Project Title:

EFFECT OF OPERATION COSTS IN PROFIT AND LOSS

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MBA

A DISSERTATION REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR

MBA - LOGISTICS AND SUPPLY CHAIN MANAGEMENT

OF

UNIVERSITY OF PETROLEUM & ENERGY STUDIES, INDIA

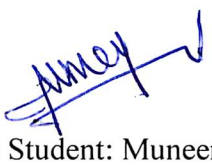
CENTRE FOR CONTINUING EDUCATION
UNIVERSITY OF PETROLEUM & ENERGY STUDIES, DEHRADUN

ACKNOWLEDGEMENT

This is to acknowledge with thanks the help, guidance and support that I have received during the Dissertation.

I have no words to express a deep sense of gratitude to the management of ABU DHABI MEDICAL DEVICES CO. LLC for giving me an opportunity to pursue my Dissertation, and in particular Ms. Renade Al Khawaja, Supply Chain Manager, for her able guidance and support.

I must also thank Mr. Tariq Obaidat, Production Manager, Mr. Mohammad Ali, QC Manager and Mr. Saulat Ali Baig, Finance and Administration Manager for their valuable support and feedback.



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Abu Dhabi Medical Devices Company

Declaration by the Guide

This is to certify that the **Mr. MUNEER TV**, a student of **MBA - LOGISTICS & SUPPLY CHAIN MANAGEMENT**, **Roll No: 500041841** of UPES has successfully completed this dissertation report on "**EFFECT OF OPERATION COSTS IN PROFIT AND LOSS**" under my supervision.

Further, I certify that the work is based on the investigation made, data collected and analyzed by him and it has not been submitted in any other University or Institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a dissertation towards partial fulfillment for the award of degree of MBA.

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Executive Summary

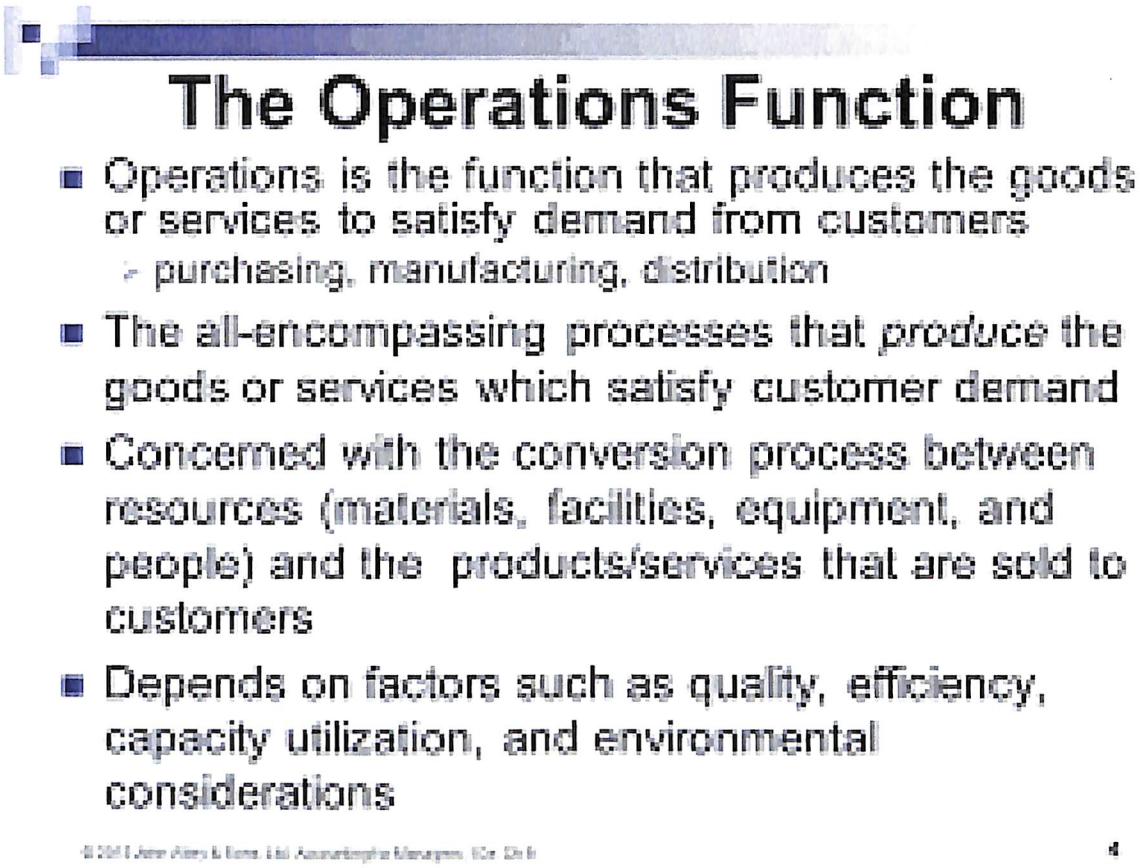
Operations costs are a major part of the total operating costs of all manufacturing or production plants. Depending on the specific industry, Operations costs can represent between 15 and 60 percent of the cost of goods produced.

Recent surveys of Operations management effectiveness indicate that one-third—33cents out of every dollar—of all maintenance costs is wasted as the result of unnecessaryor improperly carried out maintenance.

The result of ineffective operations management represents a loss of more than$60 billion each year. Perhaps more important is the fact that ineffective operationsmanagement significantly affects the ability to manufacture quality products thatare competitive in the world market. The losses of production time and productquality that result from poor or inadequate maintenance management have had adramatic impact on U.S. industries' ability to compete with Japan and other countriesthat have implemented more advanced Operations managementphilosophies.

The dominant reason for this ineffective management is the lack of factual data toquantify the actual need for repair or maintenance of plant machinery, equipment, and systems. Maintenance scheduling has been, and in many instances still is, predicatedon statistical trend data or on the actual failure of plant equipment.Until recently, middle- and corporate-level management have ignored the impact of the maintenance operation on product quality, production costs, and more important,on bottom-line profit. The general opinion has been "Maintenance is a necessary evil"or "Nothing can be done to improve maintenance costs." Perhaps these statementswere true 10 or 20 years ago, but the development of microprocessor- or computer based instrumentation that can be used to monitor the operating condition of plantequipment, machinery, and systems has provided the means to manage the maintenanceoperation. This instrumentation has provided the means to reduce or eliminateunnecessary repairs, prevent catastrophic

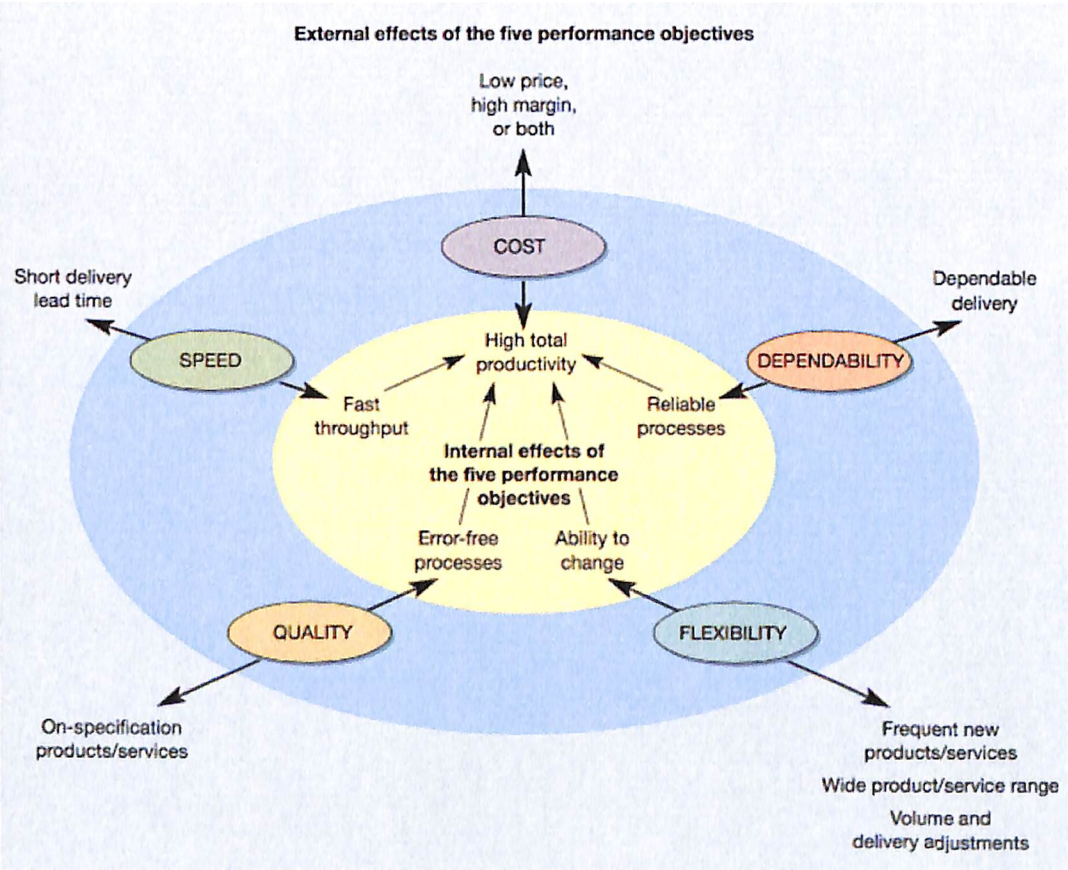
machine failures, and reduce the negativeimpact of the maintenance operation on the profitability of manufacturing and production plants.



Since the Industrial Revolution, maintenance of engineering equipment in the field has been a challenge. Although impressive progress has been made in maintainingequipment in the field in an effective manner, maintenance of equipment is still achallenge due to factors such as size, cost, complexity, and competition. Needlessto say, today's maintenance practices are market driven, in particular for the manufacturingand process industry, service suppliers, and so on.

An event may presentan immediate environmental, performance, or safety implication. Thus, there is adefinite need for effective asset management and maintenance practices that willpositively influence critical success factors such as safety, product quality, speed ofinnovation, price, profitability, and reliable delivery.Each year billions of dollars are spent on equipment maintenance around the world.Over the years, many new

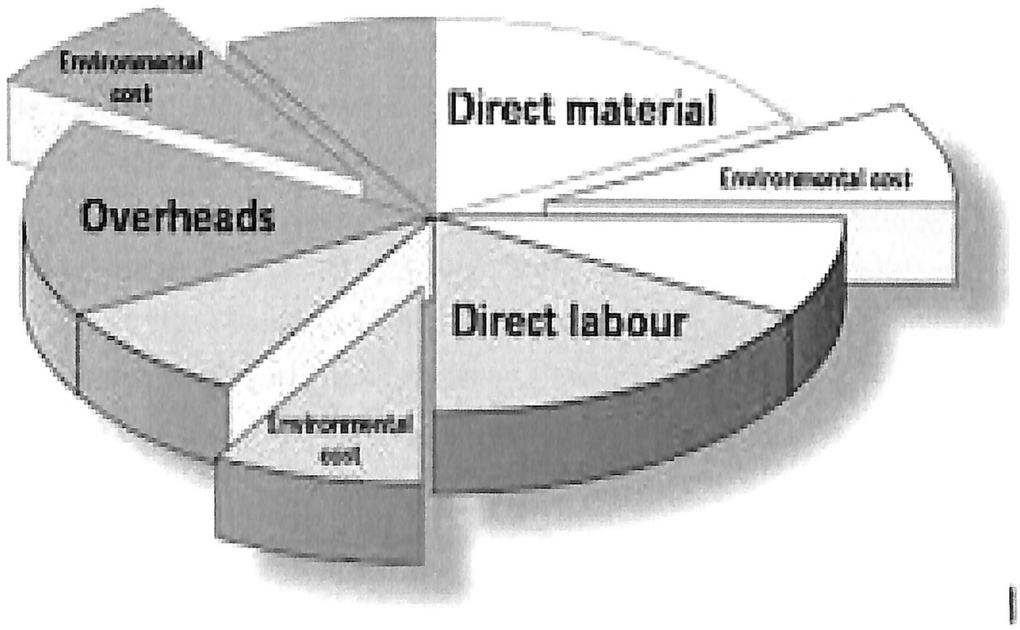
developments have taken place in this area. The terms“maintenance” and “maintenance engineering” may mean different things to different people. For example, the U.S. Department of Defense sees maintenance engineering as a discipline that assists in acquisition of resources needed for maintenance,and provides policies and plans for the use of resources in performing or accomplishingmaintenance.In contrast, maintenance activities are viewed as those thatuse resources in physically performing those actions and tasks attendant on theequipment maintenance function for test, servicing, repair, calibration, overhaul,modification, and so on.



