Introduction to Production and Operations Management

COMPLIED BY,

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Operation

- The action of functioning or the fact of being active or in effect.
- Performance of a practical work or of something involving the practical application of principles or processes.
- An exertion of power or influence.
- The quality or state of being functional or operative.

Production and Operation Management

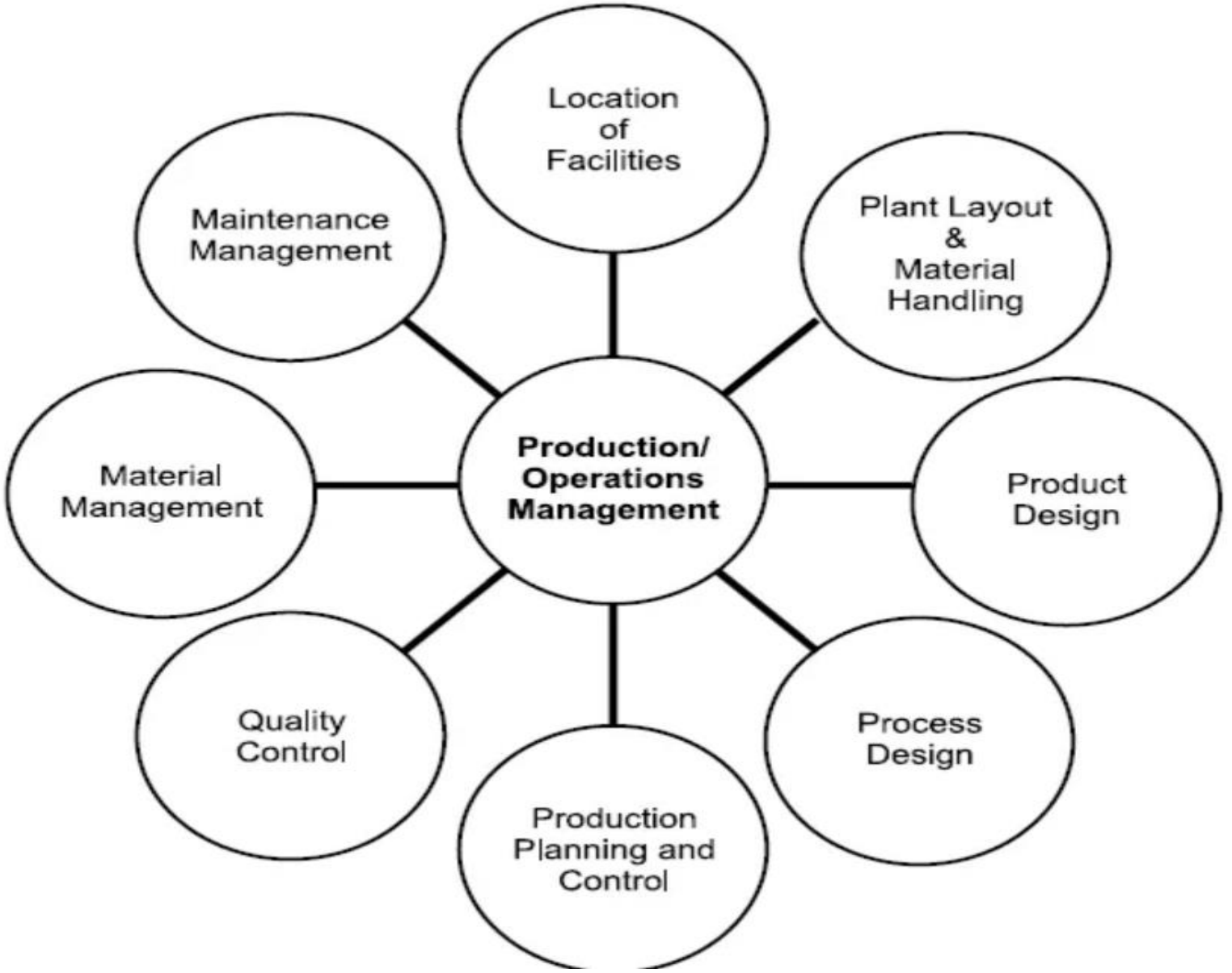
- Production is the creation of good and services.
- Production / Operations Management is defined as the process which transforms the inputs / resources of an organization into final goods (or services) through a set of defined, controlled and repeatable policies.
- Operations management is the set of activities that create value in the form of goods and services by transforming inputs into outputs.
- Production and Operations Management has a primary objective, which is to employ the company's resources to produce goods and services fit for the market.

