2.23 Respondents feelings about the technologies flexibility towards the application of work

Table 4.2.24 Cross Tabulation-Experience*Trainee's Feedback about the training

Experience	Trainee's feed back about the training					Total
	Excellent	Very Good	good	average	Below average	
Below 5 yrs	8	11	9	3	1	32
5-10 yrs	7	18	17	3	0	45
11-15yrs	5	3	5	1	1	15
15+yrs		4	3	1	0	8
Total	20	36	34	8	2	100

SOURCE: PRIMARY DATA

Let,

H0: There is no significant relationship with experience and trainee's feedback about the training

H1: There is significant relationship with experience and trainee's feedback about the training

CALCULATED VALUE (x^2): 9.355; TABLE VALUE (x^2): 21.03;

DEGREES OF FREEDOM: 12; SIGNIFICANCE LEVEL: 5%

INFERENCE

Since the calculated value is less than the table value at 5% level of significance and 12 degrees of freedom we accept the null hypothesis (H_o) and infer that there is no significant relationship with experience and trainee's feedback about the trainin

**Table 4.2.25 Calculation of weighted average to the following facts**

Weighted Item	RANK1 10	RANK2 9	RANK3 8	RANK4 7	RANK5 6	RANK6 5	RANK7 4	RANK8 3	RANK9 2	RANK 10 1	Weighted average Point
Service	410	378	64	63	0	0	0	0	0	0	1
Reduction of operation cost	0	0	0	0	54	90	32	24	96	9	9
reduced wastage consumption	80	0	0	0	150	85	72	18	18	17	8
Increased overall profit	350	90	48	287	0	40	0	0	0	0	2
performance	0	225	0	0	156	0	56	57	16	8	5
comfortability	0	0	200	0	0	160	0	24	54	8	7
User friendly	160	54	144	189	48	125	0	0	0	0	3
Flexibility	0	81	200	42	108	0	136	24	0	0	4
secured databases	0	72	144	56	36	0	68	102	0	9	6
easy accesibility of data	0	0	0	63	48	0	36	51	16	49	10

Source: Primary Data

INTERPRETATION: In this table we found that Rank I is given for Service, Rank II is given to increased overall profit, Rank III is given for User Friendly, Rank IV is given to Flexibility Rank V is given to performance,Rank VI is given to secured datatbases, Rank VII is given to comfortability, Rank VIII is given to Reduced wastage reduction, Rank 1X is given to reduction in operational cost, and Rank X is given to easy accessibility of data.

4.3.DIAGRAMMATIC REPRESENTATION
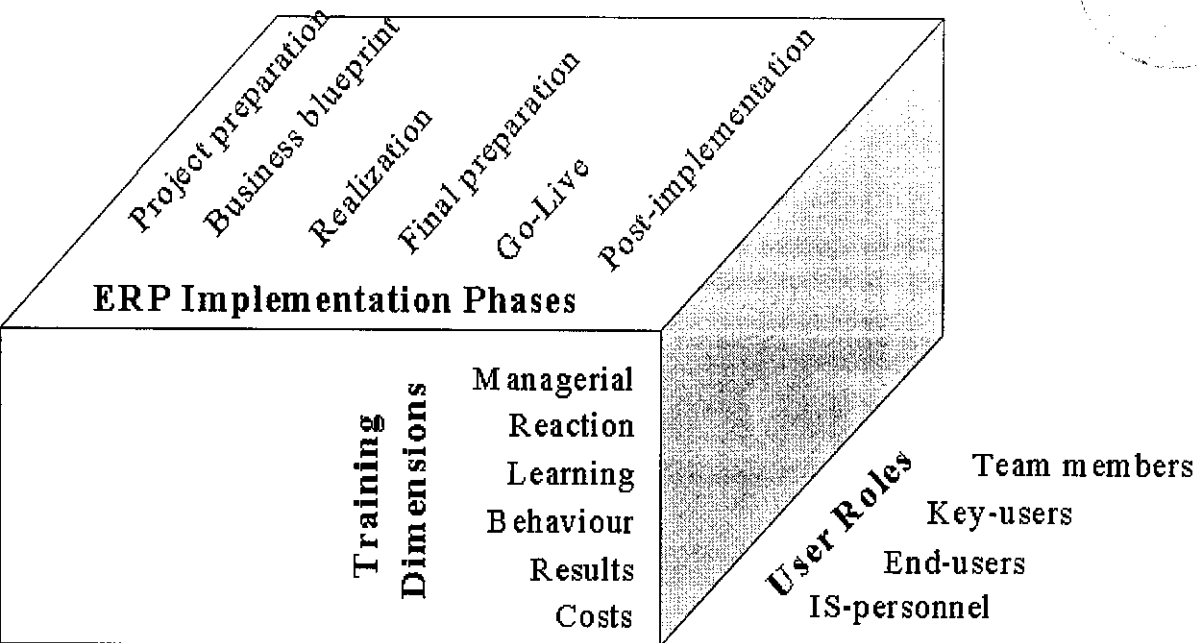
4.4. DELIVERABLES

- Reducing the wastages consumed by taking necessary steps from the data's monitored during each process and through which cost saving occurs.

