

Operations management assignment

[Business](#), [Management](#)



Introduction to Operations Management Contents: 1- What Is Operations Management (OM)? 2- OM Decisions. 3- Contributions of OM to the society. 4- The emergence of OM. 5- The Ever-Changing World of Operations Management. 6- Historical Development of OM. 7- The Main Challenges Face OM (+ in Sudan) – “ ASSIGNMENT” 1-What is Operations Management? 1- Operations Management (OM) is the management of the direct recourses that are required to produce and deliver an organization’s goods and services – OM is the business function responsible for Planning, Coordinating, and Controlling the resources needed to produce a company’s products and services. (this is an organizational perspective to define OM). 3- OM is the management of the conversion process that transforms inputs into outputs in the form of finished goods and services. (this is an operational perspective to define OM). [pic] Operations as a transformation process: [pic] Inputs of a Production System: External; – Legal, Economic, Social, Technological Market; – Competition, Customer Desires, Product Info. Primary Resources; Materials, Personnel, Capital, Utilities Outputs of a Production System Direct; – Products – Services Indirect; – Waste – Pollution – Technological Advances The Transformation Process within OM (technical core): Operations as the technical core: [pic] Operations managers do more than efficiently convert inputs to outputs. They interact with marketing to receive estimates of customer demand and customer feedback on problems; with finance for capital investments, budgets, and stockholder requirements; with personnel to train, hire, and fire workers; and with purchasing to order needed material for production.

Input-transformation-output relationships for typical systems: (Examples of transformation process p. 8) Transformation Processes: Physical

(manufacturing) Locational (transport/storage) Exchange (retail) Storage

(Warehousing) Physiological(healthcare) Psychological (entertainment)

Informational (communications) The input-transformation-output process

covers more than manufacturing processes. Operations can take many

forms. Types of Operations: [pic] 2- OM decisions Key Decisions of OM:

What – What resources/what amounts When – Needed/scheduled/ordered

Where – Work to be done How – Designed Who – To do the work OM

decisions: Operations managers must make decisions on three levels; –

Strategic – Tactical – Operating Top-down Approach to OM Strategy:

Operations Strategy Decisions; Strategic (long-range) Needs of customers

(capacity planning) Tactical (medium-range) Efficient scheduling of resources

Operational planning and control (short-range) Immediate tasks and

activities | Strategic | Tactical | Operating | | Characteristics | Longer term

decisions | Medium term decisions | Shorter term decisions | | | Usually made

at the senior | Made by middle and senior managers| Made at middle and

lower management| | | management level | | levels | | | High capital

investment | | | | Broad in nature | Narrow in scope | These decisions

concern the | | | | day-to-day activities of workers | | Examples | How will we

make the product? How many workers do we need? | What jobs do we work

on today or | | | | this week? | | | Where do we locate the facility? | Should

we work overtime or put on | To whom do we assign tasks? | | | a second

shift? | | | | How much capacity do we need? | When should we have material

| What jobs have priority? | | | delivered? | | | When should we add more capacity? | Should we have a finished goods | | | | inventory? | | 3-

Contributions of OM to the Society(the importance of OM) (A)- Higher Standard of Living (B) – Better Quality Goods and Services (C) – Concern for the Environment (D)- Improved Working Conditions Some definitions: 1- Productivity: Is a measure relating a quantity of output to the inputs required to produce it, or the amount of output per unit of input (There are many different ways of measuring productivity) – Efficiency: Achieving the same outputs with fewer resources or more outputs for the same amount of resources. 3- Effectiveness: The ability to achieve stated goals or objectives; – Efficiency is doing things right; – Effectiveness is doing the right things – Efficiency tends to deal with Things. Effectiveness tends to deal with People. We manage things, we lead people (A)- Higher Standard of Living [pic] (B) – Better Quality Goods and Services – Competition increases quality. – Quality standards continually increased. • Six sigma (3. 4 defects /1000000). • Expensive+ impossible to achieve (cost & quality are opposites- low cost production means it is impossible to achieve high quality????????). (C)- Concern for the Environment Challenge to produce environmentally friendly products with environmentally friendly processes. – Recycling and concern for air and water quality. (D)- Improved Working Conditions Better job design and employee participation. – Empowerment (workers participate in improving operations through suggestions) • (Empowerment: The concept of encouraging and authorizing workers to take the initiative to improve operations, reduces costs, and improves product quality and customer service.) • Clear link between satisfied workers and satisfied customer

specially in service. 4- The Emergence of OM OM has been gaining increased recognition in recent years for several reasons, including: (A)- The application of OM concepts in service operations B)- An expanded definition of quality (C)- The introduction of OM concepts to other functional areas (A)- The application of OM concepts in service operations: • Initially OM concepts focused on manufacturing. • As countries become more developed, services continue to represent a large percentage of their economies. • Growth in services & the fact that services could learn much from manufacturing and vice versa expanded the application of OM in services sector Services as a Percent of Gross Domestic Product (GDP) for Different Countries Differences between Manufacturers and Service Operations: [pic] Service and Manufacturing similarities: – All use technology Both have quality, productivity, & response issues – All must forecast demand – Each will have capacity, layout, and location issues – All have customers and suppliers – All have scheduling and staffing issues (B)- An expanded definition of quality: • Quality is important in all functional areas of an organization. • Quality is now much more than the technical requirements for manufactured goods. • Service quality (customer relationships) is equally important (C)- The introduction of OM concepts to other functional areas: Tools & concepts of OM are now widely used in other function. 5- The Ever-Changing World of OM (A)- Increased global competition. (B)- Advances in technology. (C)- Supply chain management. (D)- Outsourcing offshore. (A)- Increased global competition Global (economy, village, and landscape): Are terms used to describe how the world is becoming smaller, and countries are becoming more dependent on each other. – Transformation into a global economy –