CHAPTER 1 - INTRODUCTION

1.1 : OVERVIEW

Even though operations and maintenance have the same end objectiveor goal (i.e., mission-ready equipment/item at minimum cost), the environments underwhich they operate differ significantly. More specifically, operationsis an analytical function as well as it is deliberate and methodical. In contrast, maintenanceis a function that must be performed under normally adverse circumstancesand stress, and its main objective is to rapidly restore the equipment to its operationalreadiness state using available resources. Nonetheless, the contributing objectives ofmaintenance engineering include: improve maintenance operations, reduce the amountand frequency of maintenance, reduce the effect of complexity, reduce the maintenanceskills required, reduce the amount of supply support, establish optimum frequencyand extent of preventive maintenance to be carried out, improve and ensure maximumutilization of maintenance facilities, and improve the maintenance organization.



In the globalized world, companies seek new operations strategies to ensure world corporate success. This article analyzes how the cost management models - both traditional and activity-based, aid the planning and management of corporate globalized operations. The efficacy of the models application depends on their alignment with the competitive priorities; they should then define the necessary and sufficient dependence level on costs information.

Over the past few years major companies have outsourced the large majority of the activities that can be managed by third parties, to take advantage of low-cost locations.

New opportunities for cost reduction are emerging, including internal optimization, materials cost cuts and reduced energy prices. For 2013, companies are clearly focusing on building the skills and infrastructure they need to take advantage of these trending opportunity areas.

US manufacturers are targeting a 1.5% reduction in the cost of goods sold in 2013, according to the Hackett Group's 2013 manufacturing cost optimization study. It will be driven in part by a planned 1.7% reduction in internal manufacturing costs.

About the Company

Abu Dhabi Medical Devices Company (ADMD) set up as a joint venture between ADNIP (Abu Dhabi National Industrial Projects) and NNE Pharmaplan of Germany in 1999. It is a leading manufacturer of Auto Disable syringes, Single Use syringes, Insulin syringes and IV Cannula. It combine entrepreneurial vision with a strong business model built on high standards of product quality, safety and a sustainable working environment. It's clients include leading Non Governmental Organizations, Ministries of Health and private sector companies spread out in over 60 countries across the globe.

The company started commercial operations in the year 2000, specializing in the manufacturing of high quality medical devices. Over the years, ADMD expanded market

share and offerings by introducing a range of standard single use syringes, IV infusion sets and IV Cannula.

In 2003, as part of contribution to injection safety, ADMD commissioned a new production line dedicated to Auto-Disable (AD) syringes – becoming the first and only manufacturer of AD syringes in the Middle East and Africa. AD syringes virtually eliminate the risk of patient-to-patient infection via blood-borne pathogens (such as Hepatitis B or HIV) because they cannot be refilled and reused. The Company's syringes enjoy global quality approvals and certifications from bodies such as the ISO and World Health Organization (WHO). We are the only WHO-approved manufacturer of AD syringes in the Middle East, producing over 300 million units per year.

1.2 BACKGROUND

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ADMD define success as being recognized as the leading healthcare supplier. Its reputation is based on providing cutting edge, high quality healthcare products at an affordable price to improve quality of life for people around the world. Its products are made to the highest quality management standards. This ensures that the most rigorous manufacturing protocols and specifications are continuously met, without any exceptions. None of our products are touched by human hands during production. And stringent

measures are taken to eliminate all bacteria in the production process. The company facilities boast the most advanced machinery and test equipment in compliance with industrial standards and protocols. ADMD maintain positive air pressure and a highly hygienic environment to protect the area from external particles and contamination. Complementing these measures are our highly qualified, experienced and trained professionals who employ computerized monitoring and control systems to ensure zero-defect quality.

ADMD's key markets include Iraq and the Indian subcontinent, where its products have been helping to deliver the best possible care at the lowest cost possible. ADMD's strong partnership with Pan American Health Organization and United Nation Children and Educations Funds has led to new opportunities throughout Latin America and Africa. ADMD's reputation for quality and safety, endorsed by WHO and Health Ministries worldwide, has led to increased market shares and rapidly expanding production capabilities. Today, the company's product lines enjoy a growing demand in over 60 countries across the Middle East, Africa, the Indian subcontinent and the Far East.

Each year, about 400,000 people die as a result of diseases transmitted by unsafe injections. Yet, over 16 billion unsafe injections are still in use in developing countries.

At ADMD, the company use technology to innovate a range of healthcare products that address some of these critical issues. Our flagship Auto Disable (AD) syringe comes with a fixed needle that can be used just once. It uses a three-part assembly which forms a unique one way valve. The valve gets activated after the first usage, blocking further intake of liquid and preventing refill.

The Auto Disable mechanism effectively eliminates the risk of patient-to-patient infection via blood borne pathogens such as HIV or Hepatitis B. The three major global health policy bodies, the World Health Organization (WHO), the United Nations Children's Fund (UNICEF) and the United Nations Population Fund (UNFPA) have fully endorsed and implemented the use of AD syringes in all global immunization services as recommended in the WHO-UNICEF-UNFPA Joint Statement of 1999.

The AD syringe is a shining example of our innovation aimed at enhancing patient care and improving healthcare outcomes worldwide.

How the Auto Disable mechanism works

- Injection of medicine activates the AD mechanism
- AD activation blocks further suction
- Plunger breaks when pulled beyond stopping point

ADMD Products List:

- Auto Disable Syringes
- Auto Disable Needles
- Single Use Syringes
- Insulin Syringes
- IV Cannula
- Infusion Sets
- Stopcocks
- Scalpvein Sets
- Re-use Prevention Syringes

Today there is a great world movement of capitals and productive resources seeking for more favorable locations to attain their goals. these changes are motivated by a competitive logic, in which companies may decide about re-directing capitals, equipment and people all over the world, in their search for new markets and for more economic locations. In this context, companies need to clearly identify their competitive strengths and weaknesses.

The information on the profitability of products, processes and trade channels in different countries - and even in inter-countries operations-, are indispensable for the project and for making new businesses feasible. The adequate structuring of the processes and products engineering in globalized manufacturers favors the assessment of

production costs in different markets, by means of performance indicators that take into consideration not only economic-financial aspects, but also operational, technological and institutional ones.

At present, many works seek to understand how different cost management models may help companies with their choice for more advantageous corporate actions, thus becoming more profitable and competitive.

Due to various factors, it was established in the previous century that "OPERATIONS must be an integral part of the production strategy for the overall success of an organization. For the effectiveness of the maintenance activity, the 21st century must build on this. It is expected that equipment of this century will be more computerized and reliable, in addition to being vastly more complex. Further computerization of equipment will significantly increase the importance of software maintenance, approaching, if not equal to, hardware maintenance. This century will also see more emphasis on maintenance with respect to such areas as the human factor, quality, safety, and cost effectiveness. New thinking and new strategies will be required to realize potential benefits and turn them into profitability. All in all, profitable operations will be the ones that have employed modern thinking to evolve an equipment management strategy that takes effective advantage of new information, technology, and methods.

Sievers outlined several measures manufacturers are taking to drive efficiencies. They include:

Plant network management: companies not only have an eye on removing underperforming plants but also aim to boost productivity by improving capacity utilization, allocating production more efficiently and making decisions more holistically rather than with a plant-by-plant approach.

"We do not expect to see a net reduction in the number of plants but better usage" Sievers says.

Integrated business planning: Companies are investing in information technology to support their drive for a more efficient plant network. They are taking that same mindset to their supply chain and other networks.

Where it makes sense, manufacturers are investing in equipment and systems to improve productivity. That said, investment in upgrading or building additional capacity is down by half from 2012. Instead, manufacturers are placing a higher investment priority on training.

Lean manufacturing and other continuous-improvement actions remain a significant means by which plants are improving operations.

Meaning of Operations Costs

Operating costs are expenses associated with the maintenance and administration of a business on a day-to-day basis. The operating cost is a component of operating income and is usually reflected on a company's income statement. While operating costs generally do not include capital outlays, they can include many components of operating a business including:

- Accounting and legal fees
- Bank charges
- Sales and marketing costs
- Travel expenses
- Entertainment costs
- Non-capitalized research and development expenses
- Office supply costs
- Rent
- Repair and maintenance costs
- Utility expenses
- Salary and wage expenses

1.3: PURPOSE OF STUDY

- ❖ Study and know the operations scenario in ABU DHABI MEDICAL DEVICES CO. LLC.
- ❖ Know the level of operations undertaken by the company.
- ❖ Identify Operations Costs.
- ❖ To give recommendations to reduce the operation costs.

The study is intended to evaluate the operation costs in the organization. Operating costs are the expenses which are related to the operation of a business, or to the operation of a device, component, and piece of equipment or facility. They are the cost of resources used by an organization just to maintain its existence.

This means getting the company to operate more economically and at the same time maintaining the quality of the company.

Need and Purpose of the Operations Management.

Importance of Operations Management

An effective operation can give four types of advantage to the business:

- Operations management can reduce the cost of products and services by being efficient
- Operations management can increase revenue through increased customer satisfaction in producing quality goods and services.
- Operations management can reduce the amount of investment (capital employed) necessary to produce the goods and service by being effective and innovative in the use of resources.
- Operations management provides the basis for innovation by building a solid base of operations and knowledge

Operations management is a multi-disciplinary field that focuses on managing all aspects of an organization's operations. The typical company carries out various functions as a part of its operation. The dividing of a company's activities into functional categories occurs very early on, even in a company formed and operated by a single individual. Most companies make a product of some kind or produce a salable service. They must also carry out a sales and marketing function, an accounting function, and an administrative function to manage employees and the business as a whole. Operations management focuses on the function of providing the product or service. Their job is to assure the production of a quality good and/or service. They apply ideas and technologies to increase productivity and reduce costs, improve flexibility to meet rapidly changing customer needs, assure a safe workplace for all employees, and when possible assist in assuring high-quality customer service.

For the most part, the title "Operations Manager" is used in companies that produce a tangible good—manufacturers on the whole. In service-oriented businesses, the person responsible for the operations manager role is often called by another name, one that addresses the service being offered. Examples include project manager, consultant, lawyer, accountant, office manager, datacenter manager, etc.

Purpose of Operation Costs

Businesses have to keep track of both operating costs and costs associated with non-operating activities, such as interest expenses on a loan. Both costs are accounted for differently in a company's books, allowing analysts to determine how costs are associated with revenue-generating activities and whether or not the business can be run more efficiently.

Generally speaking, a company's management will seek to maximize profits for the company. Because profits are determined both by the revenue that the company earns and the amount the company spends in order to operate, profit can be increased both by increasing revenue and by decreasing operating expenses. Because cutting costs generally seems like an easier and more accessible way of increasing profits, managers will often be quick to choose this method.

However, trimming operating costs too much can reduce a company's productivity and, thus, its profit as well. While reducing any particular operating cost will usually increase short-term profits, it can also hurt the company's earnings in the long-term. For example, if a company cuts its advertising costs its short-term profits will likely improve, as it is spending less money on operating costs. However, by reducing its advertising, the company is also reducing its capacity to generate new business, and earnings in the future can suffer, as can the company's growth potential. The best course of action, then, is to keep operating costs as low as possible while still maintaining the ability to increase sales.

OPERATIONS COSTS TERMS AND DEFINITIONS

Operations Cost management is the process of planning and controlling the budget of a business. Operations Cost management is a form of management accounting that allows a business to predict impending expenditures to help reduce the chance of going over budget.

This section presents some terms and definitions directly or indirectly used in Operations Cost.

Business's operating costs are comprised of two components, fixed costs and variable costs, which differ in important ways.

A fixed cost is one that does not change with an increase or decrease in sales or productivity and must be paid regardless of the company's activity or performance. For example, a manufacturing company must pay rent for some sort of factory space regardless of how much it is producing or earning. While it can downsize and reduce the cost of its rent payments, it cannot entirely eliminate these costs, and so they are considered to be fixed. Fixed costs generally include overhead costs, and other examples of fixed costs include insurance, security and equipment.

