202 operations management

GITAM UNIVERSITY (Estd. U/S 3 of the UGC Act, 1956) Accredited by NAAC with ‘ A’ Grade Centre for Distance Learning (Approved by Joint Committee of UGC – AICTE- DEC) 3rd Floor, Balaji Metro Plaza, Dondaparthi Main Road, Visakhapatnam-530016 Ph. : 0891-2796499, 2797499, 7799668883, E-mail: edu ASSIGNMENT BOOKLET Identity No. : __c13mb0480001_____ Learner Name : _P. SANTOSH REDDY Programme : ___MBA Group : ___GENERAL Paper Name (Subject) : _____ _____ _____ _____ 202 – OPERATIONAL MANAGEMENT_ ___ v Year/ Semester : 1st Study Centre : 2nd 3rd CDL GITAM UNIVERSITY Station _____ : VISAKHAPATNAM Date 4th : 23-12-2012 _ Learner Signature Assignment – I 1. Discuss the role of operations manager in an organization. Operations management: Operations Management is an area of management concerned with overseeing, designing, controlling the process of production and redesigning business operations in the production of goods and/or services.

It involves the responsibility of ensuring that business operations are efficient in terms of using as few resources as needed, and effective in terms of meeting customer requirements. It is concerned with managing the process that converts inputs (in the forms of materials, labor, and energy) into outputs (in the form of goods and/or services). The relationship of operations management to senior management in commercial contexts can be compared to the relationship of line officer to highest-level senior officers in military science.

The highest-level officers shape the strategy and revise it over time, while the line officers make tactical decisions in support of carrying out the strategy. In business as in military affairs, the boundaries between levels are not always distinct; tactical information dynamically informs strategy, and individual people often move between roles over time. According to the U. S. Department of Education, operations management is the field concerned with managing and directing the physical and/or technical functions of a firm or organization, particularly those relating to development, production, and manufacturing.

Operations management programs typically include instruction in principles of general management, manufacturing and production systems, plant management, equipment maintenance management, production control, industrial labor relations and skilled trade’s supervision, strategic manufacturing policy, systems analysis, productivity analysis and cost control, and materials planning. Management, including operations management, is like engineering in that it blends art with applied science.

People skills, creativity, rational analysis, and knowledge of technology are all required for success. Being an operations manager involves overseeing and having responsibility for all the activities in the organization which contribute to the effective production of goods and services. Depending on the organizational structure, the exact nature of tasks that are classified under the operations function may differ from business to business. However, the following activities are usually applicable to all types of operations: • • •

Understanding strategic objectives: Operations managers must clearly understand the goals of the organization and develop a clear vision of exactly how operations will help achieve them. This also involves translating these goals into implications for the operation’s performance, objectives, quality, speed, dependability, flexibility and cost. Developing an operations strategy: Due to the numerous decision-making involved with operations, it is critical that operations managers have a set of guidelines that are align with the organization’s long term goals.

Designing the operation’s products, services and processes: Design involves determining the physical form, shape and composition of products, services and processes. • Planning and controlling: This involves deciding what the operations resources should be doing and making sure that it is getting done. • Improving the performance of operation: Operations managers are expected to continually monitor and improve the overall performance of their operation. The Operations Manager is purely responsible for the improvement in operational system of any organization.

The operations manager has to take responsibility of data entry work, employment payroll, payable accounts, administrate HR of the organization. The operations manager should help in creating program budgets involving in group effort with the program directors and ED. Top roles and duties of operations manager: • • • • • • • Must lead the organization and provide development in short term and long term operations performed. Must interact with the directors and maintain operations by directing all activities which are performed daily, weekly and monthly.

Responsible for the development of workforce. Review performance of the team members and responsible for conducting training or development opportunities for them. Support production plans by delivering inbound and outbound pallet activities. Responsible for material handling, storage and dispatching. Ensure effective planning and execution of operations and has to reduce waste levels and achieve milestones and requirements of the organization

========== 2.

What is an operations system? Explain the process of operations system. Operations as a System Inputs Outputs Conversion Subsystem Production System Control Subsystem. Inputs of an Operations System External Legal, Economic, Social, Technological Market Competition, Customer Desires, Product Info. Primary Resources Materials, Personnel, Capital, Utilities. A system may be defined as “ a purposeful collection of people, objects and procedures for operating within an environment”. Thus every organization can e represented as a system consisting of interacting sub-systems. The features of a system are that these have inputs and outputs. The basic process of the system convents the resource inputs into some useful form of output, of course, depending upon the efficiency of conversion process we may have undesirable outputs too such as pollution, scrap or wastage, rejections, loss of human life (in a hospital) etc. using the generalized concept of production (which includes services) – as production systems. Conceptual Model of a Production/Operation System

Random Fluctuations Inputs Land Labour Capital Management Conversion Process Outputs Goods Services Comparison actual desired The above figure describes a generalized concept of production system. It takes resource inputs and processes them to produce useful outputs in the form of goods or services. Inputs and Outputs: Inputs to the system may be labour, material, equipment (machines), facilities, energy, information and technology. Thus machines and materials are the resources inputs require by the production systems.

Other inputs to operating system can be customers in a bank, patients in hospital, commuters to a public transport system, files and papers to an office situation, and programmes to be run in a computer center etc. Similarly outputs from a system may be in terms of finished products, transported goods, delivered messages, cured patients, serviced customers etc. Productivity of Conversion Process: This concerns the efficiency with which we are converting the inputs into outputs.

This conversion efficiency can be roughly gauged by the ratio of output/input; a term which is generally known as ‘ productivity’ of the system. It is obvious that productivity can be improved by maximizing the desirable form of outputs from the system for a given level of resources inputs or alternatively by requiring a minimum amount of resource inputs for a given level of output from the system. Output (O) Productivity (P) = ————————-Inputs (I) Management of production systems is essentially concerned with the management for productivity.