Production and Operation Management

- **Operations management** is concerned with converting materials and labor into goods and services as efficiently as possible.
- The history of operations management can be traced back to the industrial revolution when production began to shift from small, local companies to large-scale production firms. One of the most significant contributions to operations management came in the early 20th century when Henry Ford pioneered the assembly line manufacturing process. This process drastically improved productivity and made automobiles affordable to the masses.
- The study of operations deals with how the goods and services that you buy and consume every day are produced.

What are Goods and Services

- A product is a tangible offering to a customer, whereas a service is an intangible offering. The former is usually a one-time exchange for value. In contrast, a service usually involves a longer period of time.
- The value of a product is inherent in the tangible offering itself, for example, in the can of paint or pair of pants. In contrast, the value of a service often comes from the eventual benefit that the customer perceives from the time while using the service.
- In addition, the customer often judges the value of a service based on the quality of the relationship between the provider and the customer while using the service.
- Services can have simultaneous production and consumption, are perishable (there is no inventory management), ownership and tangibility (it is difficult to evaluate). These features make operations management more of a challenge in services.


Location of Facilities
Maintenance Management
Plant Layout & Material Handling
Material Management
Production/ Operations Management
Product Design
Quality Control
Process Design
Production Planning and Control

Nature and Scope

- Operation Management is very critical in achieving the objective of the business.
- Operation Management helps in utilizing the resources at the optimum level.
- Operation Management aids in enhancing the productivity of the employees.
- Operation Management is vital for all types of business organization.

Production Function

A production function relates physical output of a production process to physical inputs or factors of production. It is a mathematical function that relates the maximum amount of output that can be obtained from a given number of inputs – generally capital and labor.

The production function, therefore, describes a boundary or frontier representing the limit of output obtainable from each feasible combination of inputs.

One very simple example of a production function might be Q=K+L, where Q is the quantity of output, K is the amount of capital, and L is the amount of labor used in production. This production function says that a firm can produce one unit of output for every unit of capital or labor it employs. From this production function we can see that this industry has constant returns to scale – that is, the amount of output will increase proportionally to any increase in the amount of inputs.

Definitions

"The production function is a technical or engineering relation between input and output. As long as the natural laws of technology remain unchanged, the production function remains unchanged."