Fixed Costs

Fixed costs can help in achieving economies of scale, as when many of a company's costs are fixed the company can make more profit per unit as it produces more units. In this system, fixed costs are spread out over the number of units produced, making production more efficient as production increases by reducing the average per-unit cost of production. Economies of scale can allow large companies to sell the same goods as smaller companies for lower prices.

This principle can be limited in that fixed costs generally need to increase with certain benchmarks in production growth. For example, a manufacturing company that increases its rate of production over a certain period will eventually reach a point where it needs to increase the size of its factory space as well in order to accommodate the amount of the product it is making.

Variable Costs

Variable costs, like the name implies, are comprised of costs that may vary. Unlike fixed costs, variable costs will increase as production increases and decrease as production

decreases. Examples of variable costs include raw material costs, payroll and the cost of electricity and other utilities. For example, in order for a fast-food restaurant chain that sells French fries to increase its French fry sales, it will need to increase the size of its purchases from its potato supplier.

It is sometimes possible for a company to achieve a volume discount or "price break" when purchasing supplies in bulk, wherein the seller agrees to slightly reduce the per-unit cost in exchange for the buyer's agreement to regularly buy the supplies in large amounts, thereby diminishing the correlation somewhat between an increase or decrease in production and an increase or decrease in the company's operating costs. For example, the fast-food company may buy its potatoes at $0.50 per pound when it buys potatoes in amounts of less than 200 pounds, but the potato supplier may offer the restaurant chain a price of $0.45 per pound when it buys potatoes in bulk amounts of 200 to 500 pounds. Yet, volume discounts generally have a small impact on the correlation between production and variable costs and the trend otherwise remains the same.

Generally speaking, companies with a high proportion of variable costs relative to fixed costs are considered to be less volatile, as their profits are more dependent on the success of their sales. In the same way, the profitability and risk for the same companies are also easier to gauge.

Semi-variable Costs

In addition to fixed and variable costs, it is also possible for a company's operating costs to be considered semi-variable (or "semi-fixed"). These costs represent a mixture of fixed and variable components and thus can be thought of as existing between fixed costs and variable costs. Semi-variable costs vary in part with increases or decreases in production, like variable costs, but still exist when production is zero, like fixed costs. This is what primarily differentiates semi-variable costs from fixed costs and variable costs.

A relatively simple example of semi-variable costs is overtime labor. Regular wages for workers are generally considered to be fixed costs, as while a company's management

can reduce the number of workers and paid work-hours, it will always need a work force of some size in order to operate. Yet, overtime payments are often considered to be variable costs, as the number of overtime hours that a company pays to its workers will generally rise with increased production and drop with reduced production. Because wages paid in conditions allowing for overtime have both fixed and variable components, they are considered to be semi-variable.

1.4 : RESEARCH HYPOTHESIS

A manufacturing industry has lot of components which is a part of operations costs. Major factors are Building rents, Salary and wages, Transportation and Logistics cost, Sales and marketing cost, Maintenance cost, Utility expense etc.

Operations Costs are associated with:

1. **Salary and wage expenses**

   Different levels of staffing is required in the manufacturing industry. Like Managers, Section head, shift supervisors, machine operators, Fork lift operators, Assembly in-charge, labors, store keeper etc.

2. **Supply costs**

   Raw materials cost, Purchase of furniture, machineries, IT Equipment, lab facilities etc.

3. **Maintenance of the building**

   Buildings doesn't provide lifetime guarantee for their appearance and working conditions and is always subjected to wearing, decaying and filth. Building cleaning plays a very important and crucial role, when it comes to building maintenance. Building cleaning can be a simple approach towards green cleaning and take part in extending the life and appearance of building.

4. **Transportation and logistics**

   Transportation of raw materials and finished goods, warehouse handling, 3PL Warehousing and distribution cost etc.

5. **Training costs-**

Give training for the staffs and labours for the better work environment and achieve better outputs.

6. **Sales and marketing**

Brochures and exhibitions are the best marketing tool for this industry and also appointing marketing executives who go around the world.

7. **Building Rent**

The Rent and other expense for the factory premises and warehouses.

8. **Utility Expenses**

Utility expense including Electricity, Gasoline, telephone, Fax, Internet etc.

Here we are going to study the maintenance cost as operations cost.

NATURE OF OPERATION & PROBLEM STATEMENT

Many organizations have hundreds or even thousands of pieces of equipment to maintain, and a single breakdown could bring operations to a halt. While there's no arguing with the fact that fixing something as soon as it breaks is important, what may not realize is that there are high costs associated with working in reactive mode. An effective proactive maintenance program can preserve equipment and keep it is optimum condition, making unexpected equipment failure mostly a thing of the past. Current Operations in the company is focused mainly on traditional practices and is reactive ie. Break down. It is a practice that is inherently wasteful and ineffective with disadvantages such as unscheduled downtime of machinery, possibility of secondary damage, no warning of failure with possible safety risks, production loss or delay, and the need for standby machinery where necessary. Reactive maintenance will lead to machinery condition and general state of facilities becoming locked in to a down-ward spiral leading to further

deterioration and more problems. Thus, real cost of reactive maintenance is much more than the cost of maintenance resources and spare.

There are two basic approaches to maintenance management: reactive and proactive. Reactive maintenance, which is precipitated by failure, results from a lack of preventive and predictive maintenance. On the other hand, proactive maintenance keeps equipment serviced and in working order through preventive and predictive maintenance. A reactive maintenance approach can be detrimental to your organization because it means that preventive maintenance will get put aside due to constant emergency maintenance work. This is because reactive maintenance task tend to be complex, whereas preventive and predictive maintenance tasks are relatively simple. Sadly, the "if it ain't broken, don't fix it" attitude still permeates some parts of the maintenance management industry.

The research problem here in this study is associated with the changing from reactive to proactive work culture, UAE.

CHAPTER 2 :
LITERATURE REVIEW

2.1 : REVIEW AREA BROAD

Operations Costs

Operating costs are the expenses which are related to the operation of a business, or to the operation of a device, component, and piece of equipment or facility.

Stages of evolution

Firstly, the literature on strategic management, globalized operations management, and activity-based management is reviewed. Multiple case studies were also conducted to demonstrate the efficacy of the use of cost management models aligned to operation strategy.

The purpose of the research was to understand how economic information provides support to competitive strategies, and how the alignment between cost management models and operations global strategy is conducted. Therefore, based on the theoretical references studied, the following propositions are investigated:

Corporate strategy requires economic information in several formats - information on product costs, processes, trade channels, networks and supply chains etc.

The decisions on the different aspects of operations management (Planning, Organization, Decision and Control), hoe to consider mainly economic and financial, besides physical, operational, technological and institutional information.

Economic decisions affect globalized operations day-to-day.

The activity-based management model provides an efficient way for the management of global and inter-regional operation goals.

To investigate the research problem and the propositions posed, the option was for qualitative research, developed by means of the multiple case studies approach (Yin, 1991)

Companies present different strengths and weaknesses, even when producing similar products, and may choose various ways to be differentiated from their competitors. That is, they have to opt among a varies list of production methods, take decisions concerning market segmentation, besides defining their operational alternatives to competition. Thus, the company's manufacturing management mission is to configure the production system through a series of consistent choices that reflect the priorities and the implicit commitment of its competitive situation.

The present globalized industrialization stems from the integration of production systems with markets, Thus, the transnational companies, stimulated by this world economic reality, are spreading throughout all countries in the world, sometimes with the implementation of new units; others with the acquisition of local plants. This reconfiguration transforms the transnational companies into dynamic poles. Depending on their strategic focus competencies not only in their countries of origin, but also in the developing countries. This interaction among transnational and local companies means a new international division of companies (Fleury and Fleury, 2000)

The international market opening has encouraged nations to specialize in certain production segments, with different production models and in specific industries. The strategy is that creating competitive advantages, opening new markets, using scale economy, rationalization standardization of projects and products manufacturing.

However, so that they can profitable in the global economy, companies must have full knowledge that their decisions really add value for sake holders and for clients. It is acknowledged today that costs information alone is not enough to determine profitability; management methods deal with quality criteria, productive flexibility and innovation as factors with the same importance as knowledge of the costs involved.

The aim is clearly to develop and to create sustainable competitive advantage, finding new ways that may guarantee not only markets participation, but also opportunities that provide growth and company continuity.

Nevertheless, in their researches, Bolwijn and Kumpe (1990) concluded that most the manufacturing companies present cumulative evolution in the employment of strategies. At first, companies developed competency in costs they then started their quest for attaining competitively in quality. Next, the response time between manufacturing and clients needs were equated. After managing to establish goods competitions parameters in these three criteria, companies sought to acquire flexibility in the productive system to, finally, become innovators.

Sometimes companies have few options to determine their competitive strategy (Fleury and Fleury, 2002). This happens when there are many entrance barriers, when clients rigidly specify the necessary products and services, and when in a way they also determine the price limits (perceived values). Competencies, therefore besides analyzing how their competitors are operating, must search new ways to be differentiated, respecting regional policies and needs. Analyzing these concepts under the new global competition environment point of view, it can be verified that, for many of these companies, the initial development of cost -centered strategy is a fundamental factor for the successful implementation of the new plant, independently of the present stage of competition of the main office and of the other plants.

On account of that need, some transnational and multinational companies are developing and planning activity-based costing systems, aiming to provided new tools for the global costs strategic management. They thus intend to create rules and standards to coordinate the processes and the global production activities, establish indicator to manage raw material purchase decision, labor cost per activities, planning and control of the productive process and quality, new product development products mix , processes improvement, activities that add value to the product, profitability per product , regional profitability, among other decisions, besides establishing management and global performance indicators.

The development of a competitive strategy is, in essence, the development of a broad formula for the way a company will compete (Porter, 1991).

It is very important for the company to define its work network, to identify its competitive strengths, to plan tasks for each strength, to make a forecast of the necessary resources, to establish the goals and then construct a framework on the probable profitability (Porter and Millar, 1979)

The company should be concerned with creating consistent solutions situated between client's needs and organizational practices. Skinner (1996) identified the establishment of performance measures, such as quality, production speed or attendance, reliability, flexibility and cost as the practical aspects of competitive advantage.

Buffa (1985) already stressed that the formulation of a manufacturing strategy, it would be important to consider all aspects of operational decisions, which he classifies into six great components.

Positioning the product system

Decision on capacity and location

Technological product and processes

Work force and production planning

Strategic implications of operational decisions.

Vertical integration and suppliers.

These components are the basic elements for formulating the production strategy, once they provide a broad scenario for choosing the feasible alternatives. Each of the latter will have its effect in the long run in the company's competitive scenario and will also cause impacts on costs, on quality, on products feasibility and on the production flexibility.

Therefore, the development of a corporate strategy is the rationalization and the interviewing of the different activities that will provide support to competivity. Hence all competencies must be consider in the formulation of the different internal strategies such as for example the production strategy and the costs strategy.

Costs Strategic Management, in turn, concerns costs management, be it for the financial and profitability analyses of the products, be it for verifying and assessing the short and long-term business profitability. To attain these objectives, an efficacious and efficient cost management is necessary, and should be coordinated with the business strategies, so as to provide sustainable competitive advantage.

Strategic Costs Management also significantly contributes to efficiency in analyzing value for the stakeholders, in a possible alteration of organizational behavior and to minimize the risks for the company.

Porter (1996) deals with the issue identifying the company's need to assess the competitors' performance and to establish a difference that may be preserved. That is, going beyond what its competitors do, the company needs to add more value to the clients, or create value comparable to that of its competitors, however, at smaller costs. The essence of the strategy lies in the activities - the choice for the company's activities performance, as opposed to its competitors' activities performance.

By means of the critical analysis of activities, the companies must identify which indicators performance should be monitored, allowing for commitment decisions, ensuring the advantage to facilitate the good use of opportunities and of market changes, or also, they must choose different activities and establish the necessary performance, aiming to conduct them in a better way than that of the competitors.

Most of the large companies seem to ignore the fact that their cost systems have not updated to face the present competitive environment; the methods used to assess products costs are irremediably obsolete (Kaplan 1984).

Owing to the difficulty in precisely identifying the costs of products in the traditional costing models, a large number of companies fail to incorporate these fundamental pieces of information as a strategic issue. There is now the need of developing new costs assessment tools, aiming to guide the corporate strategy, that is, an accurate piece of cost information, in a simple way, may provide competitive advantage to a company.