Pressure to excel on multiple competitive dimensions – Increased emphasis on logistics Ford's Global Network to Support the Manufacturing of the Escort (B)- Advances in technology • Advance in technology in recent years have had a significant effect on the OM function. • IT+ automation + Internet (C) – Supply chain management (Linking OM to Customers and Suppliers);

In the past most manufacturing organizations viewed operations as internal function that must be buffered from the external environment (see page 9) Benefits of Buffering the Transformation Process; – The process not disturbed by environmental interaction. – The process was often more efficient than input and distribution processes. – Productivity was maximized when processes operated at continuous rates. – Process management skills were different from those of other functional activities. Disadvantages of Buffering the Transformation Process; – Information lags in interaction with other functional activities. – Lack of communication between customers and the shop floor for problem solving. • Value Chain; Steps an organization requires to produce a good or a service regardless of where they are performed. – Virtual enterprises: fully integrated and interlocked networks of interdependent companies. (D)- Outsourcing offshore – Jobs are now outsourced worldwide. – Originally outsourcing involved primarily manufacturing jobs; increases in technology now allow the outsourcing of white collar jobs 6- Historical development of OM (A)- Prior to 1900. (B)- Scientific Management. (C)- Moving assembly line. (D)- Hawthorne studies. (E)- Operations research. (F)- OM emerges as a field. (G)- The marriage of OM & IT. (H)- Integration of manufacturing & services. A)- Prior to 1900; –

Cottage industry produced custom-made goods. – Watt's steam engine in 1785. – Whitney's standardized gun parts in 1801. – Industrial Revolution began at mid-century. (B)- Scientific Management (Frederick W. Taylor); – Systematic approach to increasing worker productivity through time study, standardization of work, and incentives. – Viewed workers as an interchangeable asset. Other Management Pioneers – Frank and Lillian Gilbreth ? Motion study and industrial psychology – Henry L. Gantt ? Scheduling and the Gantt chart (C)- Moving Assembly Line (1913); – Labor specialization reduced assembly time. (D)- Hawthorne Studies; Yielded unexpected results in the productivity of Western Electric plant workers after changes in their production environment. – Led to recognition of the importance of work design and employee motivation. (E)- Operations Research (Management Science); – Outgrowth of WWII needs for logistics control and weapons-systems design. – Seeks to obtain mathematically optimal (quantitative) solutions to complex problems. (F)- OM Emerges as a Field; – 1950–1960, OM moved beyond industrial engineering and operations research to the view of the production operation as a system. (G)- The Marriage of OM and IT; – Integrated solutions approaches; ? Business process reengineering ? Supply chain management ? Systems integration (SAP) Last word:

Shifts from cost and efficiency to value, from mass production to lean production, from manufacturing technology to information technology, and from national economy to world economy have made operations management (OM) critically important in modern business. Workers are

different; they demand increasing levels of empowerment and more meaningful work. Customers are different, their demands and expectations are much higher. Technology is different; computers & automation have dramatically changed the nature of work, requiring constant learning and more abstract thinking. Finally the environment is different, we live in a global business environment without boundaries . Such changes in business are occurring at an increasingly rapid pace, and we can expect them to continue in the future.

Operations managers clearly face important challenges in preparing for this century. Operations Management in Services OM concepts can apply to both manufacturing and service operations. (H)- Integration of Manufacturing and Services; – Conducting world class operations requires compatible manufacturing and service operations. OPERATIONS STRATEGY Contents: 1- Basic concepts. 2- What is operations strategy? 3- A Short history of operations strategy. 4- The importance of operations strategy. 5- Competitive priorities. 6- Trade-Offs. 1- Basic concepts: “ What is strategy? ” Strategy is simply a carefully developed long-range plan for achieving specific desired results.

A good strategy defines how an organization will compete in the marketplace. It incorporates how: the organization will obtain funding from different sources, recognizes: with whom the organization will compete, and identities: who its customers will be. Strategy also determines: along which dimensions the organization will compete. Strategy levels: Company strategy can be formulated and implemented at three different levels: – Corporate

level – Business unit level – Functional or departmental level: 1- Corporate-level strategy: Corporate-level strategy is any strategy that guides the activities of an organization having more than one line of business.

It focuses on the kinds of businesses the firm wants to be engaged in, the ways to acquire or get rid of businesses, the allocation of resources among businesses, and the ways to manage the businesses. 2- Business-level strategy: Once top management agrees on corporate-level strategy, they can turn their attention to the business-level strategy. It is the strategy that guides the operations of a single business, outlining how it will compete (defines the long-range plan to compete in the marketplace + Helps to differentiate the firm from competitors). It answers the question of “ how do we compete? ” and this involves: (A)- How the firm can maintain a competitive advantage? B)- How each key functional department (production, human resources, marketing, and finance) can contribute to the overall effectiveness? (C)- How resources should be allocated among these functions? 3- Functional-level strategy: Functional Strategy consists of guidelines for managing a firm’s functional areas, such as marketing, human resources, engineering, R&D. Each functional strategy should be designed to contribute to the business-level strategy. [pic] Strategy Process [pic] – Whose responsibility is Strategy Planning? Is participation in this process restricted to upper level management? , or does it involve all levels of employees? – Might one have different expectations for the answer to this question for a particular company (Circle K as opposed to Merck)? What is the contrast between the strategy planning for all levels of the organization

at once, versus strategy planning for the organization as a whole, with subsequent “roll down” to lower levels? Business/Functional Strategy [pic] 2-

What is Operations Strategy? (A)- Operations strategy: It is the means by which operations management implements the firm’s corporate strategy and helps to build a customer-driven firm. It links long-term and short-term operations decisions to corporate strategy. (B)- Operations strategy: It is the plan that specifies the design and use of resources to support the business strategy. The operations strategy must be aligned with the company’s business strategy and enable the company to achieve its long-term plan. C)- Operations strategy: It is a long-range plan for the production of a company’s products/services, and provides a road map for the production function in helping to achieve the business strategy. 3- History of operations strategy: A Short history of operations strategy: In the period following World War II, corporate strategy in the United States was usually developed by the marketing and finance functions within a company. High demand for consumer products built up during the war years permitted U. S. companies to sell virtually everything they made at comparatively high prices. With most of Europe and Asia in ruins, there was little international competition.