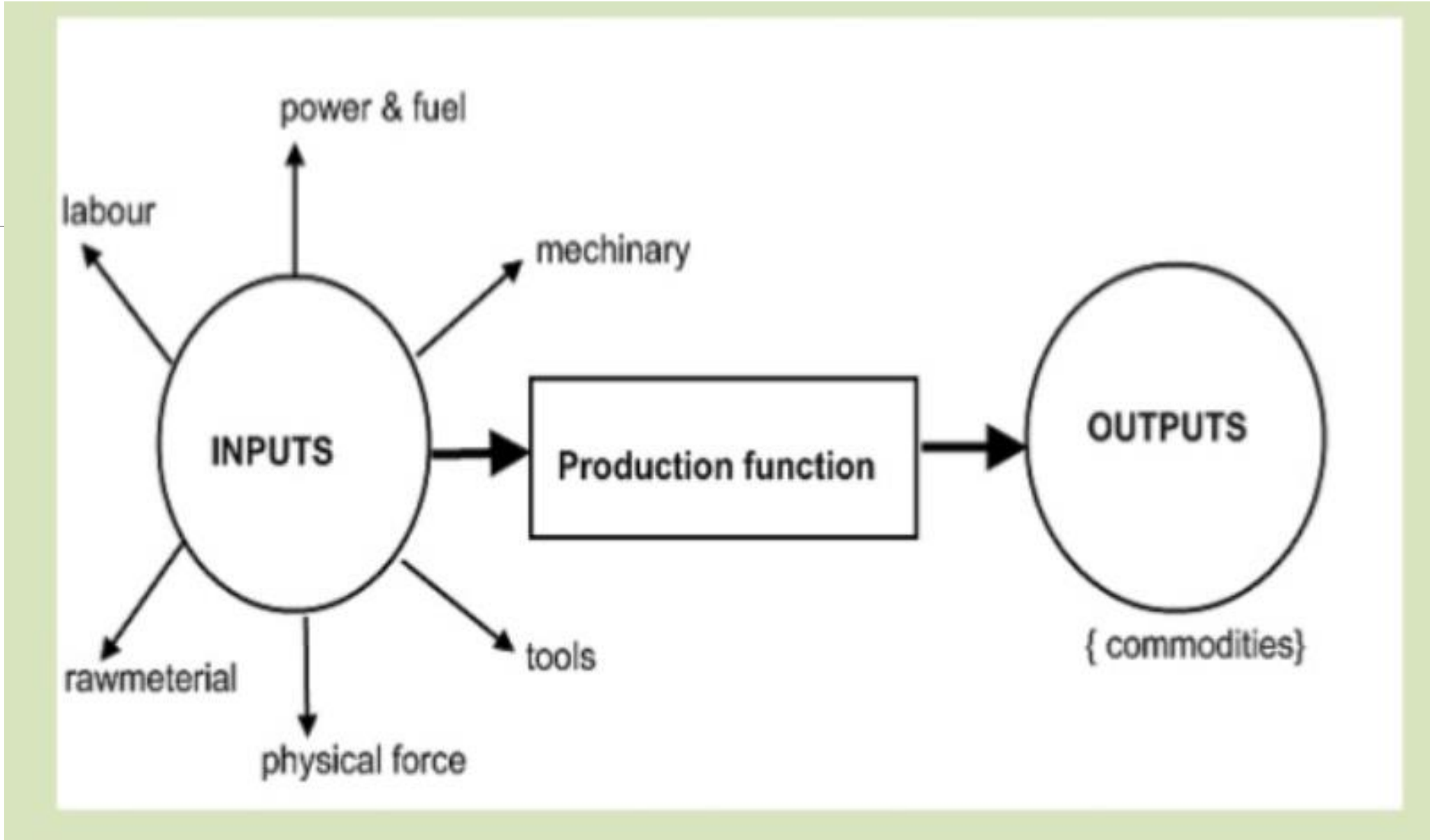
Prof. L.R. Klein

"Production function is the relationship between inputs of productive services per unit of time and outputs of product per unit of time."

Prof. George J. Stigler

Thus, from the above definitions, we can conclude that production function shows for a given state of technological knowledge, the relation between physical quantities of inputs and outputs achieved per period of time.

Production Functions


power & fuel
labour
mechinary
INPUTS
Production function
OUTPUTS
{ commodities}
rawmeterial
tools
physical force

Functions of Production Operations Manager

Operations managers are responsible for managing activities that are part of the production of goods and services.

Their direct responsibilities include managing both the operations process, embracing design, planning, control, performance improvement, and operations strategy.

Their indirect responsibilities include interacting with those managers in other functional areas within the organization whose roles have an impact on operations. Such areas include marketing, finance, accounting, personnel and engineering.

Operations Managers' Responsibilities

- ***Human Resource Management*** – the people employed by an organization either work directly to create a good or service or provide support to those who do. People and the way they are managed are a key resource of all organizations.
- ***Asset Management*** – an organization's buildings, facilities, equipment and stock are directly involved in or support the operations function.
- ***Cost Management*** – most of the costs of producing goods or services are directly related to the costs of acquiring resources, transforming them or delivering them to customers. For many organizations in the private sector, driving down costs through efficient operations management gives them a critical competitive edge. For organizations in the not-for-profit sector, the ability to manage costs is no less important.

What do Operations Manager do?

