BES 03A – Engineering Management

BES 03A – Engineering Management
First Edition, 2022

Learning Module Development Team

Assigned Chapter	Title	Author
Chapter 7:	Motivating	*Dionisio M. Martin Jr.*
Chapter 8:	Leading	
Chapter 9:	Controlling	
Chapter 10:	Managing Production and Service Operations	
Chapter 11:	Managing the Marketing Function	
Chapter 12:	Managing the Finance Function	

Evaluators:

(First Name, Middle Initial, Last Name), Position
(First Name, Middle Initial, Last Name), Position
(First Name, Middle Initial, Last Name), Position

Course Overview

Introduction

Engineering Management is a three-unit basic engineering science course, which discusses the principles of management in the field of engineering on how to prepare students to become successful engineer manager through decision-making, planning, organizing, staffing, communicating, leading, and controlling an organization as well as in managing production and service operations, marketing and finance functions.

This course of study is also intended to discuss the different cases covering the different engineering principles and functions. The engineering students would learn the process in dealing some problems in relation to the chosen field.

Course General Objectives

At the end of the semester, 85% of the students have attained 90% level of understanding for being aware in the computer engineering, locally and globally.

1. Understand the basic concepts of engineering management.
2. Apply the principles of engineering management to analyze case studies.
3. Understand the different management strategies/techniques and model and the issues involving in management.

Course Details:

- ***Course Code:*** *BES 03A*
- ***Course Title:*** *Engineering Management*
- ***No. of Units****: 3-unit lecture*
- ***Classification:*** *Lecture-based*
- ***Pre-requisite / Co-Requisite:*** *None*
- ***Semester and Academic Year:*** *2nd Semester, AY 2021-2022*
- ***Schedule:*** *BSCpE 2A – Tuesday and Thursday, 7:30AM-9:00 AM)*
- ***Name of Faculty:*** *Dionisio M. Martin Jr.*
- ***Contact Details***
  Email: dmmartinjr@prmsu.edu.com
  Mobile Number: 0939-906-0585
  FB Account: Dionisio Martin Jr.
- ***Consultation***
  Day: MWF
  Time: 2:00-3:00PM

Learning Management System

The University LMS will be used for asynchronous learning and assessment. The link and class

code for LMS will be provided at the start of class through the class' official Facebook Group.

- ***Edmodo***
- ***Google Classroom***
- ***University LMS***

Assessment with Rubrics

Students will be assessed in a regular basis thru quizzes, assignments, individual/group outputs using synchronous and/or asynchronous modalities or submission of SLM exercises. Rubrics are also provided for evaluation of individual/group outputs.

Major examinations will be given as scheduled. The scope and coverage of the examination will be based on the lessons/topics as plotted in the course syllabus.

Module Overview

Introduction

discusses the principles of management in the field of engineering on how to prepare students to become successful engineer manager through decision-making, planning, organizing, staffing, communicating, leading, and controlling an organization as well as in managing in different engineering functions.

Case studies are also included in every chapter to understand more the lesson have been learned through analyzing and application in different dilemma experienced in engineering management.

Topics also included the management function in production and service operations, marketing and finance functions are also given emphasis in this module.

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Engineering Management

Chapter 10

Managing Production and Service Operations

Chapter 10

Managing Production and Service Operations

Introduction

Systems for the production and delivery of goods and services have always been an essential part of civilization. In modern society, resources are limited. Efficient utilization of resources is necessary if we are to meet educational, health care, and other service and material needs and demands. The quality and cost of a product are determined largely by the effectiveness and efficiency of the operation system used to produce it.

Operation management is the planning, organizing, directing, and controlling of an organization's production/services system. Organizations are designed mainly to produce products and services. If these organizations must survive and grow, the operations functions must be undertaken in the most economical manner possible. As most companies are expected to make profits, any activity, including those for operations must be managed to contribute to the accomplishment of such objectives.

Specific Objectives

At the end of the lesson, the students should be able to:

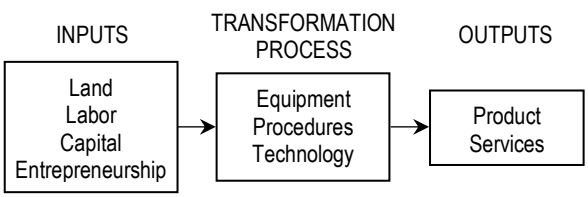
- define both the term production and service in management.
- enumerate the difference of production and service in managing different operation in an organization.
- enumerate the different types of transformation process in operation.
- construct an effective management in production and operation management.