The main industrial competitors of the United States today, Germany and Japan, lay in ruins from massive bombings, they could not even satisfy their own markets, let alone export globally. At that time, the manufacturing or operations function was assigned the responsibility to produce large quantities of standard products at minimum costs, regardless of the overall goals of the firm. To accomplish this, the operations function focused on

obtaining low-cost labor and installing highly efficient production systems. With little global competition and continued high demand, the high output, low cost goal of operations management remained virtually unchanged throughout the 1950s and early 1960s.

By the late 1960s, however, Wickham Skinner of the HBS, who has often been called the grandfather of operations strategy, recognized this weakness among U. S. manufacturers. He suggested that companies develop an operations strategy that would complement the existing marketing and finance strategies. In one of his early articles on the subject, Skinner referred to manufacturing as the missing link in corporate strategy. Subsequent work in this area continued to emphasize on the importance of using the strengths of a firm's manufacturing facilities and people as a competitive weapon in the marketplace. Operations strategy did not come to the forefront until the 1970s. Up to that time U. S. companies emphasized on mass production of standard product designs. There were no serious international competitors, and U. S. companies could pretty much sell anything they produced. However, that changed in the 1970s and 1980s when the Japanese companies began offering products of superior quality at lower cost, and U. S. companies lost market share to their Japanese counterparts. In an attempt to survive, many U. S. companies copied Japanese approaches. Unfortunately, merely copying these approaches often proved unsuccessful, it took time to really understand Japanese approaches. It became clear that Japanese companies were more competitive because of their operations strategy.

That is, all their resources were specifically designed to directly support the company's overall strategic plan

4- The importance of operations strategy:

The role & importance of operations strategy: Operations strategy provides a plan for the operations function so that it can make the best use of its resources. Operations strategy; specifies the policies and plans for using the organization's resources to support its long-term competitive role. " The operations strategy relates the business strategy to the operations function. " Professor Michael Porter (HBS) says that companies often do not understand the differences between " Operational Efficiency" and " Operational Strategy". Operational Efficiency; Is performing operations tasks well, even better than competitors. Operational Strategy; On the other hand, is a plan for competing in the marketplace" An analogy might be that of " Operating efficiently is like running a race efficiently, but it might be the wrong race" Operational Strategy is defining: " in which race you should win". Operational efficiency and strategy must be aligned together. Otherwise you may be very efficiently performing the " wrong task", the role of operations strategy is to make sure that all the tasks performed by the operations function are the " right tasks".

5-Competitive priorities Basic concepts:

Competitive priorities: " Are approaches through which operations function provides a firm with a specific competitive advantage" Competitive advantage: " Is an advantage over competitors gained by offering consumers greater value, either by means of lower prices or by providing greater benefits and service that justifies higher prices" The key to

developing an effective operations strategy lies in understanding how to create or add value for customers. Specifically, value is added through the competitive priority or priorities that are selected to support a given strategy. Skinner and others initially identified four basic competitive priorities. These were: Cost, Quality, Delivery, and Flexibility.

In the 1990's, companies began to differentiate themselves with a fifth competitive priority; Service.

Type	Priority
Low Cost	Providing low cost products.
Controlling costs across the board.	Quality
Providing high quality products.	Focus is on both product quality and process quality.
Delivery	Providing products reliably and quickly.
Flexibility	Providing a wide variety of products (mass customization).
How fast a firm can produce a new product line?	Service
Providing a “value-added” service.	How products are delivered and supported?

Competitive priorities = How operations function provides a firm with a specific competitive advantage.

Five Important Operations Questions: Will we compete using one of these five? Cost? Quality? Delivery? Flexibility? Services? OR will we compete using; All of the above? Some of them? Or, Trade-offs between them?

1-Compete on Cost? Within every industry, there is usually a segment of the market that buys strictly on the basis of price. To profitably compete in this niche, a firm must necessarily, therefore, be the lowest cost producer.

But even doing this doesn't always guarantee success. Products sold strictly on the basis of price are typically commodities. Examples of products that are commodities include flour, petroleum, and sugar. (In other words, Customers cannot easily distinguish the products made by one firm from

those of another. As a result, customer use price as the primary determinant in making a purchase.) This segment of the market is frequently very large, and many companies are lured by the potential for the significant profits that are associated with large unit volumes of product. As a consequence, the competition in this segment is exceedingly fierce “ and so is the failure rate”.

After all, there can only be one lowest-cost producer, and that firm usually establishes the selling price in the market. Competing based on cost means offering a product at a low price relative to the prices of competitors. The need for this type of competition emerges from the business strategy. The role of the operations strategy is to develop a plan for the use of resources to support this type of competition. Note that a low-cost strategy can result in a higher profit margin, even at a competitive price. Also, “ low cost does not imply low quality”. Let’s look at some specific characteristics of the operations function we might find in a company competing on cost: To develop this competitive priority, the operations function must focus primarily on cutting costs in the system such as costs of labor, materials, and facilities. – Companies that compete based on cost study their operations system carefully to eliminate all waste. They might offer extra training to employees to maximize their productivity and minimize scrap. Also, they might invest in automation in order to increase productivity. Generally, companies that compete based on cost offer a narrow range of products and product features, allow for little customization, and have an operations process that is designed to be as efficient as possible. Cost measures include: dollars per unit, inventory turns, and labor hours per unit. In the U.