- They translate the strategic direction of an organization into operational action.
- They design the operation. This means not only the design of the products and services themselves, but the systems or processes which produce them.
- They plan and control the activities of the operation by deciding when and where activities will take place and detecting and responding to any deviation from the plans.
- They improve the performance of the operation with reference to its strategic objectives, through some combination of major and minor improvement activities.

Case - IKEA

https://digital.hbs.edu/platform-rctom/submission/ikea-worlds-most-successful-furniture-retailer/

Example 1

If an organization makes furniture, some of the operations management decisions involve the following:

- Purchasing wood and fabric,
- Hiring and training workers,
- Location and layout of the furniture factory,
- Purchase cutting tools and other fabrication equipment.

If the organization makes good operations decisions, it will be able to produce affordable, functional, and attractive furniture that customers will purchase at a price that will earn profits for the company.

Example 2

United Parcel Service (UPS), an international package delivery service, formed a partnership with its customer, Toshiba computers. Toshiba needs to provide a repair service to its laptop computer customers. The old approach of providing this service was cumbersome and time-consuming:

1. UPS picked up the customer computers.
2. UPS delivered the computers to Toshiba.
3. Toshiba repaired the computers.
4. UPS picked up the repaired computers and delivered them back to the customers.

Under this traditional approach, the total time to get a laptop computer repaired was two weeks—a long time for people to be without their laptop! Then they came up with an innovative idea for Toshiba to provide better service to its customers.

Example 2(Cont….)

UPS hired, trained, and certified its own employees to repair Toshiba laptop computers. The new repair process is much more efficient:

1. UPS picks up computers from Toshiba owners.
2. UPS repairs the computers.
3. UPS delivers the computers back to their owners.

The total time to get a computer repaired is now about two days.

Most Toshiba customers think that Toshiba is doing a great job of repairing their computers, when in fact Toshiba never touches the computers! The result of this operations innovation is better service to Toshiba customers and a strong and profitable strategic partnership between UPS and its customer, Toshiba.

Sony Corporation's Operations Management

http://panmore.com/sony-corporation-operations-management-10-decisions-productivity

Productivity

Productivity is a classic economic metric that measures the process of creating goods and services. ***Productivity is referred to as the process by which resources are optimized in order to achieve the desired outcomes.***

Productivity is the ratio of the amount of output from a team or organization per unit of input. Conceptually productivity is a simple metric.

In order to calculate the metric, you would simply sum up the number of units of item produced and divide it by the amount "stuff" needed to make those units.

For example, if a drain cleaning organization of three people cleans 50 drains per month, their labor productivity per month would be 50/3 = 16.6 drains per person. The metric is a sign of how efficiently a team or organization has organized and managed the piece of work being measured.

Types of Productivity

- Labor productivity
- Capital productivity
- Material productivity
- Total Factor productivity (TFP)