Cost management, for quite some time, was a forgotten island in corporate strategy. In recent years, nevertheless, cost management succeeded in increasing its importance in opportunities prospect ion. Strategic costs management offers wider understanding of processes for managing expenses, both for financial performance measures and for identifying competitive advantages (Grundy, 1996).

Tayles and Drury (1994) believe that information systems must be developed and planned aiming to see to the needs identified by the strategic view of the objectives. This directly affects the interface between the marketing, production and accounting management departments, which have to acquire knowledge on the production, so that the performance and costs indicators systems obtain efficacy.

Several factors may influence the planning of the costing system; it is not simply the competition degree that influences the planning of the system, but the nature of competition, which, in theory, is determined by the choice of competitive strategy.

In a cost leadership strategy, the costing system has to be planned and developed to identify the potential areas for cost reduction. Smaller costs are obtained by better use and smaller material loss, by a lesser level of losses along the process, by the minimization of re-works etc.

Costs management may provide rules for the selection of clients, for market and products segments, important factors for the success of global operations. This information, associated to the activities of each productive process, generate the company's profitability map and allow for defining the best competitive strategy for different countries and markets, seeking to attain regional objectives and maximizing the global corporate result.

ACTIVITY-BASED COSTING (ABC)

The activity-based costing emerged with the aim of aiding managers with the new competitive environment, introduced by the new production technologies and by the emphasis on the client. Kaplan and Cooper (1997) reports that the costing models used beforehand did not count on control and accuracy mechanisms that could guide the companies when making decisions concerning:

Products and services planning that meet clients' expectations and may profitably be produced and delivered;

Point out where improvements in quality, efficiency and speed are necessary;

Advise collaborators in their learning and in the continuous improvement of activities;

Guide the decisions concerning products mix and investments;

Choose among different suppliers alternatives;

Support price negotiation, products manufacturing, quality, delivery, and services for clients;

Decision-taking concerning market and clients segments.

The activity-based costing economic model, therefore, aims to include important costs information to the new competition framework, creating a tool to support corporate strategy decisions.

ABC is founded on the assessment of all the necessary activities along the process, from production (manufacturing or service) to product delivery to the consumer, identifying the resources consumed by these activities by means of different costing drivers, valuing the products individually and adequately. Essentially, in the ABC costing system, the products consume the activities necessary for their production (Aderoba, 1997). In that

method, the knowledge of the whole productive process is fundamental, as is the understanding of how the system adds value to products. The ABC system is based on the resource consumption in the activities; these resources adequately include the costs of machinery, direct and indirect labor, equipment, auxiliary tools, indirect materials, advertising, governmental fees, etc, consumed by specific activities.

Thus, besides providing strategic information, aiding the continuous improvement of the process, the system offers data on the activities that do not add value, monitors quality, provides tools for decisions on prices flexibilization, controls costs, profitability and performance of products, providing sustainable competitive advantage for the companies using it, as compared to the traditional costing systems (Cooper and Kaplan, 1991; Kaplan and Cooper, 1997; Gunasekaran et al, 1998 and 1999; Chalos, 1992; Grundy, 1996, Nakagawa, 1994).

At present, this costing model has been used by transnational companies viewing the supply of a management and control instrument to determine the cost-centered global competitive strategy. This occurs by the standardization of processes, activities, control of joint costs, decisions regulation on the purchase of materials and suppliers, planning taxes in different countries, assessing the use of production capacity in tune with the global corporate strategy, supporting the identification of competitive priorities and of business opportunities in each market.

Therefore, combining the information on the non-financial indicators of the activities control and of the activity-based costs information may build a profitability map, of activities and products, in all the markets where the company acts. In today's competitive world, the performance and costs information on the activities is the key for the continuous improvement of the business profitability.

The research protocol was structured on the research questionnaire serving as a base for data collection in the companies researched, the responses of which supported the case studies that will be presented further on. There are many aspects of maintenance and other plant functions that have an effect on the number of machine breakdowns and the

length of downtime. Some of these considerations are not normally associated with the term preventive maintenance, but nonetheless contribute to equipment failure, therefore, they should be considered as part of comprehensive approach to preventive & predictive maintenance.

Statistics and probability theory are the basis for condition monitoring maintenance. Trend detection through data analysis often rewards the analyst with insight into the causes of failure and preventive actions that will help avoid future failures. For example, stadium light burn out within a narrow period.

If 10 percent of the lights burned out, it may be accurately assumed that the rest will fail soon and should, most effectively, be replaced as a group rather than individually.

Scheduled, fixed-interval preventive maintenance tasks should generally be used only if failures that cannot be detected in advance can be reduced, or if dictated by production requirements. The distinction should be drawn between fixed-interval maintenance and fixed-interval inspection that may detect a threshold condition and initiate condition-monitoring tasks. Examples of fixed-interval tasks included 3,000 mile oil changes and 48,000-mile sprak plug changes and 60,000 – mile Tire changes on a car, whether it needs the changes or not. This may be wasteful because all equipment and their operating environments are not alike. What is right for one situation may not be right for another.

The five-finger approach to maintenance emphasizes elimination and reduction ofmaintenance needs wherever possible, inspection and detection of pending failuresbefore they happen, repair of defects, monitoring of performance conditions andfailure causes, and accessing the equipment on a fixed-interval basis only if no bettermeans exist.

A total PPM program is absolutely essential to an efficient, reliable and safe production process. Benefits are direct and substantial, including: high product quality, long machine life, avoidance of work stoppage, high safety, high morale and fewer frustrations. There are five essential requirements:

1. Top management leadership and absolute commitment.
2. Compliance and discipline. PPM must be a normal part of schedule and capacity determination.
3. Process operators should be involved and perform daily maintenance checks.
4. The "true cost of poor maintenance," which is several times initial estimates must be thoroughly understood by all.
5. Good PPM practices must be instituted immediately to enable the facility to achieve an efficient production system that delivers high quality goods on time, every time.

Although treated as separate elements, preventive/predictive maintenance, Reliability Engineering, equipment history and functional pride and quality assurance are inextricably supportive—each to the others. Success of the preventive/predictive maintenance program is dependent upon the existence of the other three elements. While planning and scheduling assure the effective utilization of resources to sustain an established proactive maintenance program, it is these four elements working in concert that define the proactive program.

Logically, an effective maintenance program, supported by these four essential elements, begins with equipment history. Then, based upon this factual information foundation, Reliability Engineering begins the development and subsequent refinement of a preventive/predictive maintenance program. Aneffective scheduling function assures that PPM routines are punctually performed as they become due, as follows:

A. The planning and scheduling program provides a structure into which PPM routines are woven. If PPM routines are continually shoved to one side, a proactive environment will never become reality. As scheduling contributes to the success of preventive maintenance so preventive maintenance contributes to the success of scheduling. The greatest obstacle to effective scheduling is the spasmodic occurrence of emergency

breakdown repairs. Through scheduled inspections of equipment and repairs during scheduled downtime, emergency breakdowns can be nearly eliminated; thus the cause of interruptions to the planned schedule is removed or reduced to a minimum.

B. Program consistency and punctuality is a must. PPM must be viewed and conducted as an ongoing and controlled experiment to be continually nurtured and refined. It requires dedicated, uniquely talented effort (the maintenance engineer).

PPM Requires

1. Top management understanding of the true cost of poor maintenance, which is several times initial estimate.
2. Sustained management leadership and absolute commitment
3. Knowledge of equipment/process conditions required to yield quality, output, safety, and compliance standards. A. One cannot determine what problems exist until knowing what conditions are proper.
4. PPM and other programmed maintenance must be normal part of schedule and capacity determination. Management must insure that PPM is never delayed.

A. PPM must be concluded as a Controlled Experiment. 1. Plan 2. Do 3. Evaluated 4. Refine

B. Weekly adherence to a balanced PPM Schedule.

PPM is compromised of 1. Proper organization 2. Proper operation of equipment 3. The proper lubricants, in the right quantities, in the right location, at the proper time 4. Predicting wear and detoriation by regularly checking, measuring and adjusting A. Regular inspection to identify small repairs before they become major repairs B.

Predictive technique to replace components just before they fail a. Vibration monitoring and analysis b. Infrared inspection c. Sound detection d. Lubrication and oil sampling etc. 5. Replacement of components on a regular basis before they fail 6. Correction of potential failures when inspection indicates the need 7. Overhauling equipment periodically to upgrade general equipment condition 8. Reliability engineering to reduce or eliminate repetitive failures 9. Reliability engineering to minimize failures through adjustments to the PPM program.

2.3 Current state of the Industry - Reactive and Proactive Maintenance

We deal with events before they are likely to occur, this can be done by identifying all failure modes which are likely to affect the equipment, determine what happens when it occurs and what should be done to an anticipate, prevent, detect, predict or modify it out.

In modern and forward thinking businesses it has for some years been realized that prevention is better than cure and that proactive, rather than reactive management brings the best results for these businesses.

Reactive maintenance (also known as "breakdown maintenance") are repairs that are done when equipment has already broken down.

Reactive maintenance focuses on restoring the equipment to its normal operating condition. The broken-down equipment is returned to working within service specifications by replacing or repairing faulty parts and components. Emergency repairs cost 3 to 9 times more than planned repairs, so maintenance plans that rely on reactive maintenance are generally the most expensive. Breakdown maintenance is so expensive because shutdowns happen during production runs (instead of pre-scheduled maintenance shutdowns during downtimes); because expedited shipping for spare parts cost much

more than regular shipping; and because maintenance staff is often forced to work overtime to repair machinery.

Proactive maintenance is a preventive maintenance strategy for maintaining the reliability of machines or equipment. The purpose of proactive maintenance is to view machine failure and similar problems as something that can be anticipated and dealt with before they occur.

Proactive maintenance consists of:

Preventive maintenance

Predictive maintenance

Because proactive maintenance methods are currently saving industries of all sizes thousands, even millions, of dollars on machine maintenance every year.

Advantage of Proactive

- Cost effective in many capital intensive processes.
- Flexibility allows for the adjustment of maintenance periodicity.
- Increased component lifecycle.
- Energy savings.
- Reduced equipment or processing failure.
- Estimated 12% to 18% cost savings over reactive maintenance program.
- Increased component operational life / availability.
- Allows for pre-emptive corrective actions.

- Decrease in equipment or process downtime.
- Decrease in costs for parts and labor.
- Better product quality.
- Improved worker and environmental safety.
- Improved worker moral.
- Energy savings.
- Estimated 8% to 12% cost savings over.
- Increased component operational life and availability.
- Allows for preemptive corrective actions.
- Results in decreased equipment or process downtime.
- Lowers costs for parts and labor.
- Provides better product quality.
- Improves worker and environmental safety.
- Raises worker morale.
- Increase energy savings.

Results in 8% to 12% cost savings over preventive maintenance can be the most efficient maintenance program.

- Lower costs by eliminating unnecessary maintenance or overhauls.
- Minimize frequency of overhauls.
- Reduced probability of sudden equipment failures.
- Able to focus maintenance activities on critical components.

- Increased component reliability.

Disadvantages Reactive

Increased cost due to unplanned downtime.

Increased labor cost, especially if overtime is needed.

Cost involved with repair or replacement.

Possible secondary equipment or process damage.

Inefficient use of staff resources.

<10% Reactive

25% to 35% Preventive

45% to 55% Predictive

Implementation of the Proactive system

2.2 : REVIEW AREA NARROW

Operating costs are the expenses which are related to the operation of a business, or to the operation of a device, component, and piece of equipment or facility.

They are the cost of resources used by an organization just to maintain its existence.

1. **Business operating costs**

For a commercial enterprise, operating costs fall into two broad categories:

Fixed costs, which are the same whether the operation is closed or running at 100% capacity. Fixed Costs include items such as the rent of the building. These generally have to be paid regardless of what state the business is in.

Variable costs, which may increase depending on whether more production is done, and how it is done (producing 100 items of product might require 10 days of normal time or take 7 days if overtime is used. It may be more or less expensive to use overtime production depending on whether faster production means the product can be more profitable). Variable Costs include indirect overhead costs such as Electricity, Gasoline, Cell Phone Services, Computer Supplies, Credit Card Processing, Express Mail, Janitorial Supplies, MRO, Office Products, Payroll Services, Telecom, Uniforms, Utilities, or Waste Disposal etc.