S. low cost used to be the primary objective of manufacturing firms from the 1950s to the mid 1970s. Summary: – Low Cost means delivering a service or product at the lowest possible cost to the satisfaction of the customer. – Typically high volume products. – Often limit product range & offer little customization. – May invest in automation to reduce unit costs+ eliminate all waste +increase productivity through training. – Can use lower skilled labor. – Focuses on efficiency. – Low cost does not imply low quality 2-Compete on Quality? Quality can be divided into TWO categories: (A)- Product quality, (B)- Process quality. The level of quality in a product's design well varies with the particular market that it aims to serve.

One advantage of offering higher-quality products is that they command higher prices in the marketplace. The goal in establishing level of product quality is to: “ focus on the requirements of the customer”. – Over-designed products; with too much quality will be viewed as being prohibitively expensive. – Under-designed products; on the other hand, will lose customers to products that cost a little bit more but are perceived by the customers as offering significantly greater benefits. Process quality; is critical in every market segment. Customers want products without defects, thus, the goal of process quality is to produce error-free products. 3-Compete on Delivery?

Speed of delivery; (quickly filling a customer's order) is often an important factor in the purchasing decision. A firm that can provide consistent and fast delivery can charge a premium price for its products. In addition to fast delivery, the reliability of the delivery is also important. In other words,

products should be delivered to customers when promised. Time-based competition; is a strategy that focuses on development speed and delivery speed. 4-Compete on Flexibility? Flexibility consists of two dimensions, both of which are directly related to how the firm's processes are designed: (A)- Mass customization: One element of flexibility is the firm's ability to offer its customers a wide variety of products.

The greatest flexibility along this dimension is achieved when every product is customized to meet the specific requirements of every individual customer. This is often referred to as mass customization (providing high volume products that are individually made to meet the specific needs of each customer, or satisfying the unique needs of each customer by changing the service or product designs). (B)-Volume Flexibility: The other dimension of flexibility is called Volume Flexibility. It is related to; " How fast a company can change over its production facilities to produce a new line of products (requires accelerating or decelerating the rate of production quickly to handle large fluctuations in demand)" This dimension is growing in importance as product life cycles become shorter and shorter.

Volume flexibility also related to the ability to adjust for seasonal variations and fluctuations, and is particularly important for fashion apparel firms, for example. 5-Compete on Service? With product life cycles becoming shorter, the products themselves tend to quickly resemble those of other companies. As a consequence, these products are often viewed as commodities, with price being the primary determinant in the purchase decision. A good example of this is the personal computer (PC) industry. Today, the

differences in the products offered among the different PC manufacturers are relatively insignificant, so price is the prime selection criterion.

To obtain an advantage in such a competitive environment, firm that provide goods and services are now providing “ value-added” services. The reason is simple. “ The market power is in the services because the value is in the results. ” 6- The Trade-Offs? Questioning the Trade-Offs; The growing intensity in global competition during the 1970’s and 1980’s forced companies to re-examine the concept of operations strategy, especially the so-called necessary trade-offs. Managers began to realize that they didn’t have to make trade-offs to the extent that they had previously thought. They realized the need to establish a hierarchy among the different priorities, as dictated by the marketplace. In the late 1960’s and early 1970’s, COST was the primary concern.

A hold-over from the philosophy of the 1950’s that manufacturing’s only objective was to minimize production costs. However, as more and more companies began to produce low-cost products, they needed to develop other ways to differentiate themselves from their competitors. The priority shifted to QUALITY. Companies with higher quality could charge more, as long as, the value to the customer was high. However, competition again soon caught up, and more and more firms were offering high-quality products that were reasonably priced. Companies next turned to SPEED AND RELIABILITY OF DELIVERY as a means of differentiating themselves from the rest of the pack.

Now, at this stage, the ante into the game became: “ high-quality products that were reasonably priced and that could be delivered quickly and reliably to the customer. ” In the 1980’s, the speed of delivery was a major factor in determining the success of a company. Companies therefore concentrated their resources on reducing product lead times with very dramatic results. Products that once took weeks or months to deliver were now being shipped within hours or days of the receipt of an order. Eventually, the competition again caught up, and the more aggressive firms looked for a new way to obtain a competitive advantage This time flexibility came to the forefront.

The marketplace dictated that for firms to be successful, they had to “ produce reasonably priced, customized products of high quality that could be quickly delivered to the customer. ” Trying to compete on more than one dimension might lead to the conclusion that there are no longer any trade-offs. This is not the case. As Wickham Skinner said “ There will always be tradeoffs. ” Assignment (2) For long years, firms have used four competitive priorities (or operational objectives): cost, quality, delivery, and flexibility.

(A)- Discuss the possible conflict, and the possible trade- off between these goals or priorities (cost & quality on one hand, delivery and flexibility on the other hand) B)- Some have argued that delivery and flexibility are the most important objectives in some industries because cost-cutting programs and quality improvement programs have “ leveled the playing field” on cost and quality. Are you agreeing with this argument? Why?

FACILITY LOCATION

Introduction: Choosing where to locate new manufacturing facilities, service outlets, or branch offices is a strategic decision. The location of a business’s

facilities has a significant impact on the company's operating costs, the prices it charges for goods and services, and its ability to compete in the marketplace. Analyzing location patterns to discover a firm's underlying strategy is fascinating. For example: • Why does McDonald locate restaurants in a posh area? • Why do competing new-car sales showrooms cluster near one another?

McDonald's target customers are those in high-income group. In contrast, managers of new-car showrooms deliberately locate near one another because customers prefer to do their comparison-shopping in one area. In each case, management's location decision reflects a particular strategy. There are strategic impacts of location decisions. I- Locating Manufacturing Facilities: The facility location decision for a manufacturing firm usually involves the location of both the manufacturing plant and the warehouse or distribution facilities. As a general rule, products that decrease in weight and volume during the manufacturing process tend to be located near the sources of raw material.