Thus a simple way to look at the productivity improvement is to attack wastes of all types of resources like materials, labour, capacity of machines, time space, capital etc. if we look a bit deeper into what s happening inside the conversion system, we could find only two mutually exclusive things happening. Either, the resources are being processed (operation) tacking it nearer to the completion stage or nothing useful is happening to the resources inputs. For example materials may be waiting in the form of inventory in stores, waiting to be loaded on the machine.

Job orders may be form waiting to be processed. In a hospital a patient may be waiting to be attended to etc. All these forms of waiting, delays in inventories are non-productive events and any drive to improve productivity must aim at eliminating or at least reducing such idle time, waiting etc. This if you wish to improve the system operations, try to attack such nonproductive elements in the total throughput time of the entity in the system. Manufacturing and service systems: As stated earlier, the generalized model of production system includes both manufacturing systems as well as service systems.

Examples of manufacturing systems are: Manufacturing of fertilizers, cement, coal, textile, steel, automobiles, machine, tools, blades, televisions, furniture’s etc. Examples of service systems includes a post office, bank, hospital, municipal corporation, transport organization, university, supply office, telephone exchange etc. Although basic structure of service systems is amenable to same analysis as manufacturing systems , service systems do have some salient features making the management of such systems slightly

more difficult. Some of these characteristics are: a) Output from the system is non-inventoriable.

You cannot generally produce to stock. b) Demand for the services is variable. c) Operations may be labour-intensive. d) Location of services operation is dictated by location of users.

========== 3. What are the different types of Layouts? Explain and how should an organization decide on which layout to choose? Layout determines the way in which materials and other inputs (like people and information) flow through the operation. Relatively small changes in the position of a machine in a factory can affect the flow of materials considerably.

This in turn can affect the costs and effectiveness of the overall manufacturing operation. Getting it wrong can lead to inefficiency, inflexibility, large volumes of inventory and work in progress, high costs and unhappy customers. Changing a layout can be expensive and difficult, so it is best to get it right first time. The first decision is to determine the type of manufacturing operation that must be accommodated. This depends on product volume and variety. At one extreme, the factory will produce a wide variety of bespoke products in small volumes, each of which is different (this is called a ‘ jobbing’ operation).

At the other extreme it will produce a continuous stream of identical products in large volumes. Between the extremes, the factory might produce various sized batches of a range of different products. BASIC LAYOUT TYPES

Once the type of operation has been selected (jobbing, batch or continuous) the basic layout type needs to be selected. There are three basic types: • • • Process layout Cell layout Product layout Jobbing operations (high variety/low volume) tend to adopt a process layout. Batch operations (medium variety and volume) adopt either a cell or process layout.

Continuous operations (low variety/high volume) adopt a product layout. 1. Process layout In process layout, similar manufacturing processes (cutting, drilling, wiring, etc.) are located together to improve utilization. Different products may require different processes so material flow patterns can be complex. An example is machining parts for aircraft engines. Some processes (such as heat treatment) need specialist support (e. g. fume extraction), while other processes (e. g. machining centers) need technical support from machine setters/operators.

So the factory will be arranged with heat treatment together in one location and machining centers in another. Different products will follow different routes around the factory. 2. Cell layout In cell layout, the materials and information entering the operation are pre-selected to move to one part of the operation (or cell) in which all the machines to process these resources are located. After being processed in the cell, the part-finished products may go on to another cell. In effect the cell layout brings some order to the complexity of flow that characterizes process layout.

An example is specialist computer component manufacture. The processing and assembly of some types of computer components may need a dedicated cell for manufacturing parts to the quality requirements of a particular

customer. 3. Product layout Product layout involves locating the machines and equipment so that each product follows a prearranged route through a series of processes. The products flow along a line of processes, which is clear, predictable and relatively easy to control. An example is automobile assembly, where almost all variants of the same model require the same sequence of processes.

Another is paper making. Although different types of paper can be manufactured, all types have the same processing requirements. First the wood chips are combined with chemicals, water and steam in the ‘ cooking’ process to form pulp. The pulp is then put together through a cleaning process before being refined to help the fibres lock together. The mixing process combines the refined pulp with more water, fillers, chemicals and dyes, after which it is spread on a fine flexible wire or plastic mesh. This is shaken from side to side as it moves along to lock the fibres into the sheet of paper and to drain away the water.

The press rollers squeeze more water out of the paper and press the fibres closer together. The drying process continues to reduce the water content in the paper before finally it is wound onto large reels. It makes sense then to locate these processes in the order that they are required (cooking, then cleaning, then mixing, spreading, shaking, squeezing, drying and winding) and to let materials flow through them in a predictable manner. SELECTING A LAYOUT TYPE Table 1 shows some of the more significant advantages and disadvantages of each layout type.

One significant difference is their association with fixed and variable costs. Process layouts tend to have relatively low fixed costs but high variable costs, as each product is different. By contrast, product layouts have high fixed costs to set up the manufacturing lines, then low variable costs for producing large volumes of the same product. Hence if volume is high and variability low, product layout is likely to be the best option. Table 1: Advantages and disadvantages of different layout types Layout Process Cell Product Advantages High mix and product flexibility Robust against disruptions

Easy to supervise equipment Good compromise between cost and flexibility for high-variety operations Fast throughput Low unit costs for high volume Equipment can be specialized, improving efficiency Materials movement optimized Disadvantages Low utilization of machines Can have high work-in-progress Complex flow can be difficult to control More machines needed Can give lower plant utilization Low flexibility Not very robust to disruptions ========== ========== 4. Design an assembly line for a cycle time of 10 minutes for the following 10 work elements