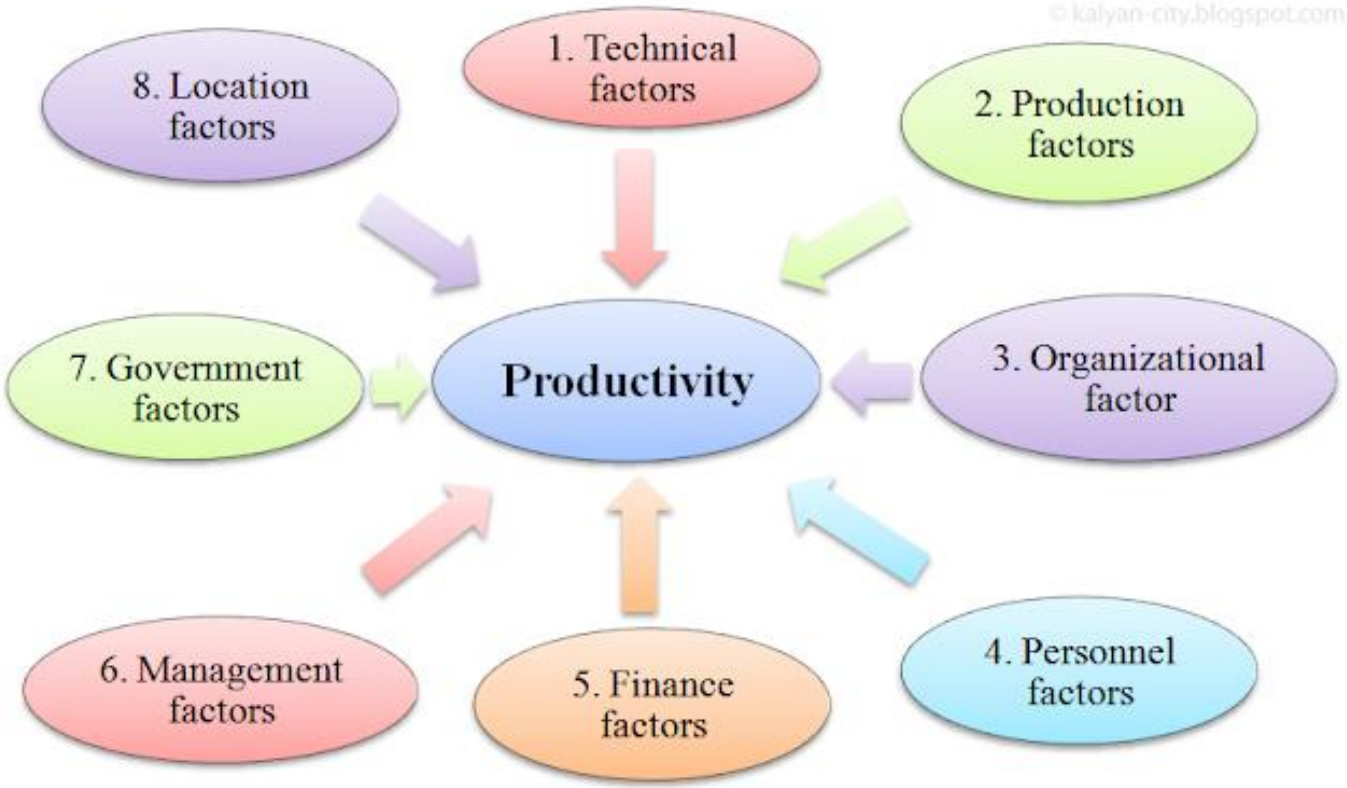
Types of Productivity

- **Labor productivity** is the ratio output per person. Labor productivity measures the efficiency of the labor in the transformation of something into a product of higher value. In software development terms, labor productivity is a measure of the efficient use of the effort needed to write and implement the code.
- **Capital productivity** is the ratio of output (goods or services) to the input of physical capital. Improving physical capital (known as capital deepening) typically yields an increase in output. In software development, physical capital includes the equipment, buildings or other items like computers needed to develop and implement the code.

Types of Productivity

- **Material productivity** is the ratio of output to the input of materials (also known as natural resources). In software development, there are very little material or natural resources that are used. Material productivity plays a larger role when considering the manufacture of hardware/software packages, such as an ATM.
- **Total Factor productivity (TFP)** is not a simple ratio of output to input, but rather it is a measure that captures everything that is not captured as labor, capital or material productivity. Factors included in total factor productivity include attributes like changes in general knowledge, the use of particular organizational structures, management techniques, or returns on the scale. The components in TFP are often the sources of productivity changes in software development.

Factors Affecting Productivity



Factors that affect or influence Productivity.

Methods of Improving Productivity

- Product Development
- Specialization and Standardization
- Market, consumer and Product Research
- Value Analysis
- Process Planning and Research
- Method Study
- Safety
- Operator Training
- Production planning and control
- Material Control

Standardized Service Strategy

Standardization is the process of creating protocols to guide the creation of a good or service based on the consensus of all the relevant parties in the industry. The standards ensure that goods or services produced in a specific industry come with consistent quality and are equivalent to other comparable products or services in the same industry.

The goal of standardization is to ensure uniformity to certain practices within the industry. Standardization focuses on the product creation process, operations of businesses, technology in use, and how specific compulsory processes are instituted or carried out.