An example of this would be a lumber mill is located in a forest where the trees are being harvested. In this case, the reduction is so significant, that the mill is often moved every few years, to be closer to the trees being harvested. On the other hand, products that increase in weight and volume during the manufacturing process tend to be located near the consumers. An example of this is a soft bottler that is located near a major city. In both of these cases, the goal is to minimize distribution costs. As the world evolves

into a single global economy, businesses need to take a more international perspective when they locate their manufacturing facilities.

The low labor costs in some counties often more than offset the additional transportation costs. However, many other factors besides costs are involved in selecting a site. As a result, the complexity of the decision-making process increases several folds when a firm decides to shift from a national to an international site location strategy. In weighing the advantages and disadvantages of alternative sites, the analysis should include an evaluation of both qualitative and quantitative factors. Qualitative Factors: The qualitative factors include; (1) Local infrastructure, (2) Worker education and skills, (3) Product content requirements, and (4) Political/economic stability.

Firms in some industries locate their facilities in clusters because they emphasize the same qualitative factors. For example, Wall Street is home to securities and investment banking firms because the stock exchanges are located in New York City. (1)-Local Infrastructure: The local infrastructure necessary to support a manufacturing operation can be divided into two broad categories: (A) Institutional, and (B) Transformational. With manufacturing operations becoming more flexible and responsive to customer requirements, there is a growing dependence on local institutions or suppliers to be more flexible and responsive, which requires that the local transportation network that links the suppliers to the manufacturer be efficient and reliable.

For example, the lack of an adequate and reliable transportation infrastructure in some countries would preclude a firm that uses just-in-time (JIT) concepts from locating in these areas. (2)-Worker Education and Skills:

The increased sophistication of today's manufacturing processes requires that the workforce be highly educated and equipped with a wide variety of skills. Increased emphasis on automation requires specific worker skills to operate and maintain equipments. As an illustration, the significant growth of business in Singapore in recent years can be attributed, in large part, to the investment of its government in educating and training its population.

(3)-Product Content Requirements:

Content requirements state that a minimum percentage of a product must be produced within the borders of a country in order for that product to be sold in that country. This assures jobs in the local economy while reducing the amount of imports. For example, for a car to be sold in the Philippines, it must be assembled there. Consequently, major car manufacturers that want to sell cars in the Philippines must have an assembly plants there, even though demand for cars in that country is sufficiently small to suggest that importing them would be more economical. (4)-Political/Economic Stability: The stability of a region refers to the number and intensity of economic and political fluctuations that might occur there.

The dissolution of the former Soviet Union provides ample evidence of the problems associated with locating a business in an unstable economy. (5)-

Other factors: 1- Available of utilities (electricity generating, clean water, water disposal, fuel) 2- Legal restrictions 3- Attractiveness of the community

(quality of house, rate of crime, quality of school, cultural institutions, etc.)

4- Climate, and environmental regulations 5- Space for expansion 6-

Proximity to other industry Quantitative Factors The quantitative factors

include: (1) Labor costs. (2) Distribution costs. (3) Facility costs. (4)

Exchange rates, and (5) Tax rates. (1)-Labor Costs: Labor costs can vary dramatically with location.

In Western Europe, the United States, and Japan, the cost of labor can exceed US\$20 per hour in comparison to countries in Asia where the cost can be less than US\$10 per day. Labor costs, of course, must be considered in light of labor skills. (2)- Distribution Costs: As we become more global, distribution and transportation costs take on added importance. In addition to the cost of transportation, the time required to deliver the products also must be considered. In many cases the low costs associated with manufacturing products in Asia are offset by the long lead times and the high cost of delivery to markets in North America and Europe. (3)-_Facility Costs:

Undeveloped or third-world countries often offer incentives in the form of low-cost manufacturing facilities to attract companies. For example, within the People's Republic of China (PRC) many special economic zones (SEZ) have been established that are exempt from tariffs and duties-provided that the products made there are sold outside the PRC. In some countries, the local government will enter into a partnership with a firm, with the government providing the land, the building, and perhaps the training of the workforce. (4)-Exchange Rates: The volatility of the exchange rates between

countries can have a significant impact on sales and profits, for example, the change in rates between the Japanese yen and the U. S. dollar from below 90 yen per dollar to more than 120 yen per dollar between 1996 and 1997 increased the price competitiveness of Japanese products in the United States while decreasing the ability of U. S. products to compete in Japan. The reverse situation occurred in 2001-2004 with an increase in the value of the euro from less than US\$0.85 to more than US\$1.25, increasing the competitiveness of U. S. products. (5)-Tax Rates: Tax rates can differ significantly between countries, and even within a country, for example, in the United States, some states have income and sales taxes, while others do not. Other taxes that need to be considered include property taxes and payroll taxes. In many western European countries, like France and Germany, payroll taxes can be as high as 50 percent.

To attract businesses, many countries and states offer significant tax incentives, for example, a country may exempt a firm from paying income taxes during its first five or 10 years of operation, after which normal tax rates will apply. II- Locating Service Operations Many of the issues manufacturing companies face when expanding their operations internationally are also faced by service operations, for example, when McDonald opened its first restaurant in Moscow, the lack of an existing institutional infrastructure to support its operation required that it built a central commissary. This commissary prepared everything for the retail outlet, from hamburger patties to rolls and French-fries.

In addition, the Russian farmers had to be shown how to grow vegetables such as potatoes and lettuce that would meet McDonald's high-quality product specifications. In contrast, the opening of a McDonald in the United States or Western Europe would only require a call to the established local suppliers.