Elements Predecessor Duration (minutes) 1 5 2 1 10 3 1 5 4 2, 3 2 5 4 7 6 4 5 7 6 10 8 5 2 9 7, 8 5 10 9 7 Calculate the line efficiency, balance delay and smoothness index using (a) Kilbridge & Wester method and (b) Helgeson & Birnie method. (a) Kilbridge & Wester method (b) Helgeson & Birnie method. Kilbridge & Wester method Section Element Time I 1 3 2 4 6 5 8 7 9 10 5 5 10 2 5 7 2 10 5 7 II III IV V VI VII Cumulative Time 5 10 10 2 7 7 9 10 5 7 Total Time (a) Line efficiency = ——————————————— ? 100 No. of

work stations ? Cycle time 51 = ———–– ? 00 = 72. 85% 7 ? 10 Idle Time 0 0 3 1 0 5 3 (b) Balance delay = 100 – Line efficiency = 100 – 72. 85 = 27. 15 (c) Smoothness index = sections Idle Time = 02+02+32+12+02+52+32 = 44 = 6. 63 (b) Helgeson & Birnie method. Element 1 2 3 4 5 6 7 8 9 10 Positional Wt. 32 32 27 22 29 27 15 7 12 7 Positional Wt. 32 29 27 22 15 12 7 Element 1, 2 5 3, 6 4 7 9 8, 10 Section Element Time I 1 3 2 4 6 5 8 7 9 10 5 5 10 2 5 7 2 10 5 7 II III IV V VI VII Cumulative Time 5 10 10 2 7 7 9 10 5 7 Total Time (a) Line efficiency = ——————————————— ? 100 No. of work stations ?

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5. Identify and explain three important factors that a location planner may consider with respect to each of the following. (a) A super specialty intensive care unit. (b) A thermal power plant operating with coal as its fuel. (c) An automobile manufacturing unit and (d) A multi cuisine restaurant a) A super specialty intensive care unit The ICU is highly specified and sophisticated area of a hospital which is specifically designed, staffed, located, furnished and equipped, dedicated to management of critically ill patients, injuries or complications. It is a department with dedicated medical, nursing and allied staff. It operates with defined policies; protocols and procedures, having its own quality control, education, training and research programmes. It is emerging as a separate

specialty and can no longer be regarded purely as part of anesthesia, Medicine, surgery or any other specialty.

It has to have its own separate team in terms of doctors, nursing personnel and other staff who are tuned to the requirement of the specialty. Intensive Care Units are the specialty nursing units specially designed for very critical patients. These units are designed, equipped and staffed with especially skilled personnel for very critical patients or patients who require specialized equipments. It is the central unit of any hospital specially 500 bedded teaching hospitals. For planning and designing of intensive care Unit; first of all, the most important thing is to decide the location.

Ideally location of ICU should be centralized place and be close and readily available to any other departments. It is important that other departments should be very easily accessible with ICU, as the patients admitted in ICU may develop any complications at any time. This requires instant treatment from other departments of hospital. Also it has another advantage that, with the help of easy accessibility to other departments and centralized location, the cost of duplication of costly equipments can be reduced and also manpower required in handling patients or equipments is lessened.

There by reducing cost burden to the hospital. There is also one designing thought for the ICU that location of patient should be different for different types of patients. So that the patient is moved from ICU to immediate care step down unit and then to general ward. It is clear that whatever may be the location of ICU, it must exclude through traffic. Most of the admissions to ICU come directly through emergency department or from the operation

theaters following major surgery. Hence, ICU must be close to emergency, OT, laboratories and radiology department.

Also it should be close to general nursing units as patient may require transfer to ICU any time. ICU should be away from heavy traffic and noise. Also, accessibility and direct visual contact between patient and nurse must also be taken into consideration. The patient should be close enough for careful watch of respirators, skin color changes, etc. The number of beds in ICU in 6 to 8 bedded hospitals may be up to 12 maximum, as these patients can be effectively monitored by the staff. Also ICU patient rooms should be planned to facilitate operations in event of crises.

Also, these beds should be located away from the wall to give staff 360o access to patient. Some things must be taken into consideration while designing ICU like, it should not be totally compact room. Some sort of window arrangement must be present there. Harsh lighting must be avoided. Also, ICU should be noise free and crowd free. Designing should accommodate the machinery, while simultaneously keeping it out of the way with particular attention to head wall. Attractive casework should be used to hide hookups in head wall.

The beds should be situated to allow ready observation of patient’s whole body particularly head. All these depend upon the layout of room which is function of overall unit design and needs to balance demands of technology, accessibility and privacy. Similar to these there are separate planning and designing guidelines for specialized ICU units like Cardiac ICU, Pulmonary

ICU, Critical care unit for elderly, Neurological ICU, Burns ICU, Pediatric ICU and Neonatal ICU. (b) A thermal power plant operating with coal as its fuel

A thermal power station is a power plant in which the prime mover is steam driven. Water is heated, turns into steam and spins a steam turbine which drives an electrical generator. After it passes through the turbine, the steam is condensed in a condenser and recycled to where it was heated; this is known as a Rankine cycle. The greatest variation in the design of thermal power stations is due to the different fuel sources. Some prefer to use the term energy center because such facilities convert forms of heat energy into electricity.

Some thermal power plants also deliver heat energy for industrial purposes, for district heating, or for desalination of water as well as delivering electrical power. A large part of human CO 2 emissions comes from fossil fueled thermal power plants; efforts to reduce these outputs are various and widespread. Almost all coal, nuclear, geothermal, solar thermal electric and waste incineration plants, as well as many natural gas power plants are thermal. Natural gas is frequently combusted in gas turbines as well as boilers.

The waste heat from a gas turbine can be used to raise steam, in a combined cycle plant that improves overall efficiency. Power plants burning coal, fuel oil, or natural gas are often called fossil-fuel power plants. Some biomass-fueled thermal power plants have appeared also. Non-nuclear thermal power plants, particularly fossil-fueled plants, which do not use co-generation, are sometimes referred to as conventional power plants. Commercial electric

utility power stations are usually constructed on a large scale and designed for continuous operation.

Electric power plants typically use three-phase electrical generators to produce alternating current (AC) electric power at a frequency of 50 Hz or 60 Hz. Large companies or institutions may have their own power plants to supply heating or electricity to their facilities, especially if steam is created anyway for other purposes. Steam-driven power plants have been used in various large ships, but are now usually used in large naval ships. Shipboard power plants usually directly couple the turbine to the ship’s propellers through gearboxes.