2. **Business overhead costs**

Overhead costs for a business are the cost of resources used by an organization just to maintain its existence. Overhead costs are usually measured in monetary terms, but non-monetary overhead is possible in the form of time required to accomplish tasks.

Examples of overhead costs include:

- payment of rent on the office space a business occupies

- cost of electricity for the office lights
- some office personnel wages

Non-overhead costs are incremental costs, such as the cost of raw materials used in the goods a business sells.

Operating Cost is calculated by Cost of goods sold - Operating Expenses. Operating Expenses consist of:

- Administrative and office expenses like rent, salaries, to staff, insurance, director's fees etc.
- Selling and distribution expenses like advertisement, salaries of salesmen.
  It includes all operating cost such as salary, rent, stationery, furniture etc.

3. Equipment operating costs

In the case of a device, component, piece of equipment or facility (for the rest of this article, all of these items will be referred to in general as equipment), it is the regular, usual and customary recurring costs of operating the equipment. This does not include the capital cost of constructing or purchasing the equipment (depending on whether it is made by the owner or was purchased as a constructed system).

Operating costs are incurred by all equipment — unless the equipment has no cost to operate, requires no personnel or space and never wears out (any examples? perhaps intangibles, though not equipment, per se). In some cases, equipment may appear to have low or no operating cost because either the cost is not recognized or is being absorbed in whole or part by the cost of something else.

Equipment operating costs may include:

- Salaries or Wages of personnel

- Advertising
- Raw materials
- License or equivalent fees (such as Corporation yearly registration fees) imposed by a government
- Real estate expenses, including,: Rent or Lease payments, Office space rent, furniture and equipment, investment value of the funds used to purchase the land, if it is owned instead of rented or leased, property taxes and equivalent assessments, Operations taxes, such as fees assessed on transportation carriers for use of highways.
- Fuel costs such as power for operations, fuel for production
- Public Utilities such as telephone service, Internet connectivity, etc.
- Maintenance of equipment
- Office supplies and consumables
- Insurance premium
- Depreciation of equipment and eventual replacement costs (unless the facility has no moving parts it probably will wear out eventually)
- Damage due to uninsured losses, accident, sabotage, negligence, terrorism and routine wear and tear.
- Taxes on production or operation (such as subsidence fees imposed on oil wells)
- Income taxes

2.3 : FACTORS CRITICAL TO SUCCESS OF STUDAY

Reducing and controlling operating costs has become a necessity in this financially challenging environment. The following strategies are among those available for reducing and controlling costs.

1. **Budget, Plan and monitor**

A budget provides a roadmap for the financial management of the organization including controlling costs. Historical results along with the effects of current revenue and cost trends provide the basis for a budget and can help predict the future financial health of the organization. It will also provide the benchmark for reporting future financial results. Monthly reviews of actual financial results compared to budgeted amounts will provide the information necessary to react quickly to variances to the plan.

2. **Review Purchasing Procedures**

Purchasing procedures should be examined for possible areas for reducing costs. During the review, a check of authorization processes should take place ensure adherence to authorization limits. The review should also look for adequate controls on spending limits and the number of people authorized to make purchases.

3. **Review Suppliers**

An analysis of the existing base of suppliers could also reveal opportunities for reducing the costs by consolidating purchases for additional buying power. Consolidation of

suppliers will also produce a reduction of administrative expenses due to processing fewer purchase orders, invoices and, payments.

Additionally try negotiating with current suppliers for better pricing and consider proposals from alternative suppliers to lower costs in all operating expenses areas including the small expenses.

4. Ask employees to Analyze expenses

Assigning a team of employees to analyze an expense category can identify areas of expense reduction. Employees can often identify items with less expensive alternatives that will meet the needs of the organization. Sometimes, items are identified that can be eliminated entirely without affecting the organization.

Rewards for participation in the effort to reduce expenses can include financial and other incentives but recognition of their achievement should also be motivational.

5. Engage Outside Help

When internal resources aren't adequate to perform the reviews and analysis necessary to reduce and control costs, consider hiring an independent, objective outside firm to benchmark and assess current costs. The consultant could also perform an operational audit of purchasing process, negotiate with suppliers, and implement cost savings recommendations. There are consultants available who will perform this service on a contingency basis.

6. Follow the Trend

Just about every kind of business sees trends that ultimately affect the bottom line. By knowing what those trends are, you can plan ahead and keep costs down. Always use comparative analysis when reviewing your P&L, so you can see how expenses are moving around from month to month. Then, take a separate approach and compare your April P&L results of the current year to the April P& results of the previous year. You will be able to spot variances much easier and that will create questions that you need to answer in order to get a reasonable explanation for the variances.

7. Prioritize

No matter what industry you're in , there's going to come a time when you and you're your team need to scramble to get something done. Outside of that, however, the way in which you handle your tasks can tie directly into managing operating costs. It's only natural that some jobs will take longer to do than others, so you want to give priority to the big things first. This will give you enough time to get the important things done before moving on to the easier and simpler tasks. Not only will this reduce the chance that something important will be rushed through once someone realizes that it's been overlooked, but it will save you from potentially having to pay for the overtime that's likely to result.

2.4: SUMMARY

To investigate the research problem and the propositions posed, the option was for qualitative research, developed by means of the multiple case studies approach (Yin, 1991)

Companies present different strengths and weaknesses, even when producing similar products, and may choose various ways to be differentiated from their competitors. That is, they have to opt among a varies list of production methods, take decisions concerning market segmentation, besides defining their operational alternatives to competition. Thus, the company's manufacturing management mission is to configure the production system through a series of consistent choices that reflect the priorities and the implicit commitment of its competitive situation.

The present globalized industrialization stems from the integration of production systems with markets, Thus, the transnational companies, stimulated by this world economic reality, are spreading throughout all countries in the world, sometimes with the implementation of new units; others with the acquisition of local plants. This reconfiguration transforms the transnational companies into dynamic poles. Depending on their strategic focus competencies not only in their countries of origin, but also in the developing countries. This interaction among transnational and local companies means a new international division of companies (Fleury and Fleury, 2000)

CHAPER 3 - RESEARCH DESIGN, METHODOLOGY AND PLAN

3.1 : DATA SOURCES

The data to test the hypothesis and information to present in this report was received from various channels. Direct communication with Department Heads will be available as when required, and very co-operative approach for the improvement. The finance Department also can provide the required information in oder to complete the study.

The major research tool that will be used to collect the information is to prepare the questionnaire which will be developed and subsequently completed by interview.

Identify and collection of Assets Details

Identify and select of the areas where operations costs are high and recommend to reduce them. These areas should be crucial to the success of overall company operations and may be experiencing a high degree of reduced operations cost. We need to collect the details of the assets and according to their field of operation. The main objective of this step is to obtain immediate results in highly important and critical areas of the company.

Collection of asset details includes the primary data collection and secondary collection.

Primary data:

1. Primary assessment to be done questionnaire and face to face interview developed is enough to obtain the information t analyze the required information regarding the pre-implementation scenario as well as post implementation forecasting.
2. Department Head to be interviewed separately to obtain their commitment in analyzing the requirement of the organization and to know about the management point of view regarding the selection, implementation and post implementation forecasting.

3. Once the questionnaire answers are analyzed, develop interview questions to meet junior staff in the organization.

4. After the analysis of questionnaire and interview answers, independent assessment will be made regarding the impact of implementation on the organization.

Primary data can be collected by directly auditing the operations of the company, taking the details of the operations cost in the operations of the company and giving recommendations to reduce it.

Secondary Data

1. Company database maintained by various departments to know about the impact of pre-implementation scenario in the organization.

2. Since the current market is advance IT Technology the company is update with their information in their website. Referring to their web site we can obtain a detailed information from beginning of the company such as history, policies, project executed, financial positions, group companies, man power details, management commitments etc.

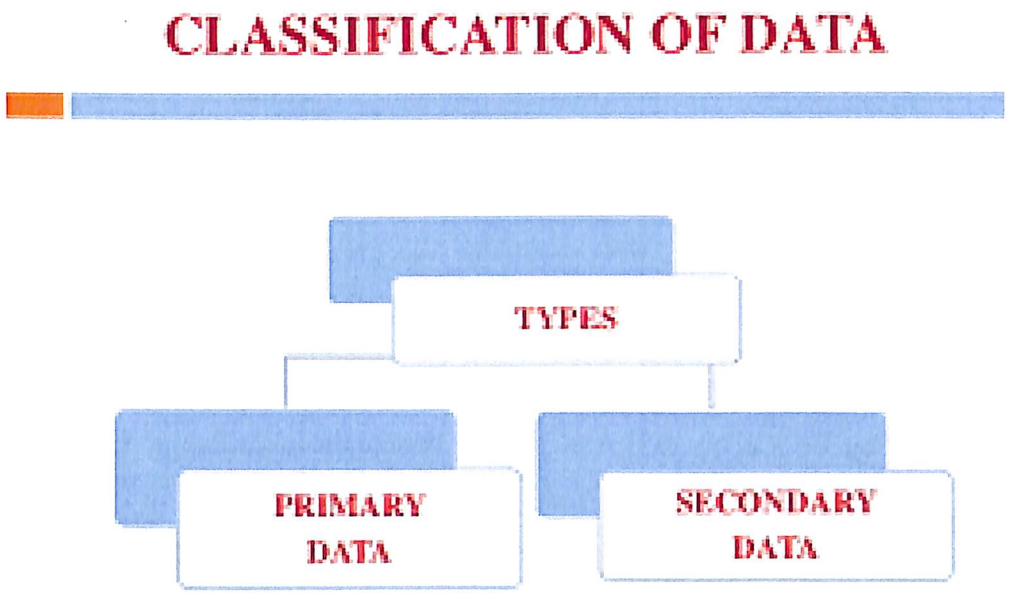
3. Data will also be collected from published sources of various newspapers, magazines, journals etc.

4. Data will also be procured from the websites maintained by various organizations which can be used as supporting information for the primary data collected.

It can be collected with the records and profit and Loss statement records from the Accounts Department. Also referring the drawing will also help to get the details of the assets. Cross checking the datas collected in the primary data is possible using the secondary data.

DATA COLLECTION METHOD

Data are the bricks with which the researcher has to make a house. While the quality of research findings depends on data, the adequacy of appropriate data in turn depends upon proper method of data collection. A number of methods are at the disposal of which one has to select the most appropriate one for visualizing the research objective. Thus we have to see that the method adopted is compatible with the resources and research study.



Primary Data: Data which are collected fresh and for the first time and thus happens to be original in character. Primary data are gathered for specific purpose. Primary data is available from:

- Questionnaires
- Personal Evaluation
- Telephonic Feedbacks

- Observations and Experiments
- Surveys

Secondary data: Data that collected from primary data i.e., they already exist somewhere. This is the information already in existence which may be useful for the purpose. It has been defined as 'data neither collected by the user, nor specifically for the user; often under the conditions not known to the user'. This may be available:

- Internally
- Externally

For the purpose of our study we collected both the data.

Secondary data was collected through company maintenance job orders and work reports. Primary data through:

a) Questionnaire method.

In our study the main emphasis was on the questionnaire method. We used questionnaire method which were of multiple choices in nature and were of closed ended.

The advantages of questionnaires

1. Practical
2. Large amounts of information can be collected from a large number of people in a short period of time and in a relatively cost effective way
3. Can be carried out by the researcher or by any number of people with limited affect to its validity and reliability
4. The results of the questionnaires can usually be quickly and easily quantified by either a researcher or through the use of a software package
5. Can be analyzed more 'scientifically' and objectively than other forms of research
6. When data has been quantified, it can be used to compare and contrast other research and may be used to measure change

The disadvantages of questionnaires

1. Is argued to be inadequate to understand some forms of information - i.e. changes of emotions, behavior, feelings etc.
2. Lacks validity
3. There is no way to tell how truthful a respondent is being
4. There is no way of telling how much thought a respondent has put in
5. The respondent may be forgetful or not thinking within the full context of the situation
6. People may read differently into each question and therefore reply based on their own interpretation of the question - i.e. what is 'good' to someone may be 'poor' to someone else, therefore there is a level of subjectivity that is not acknowledged
7. There is a level of researcher imposition, meaning that when developing the questionnaire, the researcher is making their own decisions and assumptions as to what is and is not important...therefore they may be missing something that is of importance.