Types of Service Facilities: The decision where to locate a service facility depends on the specific type of service provided and how it is delivered to the customer. We identify the following three types of service facilities, based upon the degree and type of contact each has with the customer:

- (1)-Facilities with direct interface with the customer.
- 2)-Facilities with indirect customer contact.
- (3)-Facilities with no customer contact.

(1)-Facilities with Direct Interface with the Customer: Businesses that require the actual presence of the customer as part of the service process are often referred to as brick-and-mortar operations because of their physical structures. Examples of these types of services include restaurants, hotels, branch offices of banks, hospitals, and traditional retail operations such as supermarkets, large department stores, and small clothing boutiques. For firms with these types of decentralized facilities, the critical success factor is the volume of sales a given location can generate.

Consequently, many multi-location services have developed sophisticated forecasting models for predicting the sales that potential new locations can generate.

(2)-Facilities with Indirect Customer Contact: Services such as telephone call centers and virtual firms that only link to the customer through a website do not require the customer's physical presence in order to deliver the service. Examples of the wide variety of services that have call

centers include hotels, airlines, and car rental agencies (for reservations), brokerage and financial services (for trading transactions); and mail order businesses (for customer orders). Call centers also provide customer service support for both services and manufacturing companies.

These same services often provide a website as an alternative channel of communication for the customer. For these types of facilities, being near the customer is not an issue. Consequently, the site selection process in these cases is very similar to that of back-of-the-house service operations. In fact, both the call centers and web sites are frequently located in the same facility to take advantage of economies of scale. 3)-Facilities with No Customer Contact: Services that have no direct interaction with customers are often referred to as back-of-the-house operations. Because the customer is absent from the process, these services, in many respects, tend to resemble a manufacturing operation.

Services with these characteristics can be further divided into two broad categories: (a) The processing (sometimes) and distribution of physical goods (as illustrated by a central commissary for a restaurant chain) and (b) The processing and distribution of information (as illustrated by a credit card billing operation). As in selecting a manufacturing site, the location of a physical distribution center needs to consider not only the facility's operating costs but also the distribution or delivery costs, with the goal of minimizing total costs. Methods for evaluating potential Locations: Factor-Rating Systems (Scoring models for facility location): • Center-of – gravity method • A spreadsheet approach to locating facility Liner programming • GIS • Load

distance model Facility Layouts Contents: • What is Facility Layout? • Importance of layout decision. • Types of Manufacturing Layouts. • Service layout. • Characteristics of a good layout. 1-What is Facility Layout? (A)- The arrangement of physical facilities. (B)- Physical configuration of departments, work stations, and equipment in the conversion process. It is spatial arrangement of physical resources used to create the product. (C)- Arrangement of machines, storage areas, and/or work areas usually within the confines of a physical structure, such as a retail store, an office, a warehouse, or a manufacturing facility. D)- The physical arrangement of resources (including people) in the production process. 2- Importance of layout decision • Requires substantial investments of money and effort. • Involves long-term commitments. • Has significant impact on efficiency (cost) and productivity of operations. • Layout planning is organizationally important for an efficient operation. • Marketing is affected by layout especially when clients come to the site. • Human resources are affected as layout impacts people. • Finance is involved as layout changes can be costly endeavors. In brief, layout decisions tend to be: – Infrequent – Expensive to implement – Studied and evaluated extensively – Long-term commitments 3- Types of Manufacturing Layouts

Manufacturing plants use three basic types of layouts: i- Process layout, ii- Product layout, and iii- Fixed-position layout. In addition, there is one hybrid that is referred to as a group technology or cellular layout, which is a combination of process and product layouts. Definition; Process Layout; Machines grouped by process they perform. Product Layout; Linear

arrangement of workstations to produce a specific product. Fixed Position Layout; Used in projects where the product cannot be moved. Usage: Process layout; Used for intermittent processing Product layout; Used for repetitive processing Fixed-position layout; Used when projects require special layout Hybrid layout; combinations of these pure types • Cellular manufacturing (Group technology) Types of operations: intermittent, and repetitive: (1)- Intermittent operations: “ Operations characterized by made-to-order, low volume, labor-intensive products, by a large product mix, by general purpose equipment, by interrupted product flow, and by frequent schedule changes. ” (2)- Repetitive (continuous) operations: “ Operations characterized by standardized, high volume, capital -intense products made to store in inventory, by small product mix, by special purpose equipment, and by continuous product flow. ” Layout Types [pic] a) Process Layout [pic] b) Product Layout Process layout: In a process layout (also called a job-shop layout or layout by function), similar equipment or functions are grouped together, such as in a machine shop where all the lathes are in one area and all the stamping machines are in another. • A part being worked on travel from one area to the next, according to the specific sequence of operations required. This type of layout often found in high-mix, low-volume manufacturing plants that use an intermittent process. A hospital provides a good example of a process layout in the service sector; customers (patients) go to Radiology for X-rays and to the lab for blood tests. • A process layout is appropriate for intermittent operations when work flow is not consistent for all output.

Variable work flow occurs when a variety of product or variations on a single product are produce. In a process layout, the work centers or departments are grouped together according to their functional types. Process layout examples [pic] Process layout jobs examples [pic] Advantages of Process layout:

- Can handle a variety of processing requirements
- Not particularly vulnerable to equipment failures.
- Equipment used is less costly.
- Flexibility: equipment and personnel can be used where they are needed.
- Expertise: supervisors for each department become highly knowledgeable about their functions.
- Diversity of tasks: changing work assignments make work more satisfying for people who prefer variety.