Power plants in such ships also provide steam to smaller turbines driving electric generators to supply electricity. Shipboard steam power plants can be either fossil fuel or nuclear. Nuclear marine propulsion is, with few exceptions, used only in naval vessels. There have been perhaps about a dozen turbo-electric ships in which a steam-driven turbine drives an electric generator which powers an electric motor for propulsion. Combined heat and power (CH) plants, often called co-generation plants, produce both electric power and heat for process heat or space heating.

Steam and hot water lose energy when piped over substantial distance, so carrying heat energy by steam or hot water is often only worthwhile within a local area, such as a ship, industrial plant, or district heating of nearby buildings. Conveyor system for moving coal (visible at far left) into a power plant In coal-fired power stations, the raw feed coal from the coal storage area is first crushed into small pieces and then conveyed to the coal feed

hoppers at the boilers. The coal is next pulverized into a very fine powder. The pulverizes may be ball mills, rotating drum grinders, or other types of grinders.

Some power stations burn fuel oil rather than coal. The oil must kept warm (above its pour point) in the fuel oil storage tanks to prevent the oil from congealing and becoming un-pumpable. The oil is usually heated to about 100 °C before being pumped through the furnace fuel oil spray nozzles. Boilers in some power stations use processed natural gas as their main fuel. Other power stations may use processed natural gas as auxiliary fuel in the event that their main fuel supply (coal or oil) is interrupted. In such cases, separate gas burners are provided on the boiler furnaces. (c) An automobile manufacturing unit

The automotive industry in India is one of the largest in the world and one of the fastest growing globally. India’s passenger car and commercial vehicle manufacturing industry is the sixth largest in the world, with an annual production of more than 3. 9 million units in 2011. According to recent reports, India overtook Brazil and became the sixth largest passenger vehicle producer in the world (beating such old and new auto makers as Belgium, United Kingdom, Italy, Canada, Mexico, Russia, Spain, France, Brazil), growing 16 to 18 per cent to sell around three million units in the course of 2011-12.

In 2009, India emerged as Asia’s fourth largest exporter of passenger cars, behind Japan, South Korea, and Thailand. In 2010, India beat Thailand to become Asia’s third largest exporter of passenger cars. As of 2010, India is

home to 40 million passenger vehicles. More than 3. 7 million automotive vehicles were produced in India in 2010 (an increase of 33. 9%), making the country the second (after China) fastest growing automobile market in the world. According to the Society of Indian Automobile Manufacturers, annual vehicle sales are projected to increase to 5 million by 2015 and more than 9 million by 2020.

By 2050, the country is expected to top the world in car volumes with approximately 611 million vehicles on the nation’s roads. The Indian Automobile Industry manufactures over 11 million vehicles and exports about 1. 5 million each year. The dominant products of the industry are two-wheelers with a market share of over 75% and passenger cars with a market share of about 16%. Commercial vehicles and three-wheelers share about 9% of the market between them. About 91% of the vehicles sold are used by households and only about 9% for commercial purposes.

The industry has a turnover of more than USD $35 billion and provides direct and indirect employment to over 13 million people. The supply chain is similar to the supply chain of the automotive industry in Europe and America. Interestingly, the level of trade exports in this sector in India has been medium and imports have been low. However, this is rapidly changing and both exports and imports are increasing. The demand determinants of the industry are factors like affordability, product innovation, infrastructure and price of fuel. Also, the basis of competition in the sector is high and increasing, and its life cycle stage is growth.

With a rapidly growing middle class, all the advantages of this sector in India are yet to be leveraged. With a high cost of developing production facilities, limited accessibility to new technology, and increasing competition, the barriers to enter the Indian Automotive sector are high. On the other hand, India has a well-developed tax structure. The power to levy taxes and duties is distributed among the three tiers of Government. The cost structure of the industry is fairly traditional, but the profitability of motor vehicle manufacturers has been rising over the past five years.

Major players, like Tata Motors and Maruti Suzuki have material cost of about 80% but are recording profits after tax of about 6% to 11%. The level of technology change in the Motor vehicle Industry has been high but, the rate of change in technology has been medium. Investment in the technology by the producers has been high. System-suppliers of integrated components and sub-systems have become the order of the day. However, further investment in new technologies will help the industry be more competitive. Over the past few years, the industry has been volatile.

Currently, India’s increasing per capita disposable income which is expected to rise by 106% by 2015 and growth in exports is playing a major role in the rise and competitiveness of the industry. Units concerning both manufacturing as well as the assembling of the products are on a very large scale affected by the decisions involving the location of the plant. Location of the plant itself becomes a very important factor concerning service facilities, as the plant location decisions are strategic and long-term in nature. Plant location decisions need detailed analysis because: 1.

Wrong plant location generally affects cost parameters i. e. poor location can act as a continuous stimulus of higher cost. Marketing, transportation, quality, customer satisfaction are some of the other factors which are greatly influenced by the plant location decisions – hence these decisions require in-depth analysis. 2. Once a plant is set up at a location which is not much suitable, it is a very disturbing as well as very expensive process to shift works of a company to some other place, as it would largely affect the cycle of production. 3. The investments involved in the in setting up of the plant premises . uying of the land etc are very large and especially in the case of big multinational companies, the investments can go into millions of rupees, so economic factors of the location should be very minutely and carefully checked and discussed in order to achieve good returns on the money which has been invested. PLANT LOCATION AND SITE SELECTION The geographical location of the final plant can have strong influence on the success of the industrial venture. Considerable care must be exercised in selecting the plant site, and many different factors must be considered.

Primarily the plant must be located where the minimum cost of production and distribution can be obtained but, other factors such as room for expansion and safe living conditions for plant operation as well as the surrounding community are also important. The location of the plant can also have a crucial effect on the profitability of a project. The choice of the final site should first be based on a complete survey of the advantages and disadvantages of various geographical areas and ultimately, on the advantages and disadvantages of the available real estate.