- Statistical report which describe the technology in all extent.
- Impact created in the business world by using this study.
- Satisfying customer's needs and expectations.
- Ideas and Concepts for innovative & emerging organizations to adopt Mucell technology mesh with ERP with effective analysis.
- It creates lean manufacturing.

5.1. SUMMARY OF FINDINGS

- 61 % of the respondents who woks or owns plastic injection moulding companies are interested to implement ERP to their organization.

- 35% of respondents are motivated to this technology due to service factor.

- From this study it is found that 42% of respondents have experienced with this type of technology and due to dissatisfaction of expectations they get preferred this technology

- From this study it infers that,39% of respondents use software marketing websites as a source of information to purchase this technology

- From this Study it is found that 37% of respondents prefers training to be given by experts related to that field.

- From the chi-square analysis we infer that there is no significant relationship with age and Period of time to adopt a technology i.e. How long a candidate take to get adopt to a new technology.

- From this study it is found that 63% of respondents says there is a change in way of doing a work after meshing ERP with Mucell.

- From this study it is found that 29% of respondents preferred other options from the given and 25% of them feels performance factor restrict to change from the existing one.

- From this study it is found that 57% of respondents feels that there is reduction in operational cost.

- From the chi-square analysis we infer that there is no significant relationship between experience and profit hike.

From this study it is found that 38% of respondents feels to make out a good profit they need to mesh ERP with Mucell

From this study it is found that 40% of respondents feels by appointing well experienced people related that field is one of the way to reduce the operational cost

- From this study it is found that 82% of respondents got benefited with this technology so they will prefer this to everyone.

- From this study it is found that 32% of respondents have no ides on how profit got raised,28% of respondents feels they could able realize the profit hike always.

- From this study it is found that 59% of respondents feels they have realized reduction in wastage consumption

- From this study it is found that 55% of respondents rate excellent for this technology.

- From this study it is found that 83% of respondents feels the training period was helpful to improve their skills and technology.

- From this study it is found that 57% of respondents suggests to maintain the sustainability of this technology the same work has to be continued.

- From Chi-square analysis it infers that there is no significant relationship between experience and trainee's feed back about the training.

- From the weighted mean average calculation for the indicator of special features we prefer the most is found that Rank I is given for , Rank I is given for Service, Rank II is given to increased overall profit, Rank III is given for User Friendly, Rank IV is given to Flexibility Rank V is given to performance, Rank VI is given to secured databases, Rank VII is given to comfortability, Rank VIII is given to Reduced wastage reduction, Rank 1X is given to reduction in operational cost, and Rank X is given to easy accessibility of data.

5.2. SUGGESTIONS & RECOMMENDATIONS

- Organization has to implement new technologies to make out a good profit and to meet the competition.

- As training plays a major role, So proper training method is to be adopted which is easily understandable by low profile peoples also and must be provided.

- The technology adopted must get upgraded to the changes made in the organization.

- Technology adopted must be user friendly

- As by the study it is clear that that majority of target respondents consider service as the major factor.So such type of technology must be preferred.

5.3. CONCLUSIONS

The main purpose of studying the cost and benefit involved in integrating Mucell with ERP is for making an organization is to attain the objective. An organization must enhance its capabilities and encourage employees to develop their skills in all fields of work and an organization must understand the employees difficulties and must try to reduce the way doing a work and make the work to complete in easy way.

Integrating Mucell with ERP brings possibilities like,

- It reduces the wastage consumption

- Reduce the operational cost.

- it satisfies the customer expectations.

- Lean Manufacturing is followed.

- Proper Scheduling is made into practice.

- The training given to those who work on this field, to enhance their skills and work towards achieving the goal of the organization.

- It helps to access existing and previous data's easily.

Hence, an attempt has been made to evaluate the implementation of ERP with Mucell technology in Microtech Polymers through this research.

The feed back received from this study will facilitate the Technology implementer and software developer to know the expectation and views of organization and employees and also to inform the management the key areas to concentrate to reduce the cost and make out a good profit.