Disadvantages of Process layout:

- In-process inventory costs can be high
- Challenging routing and scheduling
- Equipment utilization rates are low
- Material handling slow and inefficient
- Complexities often reduce span of supervision
- Special attention for each product or customer
- Accounting, inventory control and purchasing are more involved

Product layout:

- A product layout is appropriate for producing one standardize product , usually in large volume. Each unit of output requires the same sequence of operations from beginning to end. In a product layout, work centers and equipment are arranged in a line to afford specialized sequence of tasks. Each work center performs one highly specialized part of the total product buildup sequence. Automatic car washes, cafeterias (where a customer's tray moves through a series of stations to assemble the components of a meal), automobile makers, and soft drink use product layout. Product Layout examples [pic] Product layout jobs Examples [pic] Advantages of Product

layout: • High rate of output • Low unit cost • Labor specialization • Low material handling cost • High utilization of labor and equipment • Established routing and scheduling • Routine accounting, purchasing and inventory control

Disadvantages of Product layout: • Creates dull, repetitive jobs Poorly skilled workers may not maintain equipment or quality of output • Fairly inflexible to changes in volume • Highly susceptible to shutdowns (Dependence of the whole on each part: a breakdown of one machine or absence of enough operators to staff all work stations may stop the entire line) • Needs preventive maintenance. • Large investments: special-purpose equipment

Fixed-Position Layouts: “ Layout in which the product or project remains stationary, and workers, materials and equipment are moved as needed. Move machines and/or workers to the site; products normally remains in one location for its entire manufacturing period. Examples: Large construction projects (buildings, power plants, dams) • Shipbuilding, production of large aircraft • Rockets used to launch space missions

Disadvantages of fixed position layout: • Since the same workers are involved in more operations, skilled and versatile workers are required. The necessary combination of skills may be difficult to find and high pay levels may be necessary. • Movement of people and equipment to and from the work site may be expensive. • Equipment utilization may be low because the equipment may be left at a location where it will be needed again in a few days rather than moved to another location where it would be productive.

[pic] [pic]

Comparing the characteristics of layout: in the table below, we can see the comparison between the three types of layouts;

Aspect of conversion	Product layout	Process layout	Fixed layout
Product	Standardized product, large volume, Made-to-order, low volume	Diversified products using common	Stable rate of output
Process	operations, varying volumes, varying rate of	output	Work flow
Layout	Straight line of product; same sequence	Variable flow; each order (product) may	Little or no flow; equipment and human
Operations	of operations for each unit	require unique sequence of operations	resources brought to site as needed
Human skills	Able to perform routine, repetitive	Primarily skilled craftsmen; able to perform	Great flexibility required; work
Tasks	tasks at fixed pace, highly specialized	without close, supervision and be moderately	assignments and locations vary
Adaptability	adaptable	Support staff	Large; schedule materials and people,
Scheduling	Perform tasks of scheduling, materials	Schedule and coordinate skillfully	monitor and maintain work
Handling	handling, and production and inventory	control	Material handling
Flow	Predictable, flow, systematized and	Flow variable; handling often duplicated	Flow variable, often low; may require
Automation	often automated	heavy-duty, general purpose handling	equipment
Inventory	High turnover of raw material and	Low turnover of raw material and	Variable inventories and frequent
Work-in-process	work-in-process inventories	work-in-process inventories; high raw	tie-ups because production cycle is
Materials	materials inventories	long	Space utilization
Efficiency	Efficient utilization, large output per	Small output per unit space; large	Small output per unit space if
Unit space	unit space	work-in-process requirements	conversion is on site
Capital requirements	Large		

investment in specialized | General purpose, flexible equipment and |
 General purpose, mobile equipment and | | | equipment and processes |
 processes | processes | | Product cost | Relatively high fixed costs, low unit |
 Relatively low fixed costs; high unit costs | Relatively low fixed costs; high
 unit | | | cost for direct labor and materials | for direct labor, materials, and
 materials | labor and materials costs | | | handling | | Process selection

Contents: • What is process? • Significance of process • Factors determined
 process selection • Types of processes: o Project. o Job shop. o Batch. o
 Assembly line, and o Continuous What is process? How to define process?
 Process (or process technology) is; a specific combination of machines,
 operators, work methods, materials, tools, and environmental factors that
 together convert inputs to outputs, or Process technology refers to the
 equipment, people, and systems used to produce a firm's products and
 services. • Key process technology decisions: relate to organizing the
 process flows, choosing the appropriate product-process mix, adapting the
 process to meet strategic requirements, and evaluating automation and
 high-technology processes. Significance of process: • The choice of
 technology affects a firm's ability to manufacture products that meet the
 customers' requirements and the firm's strategic goals of quality, flexibility,
 dependability, and cost. Because operations managers must be able to
 evaluate a process in terms of its ability to meet the organization's strategic
 objectives, they must understand both the technical and the managerial
 implications of process technology. Factors determined process selection:
 The selection of a process structure is determined by many factors. Four of
 the most important are these: 1. The expected volume and demand pattern

for the products. 2. The number of different products to be made by the system and the types of processing each requires. 3. The customer order type, which defines whether the product is made to stock (the product's characteristics are set by the producer, and the product is normal made in advance of orders), or made to order (the product is made on receiving customer's order, and its characteristics may be specified by the customer). 4.

The physical characteristics of the products and the specific technologies required to produce them. Types of production systems: Process Selection in Manufacturing-Types of Processes; • Project process: Process that focuses on making one-of-a-kind products. • Intermittent process:: Process that produces products in small lot sizes (e. g. , job and batch operations) • Line-flow process: Continuous process that produces high volume, highly standardized products (e. g. , assembly-line and continuous operations).