The various principal factors that must be considered while selecting a suitable plant site, are briefly discussed in this section. The factors to be considered are: 1. Raw material availability. 2. Location (with respect to the marketing area.) 3. Availability of suitable land. 4. Transport facilities. 5. Availability of labors. 6. Availability of utilities (Water, Electricity). 7. Environmental impact and effluent disposal. 8. Local community considerations. 9. Climate. 10. Political strategic considerations. 11. Taxations and legal restrictions (d) A multi cuisine restaurant

A multi cuisine restaurant is that place which offers all the dishes from all the cuisine in its outlet. Sometimes, restaurants which do not cater exclusively to a particular cuisine may also be referred as Multi-Cuisine. Many restaurants cater to a variety of nationals and tourists present in its location. They normally employ specialist chefs for each cuisine and may sometime have separate well designed sections also. The ambience of multi cuisine restaurant should be design so that it reflects or represent each & every cuisine whose dishes are served in the outlet.

Also the menu planning & designing plays an important part; it should be written in such a manner so it represents each cuisine differently as well as the service personnel’s uniform should add an attraction to the restaurant. Four different factors of measuring Service Quality at the multi cuisine Restaurant. 1. Value Added Service. 2. Service Delivery. 3. Availability of Service Offerings. 4. Core Service Product. Each of these Factors plays a major role in measuring different aspects of service quality.

Service quality is one of the vital determinants of customer satisfaction and it will directly affect the organizational success especially in the service industry such as multi cuisine restaurants (Audrey, G. , 2003). Nowadays, almost all the multi cuisine restaurants focus on several ways to increase their service quality in order to increase the level of satisfaction among their customers and thus increase their purchase intentions as well as loyalty (Nandy Ashis, 2004). When FFRs are able to achieve or exceed the expectations of customers, the customer will be satisfied with the service.

Service quality involves a comparison of expectations with performance. According to Zeithmal (2011), service quality is a measure of how well a delivered service matches the customers' expectations. Generally the customer is requesting a service at the service interface where the service encounter is being realized, and then the service is being provided by the provider and in the same time delivered to or consumed by the customer (Cronin, J. J. , & S. A. Taylor, 1992). The main reason to focus on quality is to meet customer needs while remaining economically competitive in the same time.

This means satisfying customer needs is very important for the enterprises to survive (Lovelock, Wirtz, Chattrjee, 2010) Our objective was to identify factors influencing the perceived service quality in multi-cuisine restaurant and to study demographic variable influencing the perceived service quality in multicuisine restaurant. There is no significant difference in the customer's perception towards the perceived service quality in multi cuisine Restaurant among the people of different age group/ education qualification group/ occupational group/ income group.

There is significant difference in the customer’s perception towards the perceived service quality in multi cuisine. Age/ qualification/ occupation/ Income: As significant value is less than the level of significance we can say that there is no significant difference in the customer’s perception towards the perceived service quality in Multi cuisine.

========== Assignment – II 6. Explain the concept, functions and types of Maintenance Management. The term ‘ maintenance’ means to keep the equipment in operational condition or repair it to its operational mode.

Main objective of the maintenance is to have increased availability of production systems, with increased safety and optimized cost. Maintenance management involves managing the functions of maintenance. Maintaining equipment in the field has been a challenging task since the beginning of industrial revolution. Since then, a significant of progress has been made to maintain equipment effectively in the field. As the engineering equipment becomes sophisticated and expensive to produce and maintain, maintenance management has to face even more challenging situations to maintain effectively such equipments in industrial environment.

This brief lecture on maintenance management includes maintenance strategies, functions of maintenance department, maintenance organization and elements of maintenance management. MAINTENANCE STRATEGIES OR OPTIONS A maintenance strategy or option means a scheme for maintenance, i. e. an elaborate and systematic plan of maintenance action. Following are the maintenance strategies that are commonly applied in the

plants. Breakdown Maintenance or Operate to Failure or Unplanned Maintenance Preventive or Scheduled Maintenance Predictive or Condition Based Maintenance Opportunity Maintenance Design out Maintenance

The equipment under breakdown maintenance is allowed to run until it breaks down and then repairing it and putting back to operation. This strategy is suitable for equipments that are not critical and have spare capacity or redundancy available. In preventive or scheduled Maintenance, maintenance actions such as inspection, lubrication, cleaning, adjustment and replacement are undertaken at fixed intervals of numbers of hours or Kilometers. An effective PM program does help in avoidance of accidents. Condition monitoring (CM) detects and diagnoses faults and it helps in planned maintenance based on equipment condition.

This condition based maintenance strategy or predictive maintenance is preferred for critical systems and for such systems breakdown maintenance is to be avoided. A number of CM techniques such as vibration, temperature, oil analysis, etc. have been developed, which guide the users in planned maintenance [2]. In opportunity maintenance, timing of maintenance is determined by the procedure adopted for some other item in the same unit or plant. In design out maintenance, the aim is to minimize the effect of failures and in fact eliminates the cause of maintenance.

Although it is an engineering design problem, yet it is often a responsibility of maintenance department. This is opted for items of high maintenance cost that are due to poor maintenance, poor design or poor design outside design specifications. It may be mentioned that a best maintenance strategy for

each item should be selected by considering its maintenance characteristics, cost and safety. In addition to the above, new strategies concepts such as Proactive Maintenance, Reliability Centered Maintenance (RCM), Total Productive Maintenance (TPM), etc. ave recently been evolved to look it from different perspectives and this has helped in developing effective maintenance. In proactive maintenance, the aim is identify what can go wrong, i. e. by monitoring of parameters that can cause failures. In RCM, the type of maintenance is chosen with reliability of the system in consideration, i. e. system functions, failures relating to those functions and effects of the dominant functional system failures. This strategy in the beginning was applied to critical systems such as aircrafts, nuclear and space applications. At present, this is being extended to critical systems in the plant.

TPM, a Japanese concept, involves total participation of all concerned. The aim is to have overall effectiveness of the equipment with participation of all concerned using productive maintenance system. FUNTIONS OF A MAINTENANCE DEPARTMENT Following are the major functions of a maintenance department: Maintenance of installed equipment and facilities Installations of new equipment and facilities PM tasks – Inspection and lubrication of existing equipment CM tasks – monitoring of faults and failures using appropriate techniques Modifications of already installed equipment and facilities Management of inventory

Supervision of manpower Keeping records MAINTENANCE ORGANISATION It concerns in achieving an optimum balance between plant availability and maintenance resource utilization. The two organization structures that are common are: Centralized and Decentralized. A decentralized structure would

probably experience a lower utilization than centralized one but would be able to respond quickly to breakdowns and would achieve higher plant availability. In practice, one may have a mix of these two. A maintenance organization can be considered as being made up three necessary and interdependent components.