5.4.DIRECTIONS FOR FUTURE RESEARCH

Areas used other than Plastic Injection Molding Machines.

APPENDIX

QUESTIONNAIRE

Please provide a tick mark (✓) for your choice

*Name:

*Educational

*Qualification:_____

*Occupation: _____

*Address: _____

_____

_____

*Contact No:

*Email id:

1.Gender

☐ Male

☐ Female

2.Age

☐ Below 30 yrs

☐ 31-35 yrs

☐ 35 - 40 yrs

☐ 41 - 45 yrs

3.Experince

☐ Below 5 yrs

☐ 5-10 yrs

☐ 11-15yrs

☐ 15+yrs

4.Income per Month:

☐ 10,000 to 25,000 Rs/-

☐ Not Applicable

☐ 25,001 to 50,000 Rs/-

☐ Above 50,000 Rs/-

5.Do you interested in implementing ERP in your organization now?

☐ Yes

☐ Yes,In future

☐ No,not now

☐ No Idea .

6.What factor makes you to prefer this technology?

☐ Cost

☐ Flexibilty

☐ Service

☐ User Freindly

7.Have you ever experienced this kind of technology before?if yes, then what factor makes you to go for some other technology from the existing one?

☐ Yes, but does not satisfied the expectations

☐ Yes satisfied with expectations but no flexibility

☐ No

☐ No, only trail packs

8.What source of information do you use when purchasing a new technology?

☐ Software marketing websites

☐ Magazines

☐ Words of Mouth

☐ Newspapers

9. Among the following which type of program is preferred by the trainee?

☐ training given by the organization
☐ training given by their own superior
☐ experts from outside
☐ learning on their own
☐ Attending any lectures

10. Is this technology satisfies all your needs and expectations?

☐ Yes

☐ Yes but not to full extent
☐ Yes,Sometimes

☐ No

11. Do you interested in adapting to technological changes made by the organization & how long will you take to adopt?

☐ Yes,>6 months

☐ Yes,<6 months

☐ Yes,Immediately

☐ No

12.. Whether the ERP implementation have made a change in way of doing particular work?

☐ Yes

☐ Yes,to some extent

☐ No

13. What features restrict you to adopt to change to this technology from the existing one?

☐ Comfortability

☐ Performance

☐ Service

☐ Flexibilty

☐ Profit

☐ Preferred other options

14. On what percentage basis the cost got reduced when compared to the technology in existence or ever experienced?

☐ 5 to 25

☐ 26 to 50

☐ 51 to 75

☐ 76 to 100

15. what factor makes you to mesh erp with mucell ?

☐ yes to make out good profit

☐ to withstand competition

☐ to change the attitude of peoples

☐ not interested to mesh

☐ No

16. What are ways you think you can reduce the operational cost?

☐ by means of adopting new technologies

☐ by means of appointing well experienced people related to that field

☐ coordination

☐ preferred other

17. How your benefited with this technology and do you think that you will prefer this technology?

☐ yes will prefer

☐ No idea

☐ No

18. Have you realized a profit hike when compared to previous years?if yes,then realized through particular cost or through overall?

☐ Yes,only through operational cost

☐ Yes,always

☐ Yes through cost of wastage reduction

☐ Yes,to some extent

☐ Yes,but not always

☐ No Idea

☐ No

19. Do the consumption of wastages got reduced?

☐ Yes

☐ Yes,to some extent

☐ No,both looks quite similar

☐ No Idea

20. Rate how this technology satisfied with your objective?

☐ Excellent

☐ Very Good

☐ Good

☐ Average

☐ Below Average

21.Have the training given to you during the training period was it helpful to enhance your skills & compentency levels?

☐ Yes

☐ Yes,to some extent

☐ No

22.What are the essential steps you suggest to maintain the sustainability of this techonology

☐ Need to support & provide service as when requiired

☐ Updation of databases based on upgradation of evolving technologies

☐ The same has to be continued

☐ Preferred other options

23.Does this technology has flexibility towards your application of work

☐ Yes,Always

☐ Yes, Sometimes only

☐ No

24. Trainee's feedback about the training

☐ Excellent

☐ Very Good

☐ Good

☐ Average

☐ Below Average

25. Which of the special features do you prefer most? Rank them?

☐ Service

☐ Reduced Operational cost

☐ Reduced wastage consumption

☐ Increased over all profit

☐ Performance

☐ Comfortability

☐ User Friendly

☐ Flexibilty

☐ Secured databases

☐ Easy accesiblity of datas stored

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