Hypothesis tests

Every hypothesis test requires the analyst to state a null hypothesis and an alternative hypothesis. The hypotheses are stated in such a way that they are mutually exclusive. That is, if one is true, the other must be false; and vice versa

A t-test isany statistical hypothesis test in which the test statistic follows a Student's t distribution if the null hypothesis is supported. It can be used to determine if two sets of data are significantly different from each other, and is most commonly applied when the test statistic would follow a normal distribution if the value of a scaling term in the test statistic were known. When the scaling term is unknown and is replaced by an estimate based on the data, the test statistic (under certain conditions) follows a Student's t distribution.

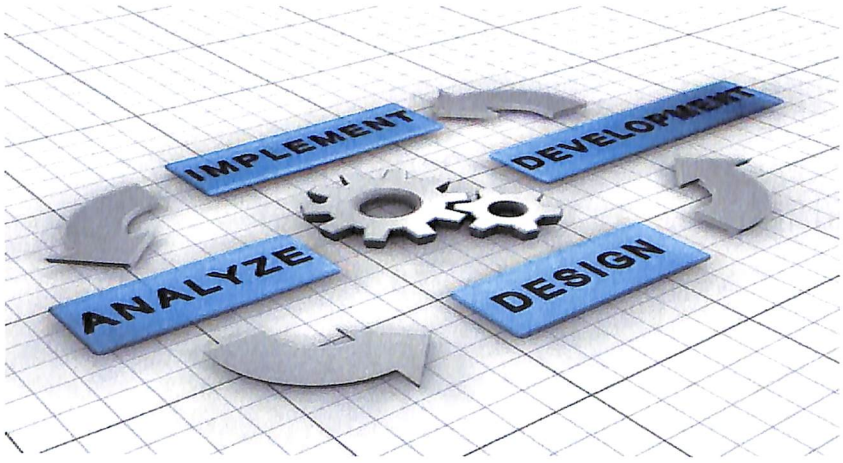
3.2 : RESEARCH DESIGN

Research Design is a logical and systematic plan prepared for directing research study, which specifies the objective of the study, the methodology and techniques to be adapted for achieving the objectives.

A good research design reduces the wastage of time and cost, and encourages co-ordination and effective organization. The research design makes enough provision for protection against bias and maximum reliability.

The present study is designed as a descriptive one based on sampling method. It involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data. So this design is selected for the study.

As an organization develops plans and strategies to deal with the opportunities and challenges that arise in its particular operating environment, it should design a system that is capable of producing quality services and goods in demanded quantities in acceptable time frames.



Designing the System:

Designing the system begins with product development. Product development involves determining the characteristics and features of the goods to be sold. It should begin with an assessment of customer needs and eventually grow into a detailed product design. The facilities and equipment that will produce the product, as well as the information systems needed to monitor and control performance, are part of this system design process. In fact, manufacturing process decisions are integral to a system's ultimate success or failure "Of all the structural decisions that the operations manager faces, the one with the greatest impact on the manufacturing operation's success is the process/technology choice", said Thomas S. Bateman and Carl P. Zeithaml in Management: Function and Strategy. "This decision addresses the question 'How will the product be made?". Product development should be a cross-functional decision-making process that relies on teamwork and communication to install the marketing, financial, and operating plans needed to successfully launch the product.

Product Design is a critical task because it determines the characteristics and features of the product, as well as how the product functions. Product design determines a product's cost and quality, as well as its features and performance. These are important factors on which customers make purchasing decisions. In recent years, new design models such as Design for Manufacturing and Assembly (DFMA) have been implemented to improve product quality and lower costs.

DFMA focuses on operating issues during product design. This can be critical even though design costs are small part of the total cost of a product, because, procedures that waste raw materials or duplicate effort can have a substantial negative impact on a business's operating profitability. Another innovation similar to DFMA in its emphasis on design is Quality Functional Deployment (QFD). QFD is a set of planning communication routines that are used to improve product design by focusing design efforts on customer.

Process design describes how the product will be made. The process design decision has two major components: a technical (or engineering) component and a scale economy (or business) component. The technical component includes selecting equipment and selecting a sequence for various phases of operational production.

The scale economy or business component involves applying the proper amount of mechanization (tools and equipment) to make the organization's work force more productive. This includes determining: 1) If the demand for a product is large enough to justify mass production; 2) If there is sufficient variety in customer demand so that flexible production systems are required; and 3) If demand for a product is so small or seasonal that it cannot support a dedicated production facility.

Facility design involves determining the capacity, location, and layout for the production facility. Capacity is a measure of an company's ability to provide the demanded product in the quantity requested by the customer in a timely manner. Capacity planning involves estimating demand, determining the capacity of facilities, and deciding how to change the organization's capacity to respond to demand.

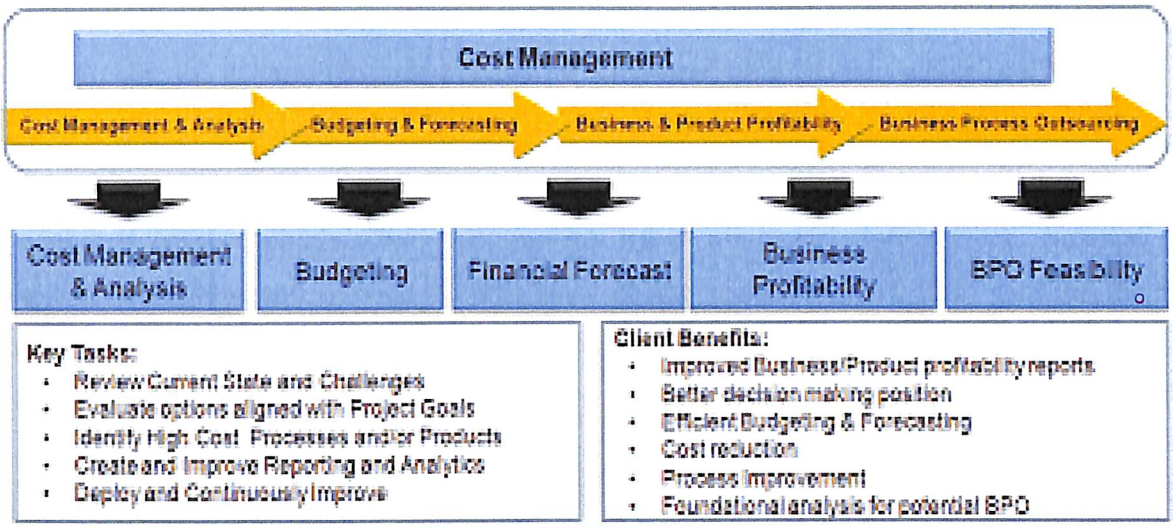
Facility location is the placement of a facility with respect to its customers and suppliers. Facility location is a strategic decision because it is a long-term commitment of resources that cannot easily or inexpensively be changed. When evaluating a location, management should consider customer convenience, initial investment necessary to secure land and facilities, government incentives, and operating transportation costs. In addition, qualitative factors such as quality of life for employees, transportation infrastructure, and labor environment should also be taken under consideration.

Facility layout is the arrangement of the workspace within a facility. It considers which departments or work areas should be adjacent to one another so that the flow of product, information, and people can move quickly and efficiently through the production system

PLANNING THE SYSTEM - Planning the system describes how management expects to utilize the existing resource base created as a result of the production system design. One of the outcomes of this planning process may be to change the system design to cope with environmental changes. For example, management may decide to increase or decrease capacity to cope with changing demand, or rearrange layout to enhance efficiency.

Decisions made by production planners depend on the time horizon. Long-range decisions could include the number of facilities required to meet customer needs or studying how technological change might affect the methods used to produce services and goods. The time horizon for long-term planning varies with the industry and is dependent on both complexity and size of proposed changes. Typically, however, long-term planning may involve determining work force size, developing training programs, working with suppliers to improve product quality and improve delivery systems, and determining the amount of material to order on an aggregate basis. Short-term scheduling, on the other hand, is concerned with production planning for specific job orders (who will do the work, what equipment will be used, which materials will be consumed, when the work will begin and end, and what mode of transportation will be used to deliver the product when the order is completed).

MANAGING THE SYSTEM - Managing the system involves working with people to encourage participation and improve organizational performance. Participative management and teamwork are an essential part of successful operations, as are leadership, training, and culture. In addition, material management and quality are two key areas of concern.



Material management includes decisions regarding the procurement, control, handling, storage, and distribution of materials. Material management is becoming more important because, in many organizations, the costs of purchased materials comprise more than 50 percent of the total production cost. Questions regarding quantities and timing of material orders need to be addressed here as well when companies weigh the qualities of various suppliers.

Research Design provides information on how the research is being carried out and how will it help to complete the study efficiently (Hair et al: 2007). Also according to Jewel (2008), research is a complex process in terms of what is there to know and how to about knowing it. In the research that the researcher is going to carry out a case study based approach is designed by the researcher. Questionnaire design is done to study the feedback on the implementation and success of proactive maintenance and the service quality. This type of research design will help the researcher to gain a wider view on service quality and success of an organization.

SAMPLING

It is not possible to collect data from all persons of the universe because it takes a lot of time, efforts and money to complete the research. For research purpose a part of the

Equipment Assets is selected. Sampling is the process in which a representative part for the purpose of determining parameters or characteristics of the whole universe is selected. This is called a sample. It is easier to contact a smaller part of the population for data collection. It can be done within a limited time, efforts and with minimum cost. For research study the complete list of Equipment list in the assets of Abu Dhabi Medical Devices Company and service records and all the technical staff form part of the company. All these cannot be selected and contacted due to limitation of distance, time and cost involved. For proper and timely study sampling is necessary.

SAMPLING METHOD

Several equipment assets have been selected on the basis if the assumption that the sample selected from them would represent the population of the entire maintenance program in Abu Dhabi Medical Devices Co. as a whole. The Equipment's assets have been selected with proper case that every segment of the population should get proper representation.

They have been selected from every Important port of the company premises ie. Injection are, Assembly area, Packaging Area, Sterilizing Area etc. For sampling purpose stratified random sampling method has been used to get a proper representative sample of the universe. From these first segment have been made and each segment on the basis of availability the samples have been picked up.

SAMPLE SIZE

To represent every segment of the universe the sample size included is sufficient in number, for higher accuracy of the data very small and large sample sizes are avoided. Large sample size has been avoided due to its difficulty to manage and small size of sample is avoided due to improper representation of the universe and one sided result. Here the sample size taken in account for the project study is 50. By selecting the sample size as 50 (10nos of 5 different equipments), we can cover Major fields of maintenance type in the University of Sharjah .

3.3 : SURVEY QUESTIONS

No Question Yes , Maybe ,No

1 Is the trend in downtime recorded and reported regularly?

2 Is there a formal PM program in place?

3 Are inspectors performing their inspection duties full-time?

4 Are check sheets controlled to assure 100% compliance?

5 Are inspection routes developed/scheduled on the basis of work measurement methods?

6 Are inspection reports randomly checked by supervisor to determine their accuracy?

7 What percentage of downtime is due to maintenance? (≥8%) (8%≤) (Unknown)

8 Is the lubrication task performed through the scheduled usage of check sheets?

9 Does maintenance management receive meaningful downtime reports?

10 Is one individual responsible for the overall PM?

11 Were lubrication routes developed and scheduled on the basis of time and method studies?

12 Is data processing used to schedule and report PM inspections and lubrication?

13 Are foreseeable problems, discovered through PM inspections, quickly reported?

14 Is PM work highlighted in the costreporting system to permit routine analysis of PM as a distinct class of expenditure?

15 Are lubrication requirements examined regularly to minimize the need for different types of lubricants?

16 Is the analysis of breakdown reports performed to detect failure patterns that can be rectified by adjusting the PM program?

17 Are plant/building assets examined regularly as an integral part?

18 Same machine is affecting more than one time in a month?

19 Is there different company's machine in the company?

3.4: INTERVIEW PROCEDURES

Before proceeding interview, we decided to follow the standards as per below.
Since interviews are particularly useful for getting the story behind a participant's experiences. The interviewer can pursue in-depth information around a topic. After coordinating with department head, we decided the staff with whom to be interviewed.

The below were the standards set for interviews.