Resources: men, spares and tools Administration: a hierarchy of authority and responsibility for deciding what, when and how work should be carried out. Work Planning and Control System: a mechanism for planning and scheduling the work and feeding back the information that is needed for correctly directing the maintenance effort towards defined objective. It may be mentioned that maintenance / production system is a continuously evolving organism in which the maintenance organization will need continuous modifications in response to changing requirements.

Moreover, it is required to match the resources to workload. Maintenance activities – be it preventive or condition monitoring, involve use of resources-men and materials including documents. This requires coordination amongst the involved personnel so that these are timely undertaken. Work planning and control system under maintenance management in the plant ensures this and provides planning and control of activities associated with maintenance. This means application of general management principles of planning, organizing, directing and controlling to the maintenance functions, e. . to the establishment of procedures for development of maintenance strategy and to models for describing the flow of work through maintenance work planning department. Control system controls the maintenance cost and plant condition. ELEMENTS OF EFFECTIVE MAINTENANCE MANAGEMENT

An effective maintenance system includes the following elements: Maintenance Policy Control of materials Preventive Maintenance Condition Monitoring Work Order Job planning Priority and backlog control Data recording system Performance measurement measures or indices

Maintenance performance for a plant or an organization can be assessed through analysis of Reliability, Availability and Maintainability (RAM) plant data. Relevant parameters, measures or indices for specific plants can be identified [5]. The performance over a period of time will show if it is improving, going down or being sustained. This will also help in knowing how well the objectives are being met. In addition, it will guide the areas which are strong and which need to be strengthened. Use of computers and dedicated software will certainly help in implementing this and the maintenance management system in general.

========== 7. Explain the following: a. Standardization: standardization is the process of developing and implementing technical standards. The goals of standardization can be to help with independence of single suppliers (commoditization), compatibility, interoperability, safety, repeatability, or quantity. In social sciences, including economics, the idea of standardization is close to the solution for a coordination problem, a situation in which all parties can realize mutual gains, but only by making mutually consistent decisions.

Standardization is defined as best technical application consensual wisdom inclusive of processes for selection in making appropriate choices for ratification coupled with consistent decisions for maintaining obtained

standards. This view includes the case of “ spontaneous standardization processes”, to produce de facto standards. Standardization is the process of establishing a technical standard, which could be a standard specification, standard test method, standard definition, or standard procedure.

Standardization means that there is a standard specification, unit, instruction or something that is understood globally. The existence of a published standard does not necessarily imply that it is useful or correct. Just because an item is stamped with a standard number does not, by itself, indicate that the item is fit for any particular use. The people who use the item or service (engineers, trade unions, etc.) or specify it (building codes, government, industry, etc.) have the responsibility to consider the available standards, specify the correct one, enforce compliance, and use the item correctly.

Validation of suitability is necessary. Standardization is implemented greatly when companies release new products or software to market. Compatibility is important for products to be successful; many devices coming out have USB, Ethernet, or other standard types of connection. This allows consumers to use their new items along with what they already own. By using standardization, groups can easily communicate through the set guidelines, in order to maintain focus. The method is made to facilitate processes and tasks; this is why it interlocks with lean manufacturing.

In the context of social criticism and social sciences, standardization often means the process of establishing standards of various kinds and improving efficiency to handle people, their interactions, cases, and so forth. Examples include formalization of judicial procedure in court, and establishing uniform

criteria for diagnosing mental disease. Standardization in this sense is often discussed along with (or synonymously to) such large-scale social changes as modernization, bureaucratization, homogenization, and centralization of society.

In the context of business information exchanges, standardization refers to the process of developing data exchange standards for specific business processes using specific syntaxes. These standards are usually developed in voluntary consensus standards bodies such as the United Nations Center for Trade Facilitation and Electronic Business (UN/CEFACT), the World Wide Web Consortium W3C, the Telecommunications Industry Association (TIA), and the Organization for the Advancement of Structured Information Standards (OASIS).

In the context of customer service, standardization refers to the process of developing an international standard that enables organizations to focus their attention on delivering excellence in customer service, whilst at the same time providing recognition of success through a third party organization, such as British Standards Institution (BSI). The International Customer Service Standard (TICSS) has been developed by The International Customer Service Institute (TICSI) with the objective of making it the cornerstone global standard of customer service. This standard has the status of an independent tandard, managed by The International Customer Service Institute. Standards can be: • de facto standards which means they are followed by informal convention or dominant usage. • de jure standards which are part of legally binding contracts, laws or regulations. • Voluntary standards which are published and available for people to consider for use b.

Codification: Codification is a process of representing item by a group of numbers and alphabets indicating the group, the subgroup, the, type and the dimensions of the item. Many organizations in the private and public sectors, railways: and DGS & D, have their own system of codification.

The number of digits and some fundamental principle of codification can be understood from the following example: digits 1-2 major group (raw materials, spare parts, subcontracted items, hardware items, packing material, tools, oil, stationery, etc.), 3-4 sub group (ferrous, non-ferrous, etc.) 5-7 dimensional characteristics (length width, head diameter, etc.) 8 minor variations, 9 location of storage, 10-11 user departments of the organizations, 12 products or product lines requiring the item, 13 any other information (related to inventory accounting, purchasing etc.)

There is merely an illustration of codification, process. The codification process can be based on the aspects also, (i) the codes could be obtained by the nature of items in grouping all items of the same metal content, say ferrous, non ferrous etc. (ii) The system could be built sometimes on the basis of the end-use of items, say maintenance, spinning, foundry, welding, packing, machine shop, etc. (iii) The codification could be thought of on the basis of source of purchasing where items obtained from one source are grouped together, (iv) The codification could also be built on the basis of alphabetical listing.