One example of standardization is the ***Generally Accepted Accounting Principles (GAAP)*** that companies must follow when preparing or reporting their annual financial statements. They ensure uniformity in how financial reports are prepared and improve the clarity of the financial information presented to the public.

Standardized Service Strategy

Manufacturing would be unthink-able today without the advantages of standardization. Standardization facilitates production in many ways, and offers uniform evaluation criteria for suppliers that have a positive effect on business relationships. Standardization creates economic advantages by facilitating access to major regional and global markets. It also supports the purchasing decisions of customers.

Operational technology and innovation management in many sectors is today unthinkable without standardization.

Standardization aids the comparison of services and service providers, and additionally provides a basis for the evaluation of service quality. Furthermore, it encourages the efficient development and provision of services.

Businesses profit from standardized services because they lead to improved competitive ability that has a positive influence on business success. Customers and service recipients can take advantage of reduced risks, greater transparency, and the associated higher degree of comparability.

Assemble-to-Order

Assemble-to-order is a manufacturing strategy under which the manufacturer stocks up on sub-assembly parts and inventories and assembles the parts into the final product when a customer places an order. The strategy relies on the ability of the company to assemble and deliver goods quickly.

In an assemble-to-order strategy, the manufacturer forecasts orders for the goods based on historical data, macroeconomic trends, and the overall condition of the market. Based on the forecasts, the manufacturer orders and stocks up on sub-assembly parts of the finished goods.

A customer then places an order, which can be customizable since the good is not finished. Based on the specific order, the manufacturer assembles the sub-assembly parts into the finished product that is delivered to the customer.

Make-to-Order and Make-to-Stock

An assemble-to-order strategy is essentially a combination of the **make-to-order** and **make-to-stock** production strategies:

Make-to-order

The make-to-order strategy involves ordering parts and assembling them based on the specific orders placed by customers and takes a longer time to deliver the final good to the customer.

Make-to-stock

The make-to-stock strategy involves stocking up on inventory of the final good based on demand forecasts. However, the cost of holding large quantities of unsold inventory tends to be high – and so does the risk.

The assemble-to-order method combines the two strategies above to form a more efficient way to deliver customized goods, without incurring the extra costs of storing finished inventory.

Advantages and Disadvantages

Advantages

- Lower capital costs
- Customizability of orders
- Quick delivery times, even with customization

Disadvantages

- Unreliability of forecasts
- Management of sub-assembly parts
- Dependence on the quality of the final assembly

Examples of Assemble-to-Order Strategy

- Dell Technologies follows an assemble-to-order business model for personal computers and laptops, whereby they allow customers to choose from a range of options for each part of the PC, including CPUs, monitors, processors, and other software and hardware. Once the customer places the order, the PC is assembled and shipped for delivery.
- Now, moving to Subway, the sandwich store offers more choice to customers. Customers place orders by picking and choosing the ingredients they want. Salespersons standing behind the counter – and not kitchen staff behind the scenes – themselves assemble the sandwich in front of customers. For example, a customer Tom can order a Veggie Delite Sub and ask for double portions of all ingredients such as tomato, cucumber, onion, green peppers, olive, pickle and jalapenos. Whereas another customer Jane could order the same Veggie Delite Sub but opt for single portions of tomato, cucumber and green peppers and skip all the other ingredients.

Customized Service Strategy

Customization is done by the user. Users are asked to identify their preferences and they are then shown things that they prefer. For example, when customers sign up for Netflix, the service asks users to select a few shows they like and then displays a list of options based on those choices. Then, Netflix customizes the user's account based on the identified preferences.

On other platforms, another example of customization happens when you click the "hide ad" option for Facebook ads or Google Display Network ads.

Product customization is the key to serving your customer base successfully. Not all of your customers want the same thing or use your product the same way. Product customization is essential for delivering a personalized customer experience to each segment of users, and can drive customer loyalty and increase customer satisfaction.

Customization is a great business strategy because it makes customers happier; and happy customers are repeat customers!

Activity

Prepare strategies for:

- Customized Service
- Customized Products
- Assemble to Order
  - Make to Order
  - Make to Stock
- Standardized Service
- Standardized Products