Types of Processes Types of production systems: • There are Five types of process technologies are: 1. Project. 2. Job shop. 3. Batch. . Assembly line, and 5. Continuous. • Each is more or less suited to different product/market situations, and each has its unique operating characteristics, problems, and challenges. • As we move from project production process to continuous flow, variety decreases, and volume increases ((high variety – low volume) 1- Project: • Project technology deals with one-of-a-kind products that are tailored to the unique requirements of each customer (a unique and usually large and complex item is produced). • Since the products cannot be standardized, the conversion process must be flexible in its equipment

capabilities, human skills, and procedures. The major strength of a project-type process is that it is totally flexible to meet the individual needs of the customer • Examples here include; the production of a movie and the construction of a skyscraper building, a customized car is another good example. • Variable costs in this category are comparatively very high. • On the other hand, fixed costs are negligible or even nonexistent. • Highly skilled personnel are usually required for this type of process, as they often must work independently, with minimal guidance and supervision. In addition, workers here need to be well trained in a variety of tasks. (Labor skills and costs are generally high) 2- Job shop: • Job-shop production processes produce a wide variety and small quantity of specialized products. • Products are generally customized; they may be produced by entirely different sequences of operations. Job shops are essentially make-to-order systems, whereas continuous flow, mass, and batch production processes are generally make-to-stock processes. • More general-purpose equipment is used, and there is less opportunity for specialized, automated equipment. • The labor force must be highly skilled and able to perform a wide variety of tasks on different jobs. Unit production costs are higher than for other production processes. • Job shop technology is appropriate for manufacturers of small batches of many different products (high variety – low volume), each of which is custom designed and, consequently, requires its own unique set of processing steps, or routing, through the production process. Some prefer to define job shop production as a process where a specific quantity of a product is produced only once. • Numbered prints from a painting, programs for concerts, and T-shirts commemorating specific

events are good examples of products made in a job shop process. • Job production involves the manufacturing of a single complete unit with the use of a group of operators and processes as per the customer' order. This is a 'special order' type of production. Each job or product is different from the others and no repetition is involved. Therefore, each job is individually planned. Job shop advantages: • Flexibility to respond to individual demands (can be adapted easily to changes in product design.

A fault in one operation does not result into complete stoppage of the entire process) • Less expensive general purpose equipment used • Maintenance and installation of general purpose equipment easier • General purpose equipment easier to modify and therefore less susceptible to becoming obsolete. • Dangerous activities can be segregated from other operations • Higher skilled work leading to pride of workmanship • Less vulnerable to equipment breakdowns Job shop Disadvantages: • General-purpose equipment is usually less efficient at processing materials. • More skilled, higher-paid employees are needed to set up and operate general-purpose equipment and to modify work methods to make a variety of products. Less efficient but more flexible material-handling methods, such as fork lifts and hand trucks, are required. • Work-in-process inventories are needed to keep the work centers operating during equipment setups, as well as to provide the scheduling flexibility needed to coordinate the variety of products and job processing times. • The large in-process inventories and flexible material-handling systems require more space than do flow processes. • Quality conformance is difficult because workers must be familiar with a

wider range of quality requirements, they perform more product changeovers, and they cannot spend as much time refining their work methods for any one product. • The variability in process sequencing, lot sizes, and processing times, as well as possible uncertainty about order receipts and due dates, make scheduling and coordinating jobs and equipment very complex. These factors, along with the large in-process inventories, result in long throughput times. • The variety of products and their processing requirements make it difficult to assign costs to each product, so it is more difficult to determine the profitability of individual products. • Much time is spent waiting for access to equipment; some equipment is overloaded while other equipments are idling, depending upon the mix of jobs at hand. • Speed of work is slow and unit costs are high. 3-Batch: Batch technology is a step up from job shop technology in terms of product standardization, but it is not as standardized as assembly line technology. • Within the wide range of products in the batch facility, several are demanded repeatedly and in large volumes. These few dominant products differentiate batch facilities from job shops. • Consequently, like job shops, batch facilities produce a wide variety of products in a wide variety of volumes. • The system must be flexible for the low-volume/high-variety products, but the higher volume products can be processed differently—for example, by producing some batches for stocking rather than for customer order. • Batch • Batch production processes are used for producing small lots of similar products.

The products are made in batches with short production runs, and the same sequence of operations is generally followed. Such processes usually differ

from mass (assembly) production in the materials used, machine setups, and layout. More labor skills are necessary to set up machines and perform a wider variety of tasks during production. These differences increase unit costs.

- Each batch contains identical items but every batch is different from the others.
- A fixed quantity or batch rather than continuous supply is required. A particular operation on a batch is performed by one group and then it is passed on to other groups for subsequent operations. Batch production is popular in bakeries and in the manufacture of shoes, pharmaceutical ingredients, inks, paints and adhesives.

• Batch – advantages

- Some degree of specialization is possible and capital investment is comparatively low.
- The batch method can be an advantage for businesses that produce a range of products. It is cheaper to produce a number of each item in one go because machines can be used more effectively, the materials can be bought in bulk and the workers can specialize in that task.
- It can reduce initial capital outlay because a single production line can be used to produce several products.
- Batch production can be useful for small businesses who cannot afford to run continuous production lines. Batch production is useful for a factory that makes seasonal items or products for which it is difficult to forecast demand

• Batch-disadvantages

- The main problem in batch production is the idle time between one operation and the other. The work has to wait until a particular operation is carried out on the whole batch (machines and workers may be idle while waiting for a whole batch to finish its previous operation)
- Work-in-progress inventory is high, and large storage space is required. (Money is tied up in work-in-progress since an order cannot be dispatched until the

whole batch has been completed) • Due to frequent changes in product design no standard sequence of operations can be used. • Machine set-ups and tooling arrangements have to be changed frequently.

Often machinery must be cleaned and adjusted and this takes time. • The workforce tends to be specialized so they may be less motivated as they have to repeat operations on every item in the batch so quality may be affected. • If batches are small then unit cost will remain relatively high. 4 – Assembly line: • Assembly line (or simply line or mass) technology is for facilities that produce a narrow range of standardized products. • Since the product designs are relatively stable, specialized equipment, human skills, and management systems can be developed and dedicated to the limited range of products and volumes. Beyond this range, the system is inflexible. •

Assembly-line