Objectives of Codification: In order to identify the items correctly and logically for processing the transactions, and to facilitate easy location in stores, a codification system should be evolved with the following objectives:

a) Accurate and Logical Identification: A separate code is allotted to each of the items available in the storehouse indicating the size, quantity, price, usability, special characteristic, specification, etc. This distinguishes one item from the other, even if nomenclature is the same, helps in accurate identification and eliminates any possibility of confusion.) Prevention of Duplication: All items are separately codified and are arranged in a logical order. Similar materials are grouped together (such as stationery items) and given a code (e. g. , 07). Once a code is allotted to a particular group, t is a decision on a organizational level and in no case it is changed. c) Standardization and Reducing in Varieties: For codification, grouping of identical items is done and it enables the stores to examine the entire range of items. It facilitates the elimination of those varieties in place of which other varieties of like quality can be used; this reduces the number of varieties to the minimum.

If proper Standardization id achieved and the number of items is kept at the minimum, it will considerably reduce investment in various items as well as the cost of inventory carrying. d) Efficient Purchasing: The filling up of purchase requisition, and preparation of purchase orders are simplified by the use of codes which easily indicate the materials required. Buying instructions to the suppliers become easy and quick if there is proper understanding of codification by the supplier. e) Efficient Recording and Accounting: Codes lead to effective stock control, efficient recording and result-yielding accounting.

Changes of mistakes are minimized. Pricing and valuation also become more accurate and reliable. f) Easy Locating, Indexing and Inspection: The

materials in the store have to be kept in an order which may facilitate their placement and location. For making it less time and energy consuming, items may be arranged according to the codes allotted to them. This would also facilitate a quick and efficient inspection. g) Easy Computerization: Small size computers such as Personal Computers (PC) are finding their wide applications in materials management. The computers work better with codes than with applications in material management.

The computers work better with codes than with long description of materials. c. Materials Variety Reduction: Process of reducing a large variety of items with close characteristics to fewer items (through Standardization). The process of Standardization logically leads to simplification or variety reduction. This implies reducing unnecessary varieties and standardizing to the most economical sizes, grades, shapes, colours, types or parts and so on. There are several items having very little variation in quantity, dimension or functional effectiveness. The process of standardization and variety reduction can be summarized as follows: . Prepare the list of all items used to make the final product. The list can be made out of the design blue-print in case the product design is just over but production has not started, or from the actual record of consumption in case the product is in production. 2. Classify the items according to their performance (or functional) and dimensional characteristics. 3. Group thee items with similar functional characteristics and then subgroup according to major dimensional values. For example, all bushes around 5 cm dia will be in one group while all around 3 cm dia will be in other group nd so on. 4. For a group of items with similar functional characteristics, study the dimensional features. In case of large

number of items, several item with the same or similar functional requirements, are likely to show the dimensions clustered in a very closed vicinity. Analyze the effect on performance of items if all items are made to the most representative (mean or mode of the frequency distribution) value of the dimension. If the performance characteristics are within satisfactory zone, these items are produced of the same dimension.

It may be noted that this is a very important step in variety reduction. 5. Check from the national or international standards if there is already a dimension existing equal to the most representative dimension found after analysis in the previous step. If such a dimension is found, the items can be deemed as standardized. If an exact dimension is not found, select the closest dimension and study again the performance of all items in the group around this dimension. If performance is acceptable, the item has been standardized according to national or international standards.

If the performance is not satisfactory, organization will adapt a local standard, the dimension being of the representative value.

========== 8. An item is demanded at the rate of 2000 units per year at a uniform rate. Ordering cost is Rs. 350 per order. Inventory carrying cost is 24% of the unit price per year. The supplier has offered a unit price of Rs. 100 per item but he is willing to reduce it to Rs. 95 per item if a purchase order of 1000 units or more is placed. Should you accept this offer?

Classical Economic Order Quantity Model (EOQ): When dealing with stocked items, the two important decisions to be made are – how much to order and when to order – EOQ provide the solution for how much of a demand and Re Order Paid (ROP) provider the answer for when. The following assumptions are made in the standard Wilson’s lot size formula to obtain EOQ a) b) c) d) e) f) g) Demand is continuous at a constant rate The process continues infinitely No constraints are imposed on capacity, budget etc. Replenishment is instantaneous All costs ate time invariant No storages, shortages are allowed

Quantity discounts are not available Total Inventory Cost = Order Cost + Carrying Cost + Material Cost Z Ordering Cost = — x 10 Q Q Carrying Cost = — x C x CC 2 Material Cost = Z x C Q = EOQ = 2 Z Co ——————- C x CC Where E Co CC Z Q C = EOQ = Economic Order Quantity = Order Cost = Carrying Cost / Holding Cost / Storage Cost = Annual Demand = Quantity to be Ordered = Cost / Unit In the given problem Q = EOQ = 2 Z Co ——————C x CC Where Z C Co CC = 2000 = 100 = 350 = 24% Q = EOQ = 2 x 2000 x 350 ——————————–100 x 24/100 Q = EOQ = 241 Total Inventory Cost Where C Q Z Co CC = 95 / Unit = 1000 Units 2000 = 350 = 24% Z Q Q = —— x Co + —– C. CC + Z x C Q 2 2000 241 24 = ——– x 350 + —— x 100 x —– + 2000 x 100 241 2 100 = 700 + 16625 + 190000 = 2, 07, 325/The total cost in the offered case of scheduled price of 95% is higher than original purchase; hence the offer may be rejected.

========== ========== 9. What are the duties of a purchasing manager? Discuss in detail the purchasing process in an organization.

Purchasing refers to a business or organization attempting for acquiring goods or services to accomplish the goals of the enterprise.

Though there are several organizations that attempt to set standards in the purchasing process, processes can vary greatly between organizations. Typically the word “ purchasing” is not used interchangeably with the word “ procurement”, since procurement typically includes Expediting, Supplier Quality, and Traffic and Logistics (T&L) in addition to Purchasing. A Purchasing Manager is an employee within a company, business or other organization who is responsible at some level for buying or approving the acquisition of goods and services needed by the company.