1. Choose a setting with little distraction. Avoid loud lights or noises, ensure the interviewee is comfortable
2. Explain the purpose of the interview.
3. Address terms of confidentiality. Note any terms of confidentiality. Explain who will get access to their answers and how their answers will be analyzed. If their comments are to be used as quotes, get their written permission to do so.
4. Explain the format of the interview. Explain the type of interview conducting and its nature.
5. Indicate how long the interview usually takes.
6. Ask them if they have any questions before you both get started with the interview.
7. Don't count on your memory to recall their answers. Ask for permission to record the interview or bring along someone to take notes.

Types of Interviews

Here we choose Closed, fixed-response interview - where all interviewees are asked the same questions and asked to choose answers from among the same set of alternatives. This format is useful for those not practiced in interviewing.

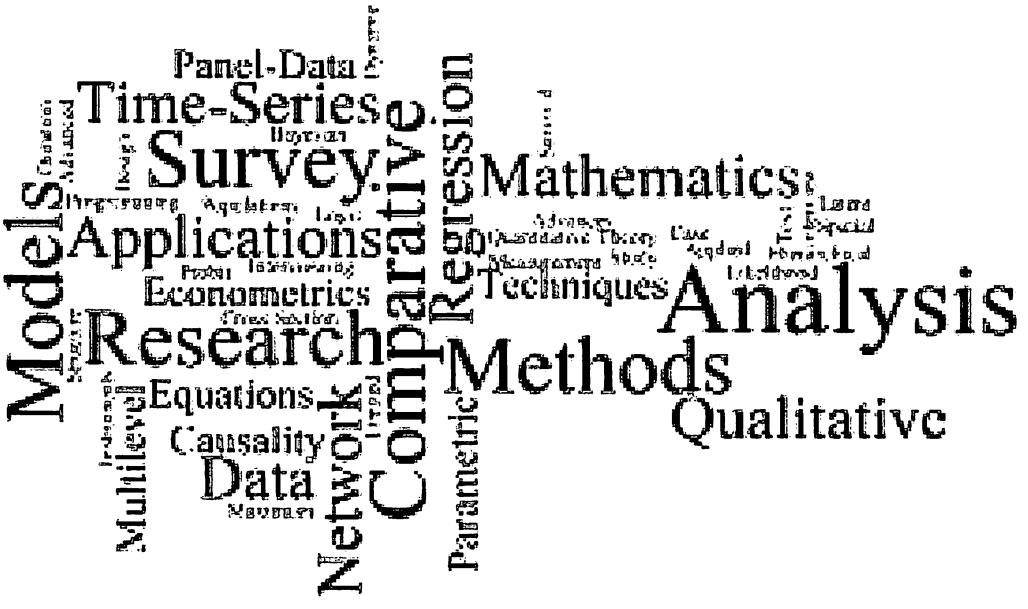
Sequence of Questions

1. Get the respondents involved in the interview as soon as possible.
2. Ask questions about the present before questions about the past or future. It's usually easier for them to talk about the present and then work into the past or future.
3. The last questions might be to allow respondents to provide any other information they prefer to add and their impressions of the interview.

3.5: DATA ANALYSIS PROCEDURES

The purpose of analysis is to evaluate the performance of each phase of maintenance work—planning, scheduling, and execution. The quality and efficiency of the work depend on how well we carry out each phase. There is a tendency to concentrate on execution, but if we do not look at how well we plan and schedule the work, we may end up doing unnecessary or incorrect work efficiently!

In the planning phase, it is important to ensure that we do work on those systems, sub-systems, and equipment that matter. Failure of these items will result in safety, environmental, and production consequences. How well we increase the revenue streams and decrease the cost streams determines the value added. Quite often, the existing maintenance plan may simply be a collection of tasks recommended by the vendors, or a set of routines established by custom and practice. So we may end up doing maintenance on items whose failures do not matter.



The objective of planning is to maximize the value added. We do this by carrying out a structured analysis to establish the strategy at the failure mode level. This task can be large and time-consuming, so we have to break it up into small manageable portions. We must analyze only those systems that matter, therefore that we use our planning resources effectively. We identify progress milestones after estimating the selection and analysis workload. In effect, we make a plan for the plan. To achieve this objective, we have to measure the progress using these milestones. Such an analysis can help monitor the planning process.

At the time of execution, we may find that some spare part, tool, resource, or other requirement is not available. This can happen if the planner did not identify it in the first place or the scheduler did not make suitable arrangements. There will then be an avoidable delay. We can attribute such delays to defective planning or scheduling. A measure of the quality of planning and scheduling is the ratio of the time lost to the total.

In the execution phase, we can identify a number of performance parameters to monitor. The danger is that we pick too many of them. In keeping with our objectives, safety and the environment are at the top of our list, therefore we will measure the number of high potential safety and environmental incidents. We discussed the importance of hidden failures in the context of barrier availability. We maintain system availability at the required level by testing those items of equipment that perform a protective function. Operators or maintainers may carry out such tests, the practice varying from plant to plant. The result of the test is what is important, not who does it. We have to record failures as well as successful tests. Sometimes people carry out pre-tests in advance of the official tests. Pre-tests defeat the objective of the test, since the first test is the only way to know if the protective device would have functioned in a real emergency. In such a case, we should report the results of the pre-test as if it is the real test, so that the availability calculations are meaningful. If a spurious trip takes place, this is a fail-to-safe

event. By recording such spurious events, we can carry out meaningful analysis of these events.

One can use some simple indicators to measure the quality of maintenance. These include, for example, the number of days since the last trip of the production system, sub-system, or critical equipment. Another measure is the number of days that critical safety or production systems are down for maintenance. If we concentrate on trends, we can get a reasonable picture of the maintenance quality. Note that work force productivity and costs do not feature here, as safety and quality are the first order of business.

Earlier, we discussed the importance of doing the planned work at or close to the original scheduled time. Compliance is an important parameter that we should measure and analyze. The ratio of planned work to the total, and associated costs are other useful indicators. In measuring parameters such as costs, it is useful to try to normalize them in a way that is meaningful and reasonable, to enable comparison with similar items elsewhere. For this purpose, we use some unit representing the complexity and size of the plant such as the volumes processed or plant replacement value in the denominator.

Finally, we can evaluate the analysis phase itself, by measuring the improvements made to the plan as a result of the analysis. In a Thermal Cracker unit in a petroleum refinery, the six-monthly clean-out shutdowns used to take 21 days. Over a period of three years, the shutdown manager reduced the duration to 9 days, while stretching the shutdown intervals to 8 months. The value added by this plant was $60,000 per day, so these changes meant that the profitability increased by about $1.7 million per annum. This required careful analysis of the activities, new ways of working, and minor modifications to the design to reduce the duration and increase the run lengths. The plant was located in the Middle East, where day temperatures could be 40 - 50°C. Working inside columns and vessels under these conditions could be very tiring and, therefore, took a long time.

One suggestion was to cool the fractionator column and soaker vessel internally, using a portable air-conditioning unit. In the past, they had been used to cool reactors in Hydro-Cracker shutdowns, to reduce the cool down time. Use of these units for the comfort of people was a new application. When the shutdown manager introduced air-conditioning, the productivity rose sharply, and this helped reduce the duration by about 36 hours. Another change was to relocate two pairs of 10 inch flanges on transfer lines from the furnace to the soaker. This clipped an additional six hours. There were many more such innovations, each contributing just a few hours, but the overall improvement was quite dramatic. This case study illustrates how one can measure the success of the analysis phase in improving the plan and thus the profitability.

It is easy to fall into the trap of carrying out analysis for its own sake. In order to keep the focus on the improvements to the plan, we need to record changes to the plan as a result of the analysis. Further, we have to estimate the value added by these changes and bank them. Hence, analysis must focus on improvements to all four phases of the maintenance process.

According to Clough and Nutbrown, 2007; 34 the task of a methodology is to 'uncover and justify research assumptions as far and as practicably as possible, and in so doing to locate the claims which the research makes within the traditions of enquiry which use it'.

Here we do the study of effects of operation cost in profit and loss through the factory maintenance cost. This research investigates the success of proactive maintenance in the factory in in the factory – Abu Dhabi Medical Devices Co. LLC, Abu Dhabi

The background information that has proven to be valuable for research purposes is found in Chapter 2 that shows the customer service strategy currently in practice at Mirror's and how it has helped them to retain considerable competitive advantage.
This chapter outlines the overall research methodology employed for this particular research and provides justification for the selected approach. Saunders et al (2003) states

that for any research strategy adopted, the emphasis should be on how that strategy will facilitate in achieving the objectives. Hence, when conducting research, a suitable research strategy is essential to obtain the most relevant results for the desired outcome

Testing of Hypothesis

Test:1 Independent t – Test

In order to study the perception of reactive and proactive maintenance about the different assets of the project, independent t-Test is conducted.

Maintenance Types and Lifecycle of assets

Hypothesis :

H0 : There is no significant difference between Reactive and Proactive maintenance , and the lifecycle of the Assets.

H1 : There is a significant difference between Reactive and Proactive maintenance, and the lifecycle of the Assets.

This table explains the role of maintenance in the perception of the lifecycle of different assets of the project.

Variables	Mean		Deviation		t- Value	nce
		e		e		
1, AHU	3.6389	4.0500	0.59648	0.20736	-1.677	0.096
2 ,Chiller	3.3894	4.1111	0.57632	0.31032	-3.036	0.003
3, MDB	3.1681	3.8667	0.67853	0.50067	-2.482	0.015
4 , SMDB	3.4292	4.1667	0.58959	0.37639	-3.024	0.003
5, Booster pump	2.6667	3.5556	0.50424	0.34427	-4.256	0.000

Inference: INTERPRETATION OF THE DATA

The table explains the perception of Reactive and Proactive towards the different assets of protect. From the table the significance value is found to be lesser than 0.05, both Reactive and Proactive have significant difference with each assets. Thus we can infer that both Reactive and Proactive Maintenance have different lifecycle in the perception of the above mentioned assets of the project.

Testing and Sampling

Number of breakdowns	0	1	2	3
Frequency of Occurrence	.2	.3	.8	.3

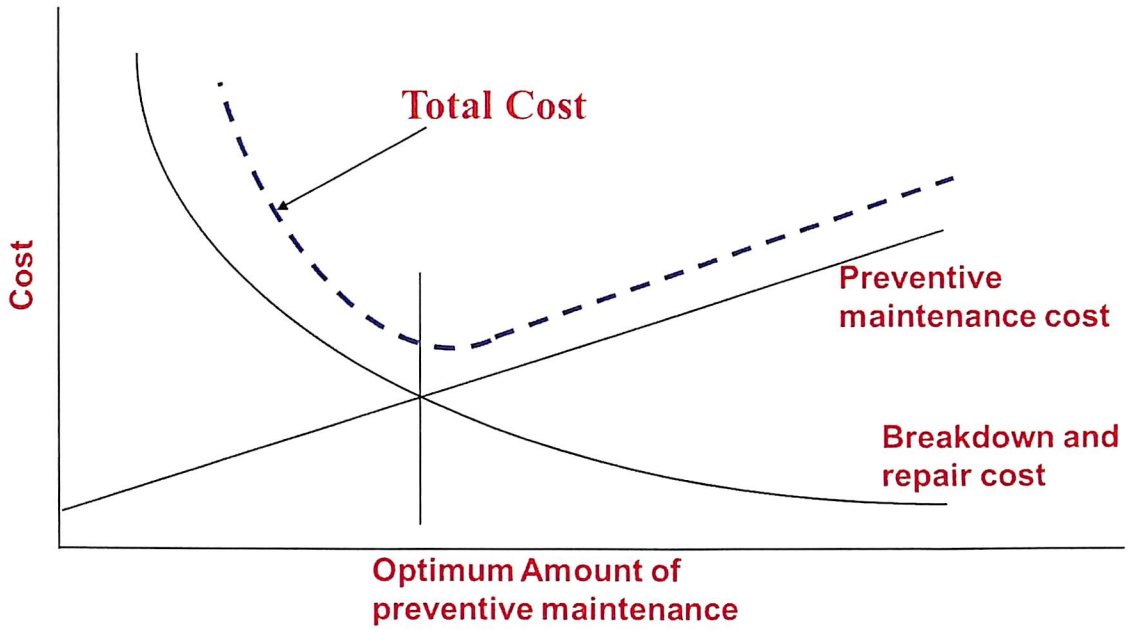
If the average cost of a breakdown is AED 1,000, and the cost of preventative maintenance is AED 1,250 per month, should we use preventive maintenance?