The position responsibilities may be the same as that of a buyer or purchasing agent, or may include wider supervisory or managerial responsibilities. A Purchasing Manager may oversee the acquisition of materials needed for production, general supplies for offices and facilities, equipment, or construction contracts. A Purchasing Manager often supervises purchasing agents and buyers, but in small companies the Purchasing Manager may also be the purchasing agent or buyer. The term Purchasing Manager is also known as “ Procurement Manager”. A Purchasing Manager’s responsibilities may include: • • • • seeking reliable vendors or suppliers to provide quality goods at reasonable prices negotiating prices and contracts reviewing technical specifications for raw materials, components, equipment or buildings determining quantity and timing of deliveries (more commonly in small companies) Forecasting upcoming demand. Purchasing managers/directors, and procurement managers/directors guide the organization’s acquisition procedures and

standards. Most organizations use a three-way check as the foundation of their purchasing programs. This involves three departments in the organization ompleting separate parts of the acquisition process. The three departments do not all report to the same senior manager, to prevent unethical practices and lend credibility to the process. These departments can be purchasing, receiving; and accounts payable or engineering, purchasing and accounts payable; or a plant manager, purchasing and accounts payable. Combinations can vary significantly, but a purchasing department and accounts payable are usually two of the three departments involved. When the receiving department is not involved, it’s typically called a two-way check or two-way purchase order.

In this situation, the purchasing department issues the purchase order receipt not required. When an invoice arrives against the order, the accounts payable department will then go directly to the requestor of the purchase order to verify that the goods or services were received. This is typically what is done for goods and services that will bypass the receiving department. A few examples are software delivered electronically, NRE work (non reoccurring engineering services), consulting hours, etc. Historically, the purchasing department issued purchase orders for supplies, services, equipment, and raw materials.

Then, in an effort to decrease the administrative costs associated with the repetitive ordering of basic consumable items, “ blanket” or “ master” agreements were put into place. These types of agreements typically have a longer duration and increased scope to maximize the quantities of scale concept. When additional supplies were required, a simple release would be

issued to the supplier to provide the goods or services. Another method of decreasing administrative costs associated with repetitive contracts for common material is the use of company credit cards, also known as “ Purchasing Cards” or simply “ P-Cards”.

P-card programs vary, but all of them have internal checks and audits to ensure appropriate use. Purchasing managers realized once contracts for the low dollar value consumables are in place, procurement can take a smaller role in the operation and use of the contracts. There is still oversight in the forms of audits and monthly statement reviews, but most of their time is now available to negotiate major purchases and setting up of other long term contracts. These contracts are typically renewable annually. This trend away from the daily procurement unction (tactical purchasing) resulted in several changes in the industry. The first was the reduction of personnel. Purchasing departments were now smaller. There was no need for the army of clerks processing orders for individual parts as in the past. Another change was the focus on negotiating contracts and procurement of large capital equipment. Both of these functions permitted purchasing departments to make the biggest financial contribution to the organization. A new terms and job title emerged – Strategic sourcing and Sourcing Managers.

These professionals not only focused on the bidding process and negotiating with suppliers, but the entire supply function. In these roles they were able to add value and maximize savings for organizations. This value was manifested in lower inventories, less personnel, and getting the end product to the organization’s consumer quicker. Purchasing manager’s success in

these roles resulted in new assignments outside to the traditional purchasing function – logistics, materials management, distribution, and warehousing.

More and more purchasing managers were becoming Supply Chain Managers handling additional functions of their organizations operation. Purchasing managers were not the only ones to become Supply Chain Managers. Logistic managers, material managers, distribution managers, etc. all rose the broader function and some had responsibility for the purchasing functions now. In accounting, purchases are the amount of goods a company bought throughout this year. it is also refers to information as to the kind, quality, quantity and cost of goods bought that should be maintained.

They are added to inventory. Purchases are offset by Purchase Discounts and Purchase Returns and Allowances. When it should be added depends on the Free On Board (FOB) policy of the trade. For the purchaser, this new inventory is added on shipment if the policy was FOB shipping point, and the seller remove this item from its inventory. On the other hand, the purchaser added this inventory on receipt if the policy was FOB destination, and the seller remove this item from its inventory when it was delivered.

Goods bought for the purpose other than direct selling, such as for Research and Development, are added to inventory and allocated to Research and Development expense as they are used. On a side note, equipments bought for Research and Development are not added to inventory, but are capitalized as assets.

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========== 10. A manufacturer of an electronic

control system (ECS) for musical appliances uses a non-destructive testing mechanism to assess the quality of ECS. A lot of 100 ECS’s is drawn periodically for testing.

After testing, the ECS’s will be classified as either defective or good depending on the outcome of the test. The following table gives the number of defects for 12 such samples. Establish a ‘ p’ chart for the process. Sample No. 1 2 3 4 5 6 7 8 9 10 11 12 No. of defects 10 9 8 11 7 12 7 10 13 12 13 14 Total No. of. Defectives Control Limit (CL) = ‘ P’ = ———————————————– Total Sample Size 10+9+8+11+7+12+10+13+12+13+14 = ——————————————————-1200 126 = ——————— = 0. 105 1200 Lower Control Limit (LCL) ‘ p’ (1-‘ p’) = ‘ P’ – 3 ————N = 0. 105 -3

Upper Control Limit (UCL) = ‘ P’ + 3 0. 105(1-0. 105) ————————- = 0. 013 100 ‘ p’ (1-‘ p’) ————N 0. 105(1-0. 105) = 0. 105 + 3 ————————— = 0. 197 100 Sample No. No. of Elements ‘ P’ 1 10 0. 1 2 9 0. 09 3 8 0. 08 4 11 0. 1 1 5 7 0. 0 7 6 12 0. 1 2 7 7 0. 0 7 8 10 0. 1 9 13 0. 1 3 10 12 0. 1 2 11 13 0. 1 3 16 14 12 10 8 6 4 2 0 S ple No. am No. of Elem ents ‘ P’ 12 14 0. 14

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