Number of breakdowns	**Frequency of Occurrence**	**Expected number of Frequency**
0	.2	0
1	.3	.3
2	.4	.8
3	.1	.3
Total	**1**	**1.4**

Expected cost to repair = 1.4 breakdowns per month X AED 1000 = AED 1400

Preventive maintenance = AED 1250

PM results in savings of AED 150 per month



CHAPER 4 – FINDINGS AND ANALYSIS

4.1: DESCRIPTIVE STATISTICS

Operations Cost Is Comprised Of..

1. Proper organization

2. Proper operation of equipment

3. The proper lubricants, in the right quantities, in the right location, at the proper time

4. Predicting wear and deterioration by regularly checking, measuring and adjusting

    A. Regular inspection to identify small repairs before they become major repairs

    B. Predictive techniques to replace components just before they fail

        a. Vibration monitoring and analysis

        b. Infrared inspection

        c. Sound detection

        d. Lubrication and oil sampling

        e. Etc.

5. Replacement of components on a regular basis before they fail

6. Correction of potential failures when inspection indicates the need

7. Overhauling equipment periodically to upgrade general equipment condition

8. Reliability engineering to reduce or eliminate repetitive failures

9. Reliability engineering to minimize failures through adjustments to the PPM program

The low cost and ease of use of modern maintenance tools is already making it a complete "no brainer" to move to a predictive maintenance strategy. The huge cost saving due to the reductions in downtime, energy costs and repair bills etc. is more than enough to justify the relatively small cost of acquiring a few handheld instruments and training the staff how to use them. Importantly however, taking this step will have set you on the way towards adopting a proactive maintenance strategy and this is when you can really start to reap the benefits of the improvements in your maintenance approach. It's the resulting change in mind set that will probably offer the biggest benefit in the longer run, when people start to think more about avoiding the things that cause breakdowns in the first place as opposed to minimizing the time taken to repair them.

4.2: CORRELATION / REGRESSION ANALYSES

Limitations

- A lot of effort is needlessly wasted on machines that are perfectly OK
- Scheduling is often difficult to get right and relies on luck that machines don't just randomly break down!
- Spares have to be ordered after the machine is stripped down or expensive redundant stock has to be carried
- Stripping down machines sometimes actually introduces faults!
- Can be very expensive if you get it wrong
- Investment in maintenance tools (e.g. vibration analysis tools)
- Training of maintenance personnel in the use of these tools

CHAPER 5 – INTERPRETATION OF RESULTS

5.1 : INTERPRETATION OF RESULTS

SWOT analysis can be used for the Maintenance methodology Analysis.

Strength

- Maximize the efficiency of the product in the life cycle
- Save scrap and rework caused by poor equipment performance
- Reductions in the total labor needed to maintain facilities in the required condition
- Fewer urgent and emergency interruptions to operations due to equipment breakdowns

Weakness

- Catastrophic failures still likely to occur
- Labor intensive
- Includes performance of unneeded maintenance
- Potential for incidental damage to components in conducting unneeded maintenance

Opportunities

- Energy savings
- Estimated 12% to 18% cost savings over reactive maintenance program
- Flexibility allows for the adjustment of maintenance schedules
- A maintenance improvement study with a detailed analysis of high priority work orders

Threats

- Top management understanding of the true cost of poor maintenance, which is several times initial estimate
- Safety hazards. Failure with no warning could create a safety issue with the failing equipment or other units that might be affected.
- Unexpected failures can increase overtime labor costs, as well as expedited delivery of replacement parts.
- Costly downtime. Equipment fails with little or no warning, so the process could be down until replacement parts arrive, resulting in lost revenue.

5.2 : COMPARISON OF RESULTS WITH ASSUMPTIONS (HYPOTHESES)

The hypotheses of the study was as follows:

In order to study the perception of reactive and proactive maintenance about the different assets of the project, independent t-Test is conducted.

Maintenance Types and Lifecycle of assets

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Total	**1**	**1.4**

Expected cost to repair = 1.4 breakdowns per month X AED 1000 = AED 1400

Preventive maintenance = AED 1250

PM results in savings of AED 150 per month

The Result is as follows:

Operation Cost is the biggest factor on which organizations have built entities which are lasting for many years, with growth and innovation. Thus operations costs play a very important role in the existence of the organization. It has been proved that removing various unnecessary costs will improve the profit of the organization. The company researched in this context is 'Abu Dhabi Medical Devices Company LLC' in which the biggest challenge of the company was the Operation Costs. Due to the several factors, the facilities for operations of the company is in high demand with the competitors. Thus, it was very important to understand the Operations of the company, to determine the main operation costs in order to retain the existence of the organization. The Researcher initially formulates hypotheses to determine the path of the project. Once the hypotheses are defined, the sampling technique for the data collection is finalized and accordingly the source and sampling methodology is determined. Once the source and sampling is determined, questionnaire is prepared and forwarded to the employees. The data collected needs to be tested for accuracy and durability as content for this research. Once the content is considered good, it will be presented in the different statistical techniques with extra finesse of Graphs. Different tools and techniques are used in determining the final results in order to determine the study outcome. Finally the outcome of the study is presented with a brief, identifying the strengths, weaknesses, outcomes and threats for the organization in terms of motivation enhancement for the organization.

CHAPER 6 – CONCLUSIONS AND SCOPE FOR FUTURE WORK

CONCLUSIONS

Organizations with a wise Operations Cost Management usually incur relatively low running costs with respect to the end product costs. However, this culture rarely exists in Nigeria, where industries tend to be reactive as well as employing fixed – time maintenance replacements schedules . This latter approach is seldom justifiable, because less than 15% of all components usually need replacements at the prescribed times chosen.

A recommendation for industries is to buy highly dependable equipment that should cost relatively little to maintain. The benefits thereby gained from reliable long lived pant extend well beyond just lower maintenance costs. For instance, smaller stocks of spare parts are needed and fewer operators and maintenance personnel required. These should be empowered and motivated to become even more competent. To this end each industry should develop a wiser maintenance culture : this would require

The industry becoming a knowledge – sharing and learning organisation.

An understanding of the unambiguous objectives of TPM and RCM processes

A comprehensive and easily accessible data base for continual improvement, benchmarking evaluation and analysis of each system's behaviour

Most large companies lose between 2 and 16 % of annual turnover due to downtime. In general , human error and laziness are the causes of atleast 20 % of downtime costs. This can be improved significantly by only using properly trained personel and by devising ad using appropriate information technology controlled processes , thereby providng better proactive servicing

The efficient maintenance of the production and the other plant machinery is crucial in determining the success and overall effectiveness of the manufacturing process. Despite time and money spent on the development/production of the advanced plant and its equipment there has nit been enough attention to defining comprehensive maintenance strategies practices and policies. However there are indications that the transition process from reactive (breakdown) maintenance to preventive maintenance is already taking place.

In order to establish autonomous maintenance teams, a better communication and team work must be promoted. It is essential that the company devices an efficient data recording system, so that an up to date and accurate information shall be available for the management.

The process of recording information must remain simple, but effective for future data analysis. If provisions were made to highlight such problems and possible causes, then it may lead to the correction of common problems such as breakdown and re work. Ultimately, if possible the aim is to eliminate such causes.

Information provided by the trend analysis can provide a basis for forming long-term plans. The maintenance department can plan spending requirement by using historical information to state the return on investment when contributing to the annual business plan of the company.

SCOPE FOR FUTURE WORK (SUGGESTIONS)

1. **Changing the Proactive system to CMMS**

A computer-based maintenance management system (CMMS) is an integrated set of computer programs and data files designed to provide its user with a cost-effective means to manage the massive amounts of data that are generated by maintenance and inventory control organizations. In addition, these systems can provide the means to effectively manage both the human and capital resources in a plant. It is imperative to understand that the CMMS is a tool used to assist in improving maintenance and related activities. In and of itself, the CMMS only manages data that have been input to it or that it has created as a result of data input. It does not manage the maintenance operation. In this chapter we will discuss typical functions that make up a CMMS, data management files, which use the system, and what it will and will not do. CMMS FUNCTIONALITY A computer-based maintenance management system (CMMS), computerized maintenance management system (CMMS), or a computerized asset management system (CAMS) is a set of integrated software programs, data files, and tables that provide functionality for a number of activities. The functionality is normally grouped into subsystems for specific activity sets within the CMMS. These subsystems may include, but are not limited to • Equipment/asset input and maintenance • Equipment/asset bills of material input and maintenance • Equipment/asset and work order history • Inventory control • Pro activeWork order creation, execution, and completion • Preventive maintenance (PM) plan development, maintenance, and scheduling • Work order planning; work order scheduling • Human resources • Purchasing and receiving • Invoice matching and accounts payable There are also programs for creating and maintaining the tables used by the CMMS and for printing reports

2. Strengthen Team service skills

First, it's important to make sure that the Technical service team has the right skills for servicing the equipment's according to the proactive standards. No amount of c software

corrective maintenance techniques can compensate for shortcomings in this area. But the skills should be looking for in a Proactive maintenance team are:

3. **Adaptability**

Every equipment is different, and some may even seem to change week-to-week. We should be able to handle surprises, sense the equipments status , work nature and adapt accordingly. This also includes a willingness to learn– providing good preventive/predictive service is a continuous learning process.

4. **Clear communication**

Ensure that they convey to supervisors exactly what they mean. They shouldn't want the technicianid doing 50% of his work and keeping 50% of his work pending. Use authentically positive language, so that supervisor can involve in the work to do needful help to complete the work.

5. **Work ethic**

Engineer / Supervisor appreciate a technician that will see their problem through to its resolution. At the same time, they must have good time management skills and not spend too much time handling one equipment while others are pending. Stay focused on the goals to achieve the right balance.

6. **Knowledge.**

Ultimately the Engineer/ Supervisor rely on the technicians based on the knowledge of the equipment working. Stay informed enough to respond to most maintenance works and know where to turn if the works become too detailed or technical to answer. But don't be afraid to say "I don't know" either. Supervisor will appreciate the honesty and their efforts to find the right answer.

7. **Team Work**

Maintenance teams are not necessarily self-managed but rather work closely together in problem solving and problem elimination, continuous improvement of critical tasks and sharing information for the good of the team The successful maintenance team is not only committed to each other as peers with potentially diverse skill sets, but they are equally committed to the success of the Maintenance.

Proactive management of actionable work for each member of the plant's maintenance crews ensures that the maintenance effort will be cost-effective. Accurate daily schedules are critical to this effort

8. **Follow-up after a problem is solved**

Make sure the issue stays fixed and that customers were satisfied with the service. Sending an email, or even a feedback work report is an excellent way to let the customer know still on their side.

Enhance customer service strategy

The staff may have the skills and know-how to interact with customers. But what organizational strategies can employ to please customers? Practice proactive customer service by making customers happy before they come to them with problems. Here's how:

Be available. Part of the personal touch is making sure the customers can reach you. Work early and late when needed, especially if the customers are in different time zones. Even providing customers with physical address helps build their trust and reminds them that equipment working properly as well.

9. **Make sure reps are engaged**

We can have the best technicians service skills and the best training in the world, but if technicians are checked out, it won't matter at all. Improving employee engagement is another way to make sure technicians have a great experience. Dissatisfied employees are unlikely to come forward with their problems, so consider an anonymous suggestion box or an employee engagement survey to see what makes employees tick.

They'll want to know how service team feels about working conditions and compensation, opportunities for career advancement, training and their peers. Our employee engagement template offers a good overview. They have also compiled benchmark engagement data to help to understand how employees' engagement compares to other companies.

Since engagement can vary from industry to industry, we may also want to look at more specific data through a service like Survey Monkey Benchmarks.

10. Give the customers a way to provide feedback

No matter how proactive they are, they'll never be able to get in front of every customer issue. To make sure they learn about the good, the bad, and the ugly experience the customers have, create an easily accessible way for customers to give feedback. Whether it's a phone survey at the end of a service call or a form on the "Contact Us" page of their website, creating a means for customers to give feedback makes it easier for you to learn what needs improvement. It also helps keep unhappy customers from voicing their displeasure on highly visible places like social media pages.

Whatever steps them choose to take, remember that the customers are the most important part of business so improving your maintenance service should be a top priority. Whatever steps you choose to take, remember feedback's importance to customer satisfaction. Make an effort to get closer both to the end user and the maintenance team. Not only will they discover touch points and skills that need

improvement, but your end user will see that are dedicated to providing top-notch, proactive maintenance service

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