Duration

Chapter 10: Managing Production and Service Operations = 3 hours
(2-hours discussion; 1-hour assessment)

Operation – is any process that accepts inputs and uses resources to change those inputs in useful ways. And inputs include land, labor, capital and entrepreneurship.

Operation Process



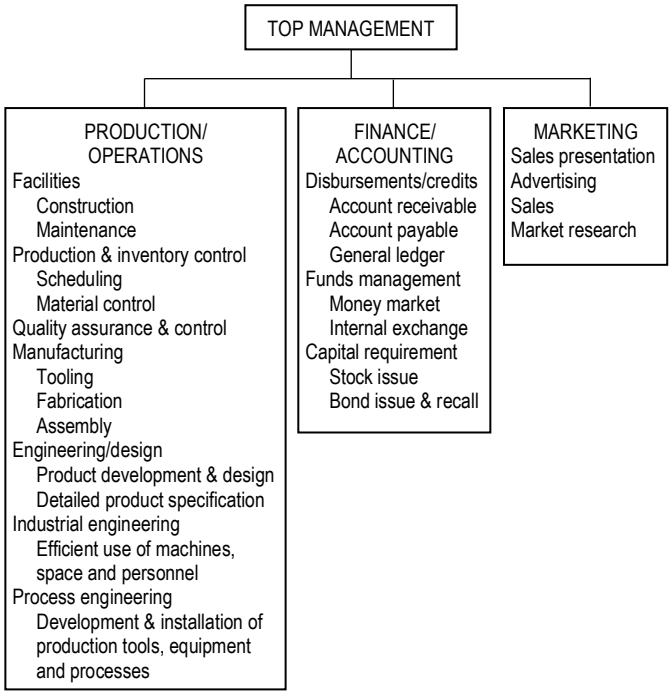
Operation Management – is any process of planning, organizing, and controlling operations to reach objectives efficiently and effectively.

Manufacturing Engineer – is a person who determines and defines the equipment, tools and processes required to convert the design of the desired product into reality in an efficient manner.

Operation Manager/Engineer – is an engineer in charge in the operations and is responsible for the actual operation of whatever has agreed to produce.

– is the person who find ways to contribute to the production of quality goods or services and the reduction of costs in his department.

Sample Organization Chart of a Manufacturing Firm

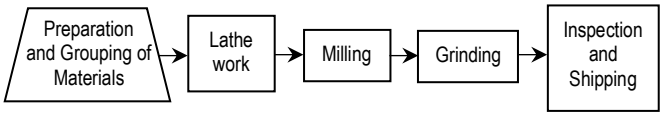


Types of Transformation Process

1. *Manufacturing processes* – refers to the making of products by hand or with machinery.
   a. *job shop* – is one whose production is based on sales orders for a variety of small lots.

      – produce custom products.

      – is one whose production is based on sales orders for a variety of small lots.



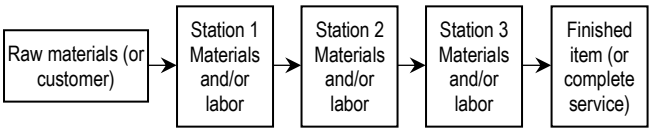
Process Flow Diagram of a Job Shop

   b. *batch flow* – is where lots of generally own designed products are manufactured. And is classified as follows:

- there us flexibility to produce either low or high volumes.
- not all procedures are performed on all products.
- the type of equipment used are mostly for general purpose.
- the process layout is used.
- the operation is labor intensive, although there is less machine idleness.
- the size of operation is generally medium-sized.

c. *worker-paced assembly line* – refers to a production layout arranged in a sequence to accommodate processing of large volumes of standardized products or services. It depends the quality and quantity to the skills of the labor utilized. And characterized as follows:

- the products manufactured are mostly standardized.
- there is a clear process pattern.
- specialized equipment is used.
- the size of operation is variable.
- the process is worker-paced.
- the type of layout used is the line flow.
- labor is still a big cost item.



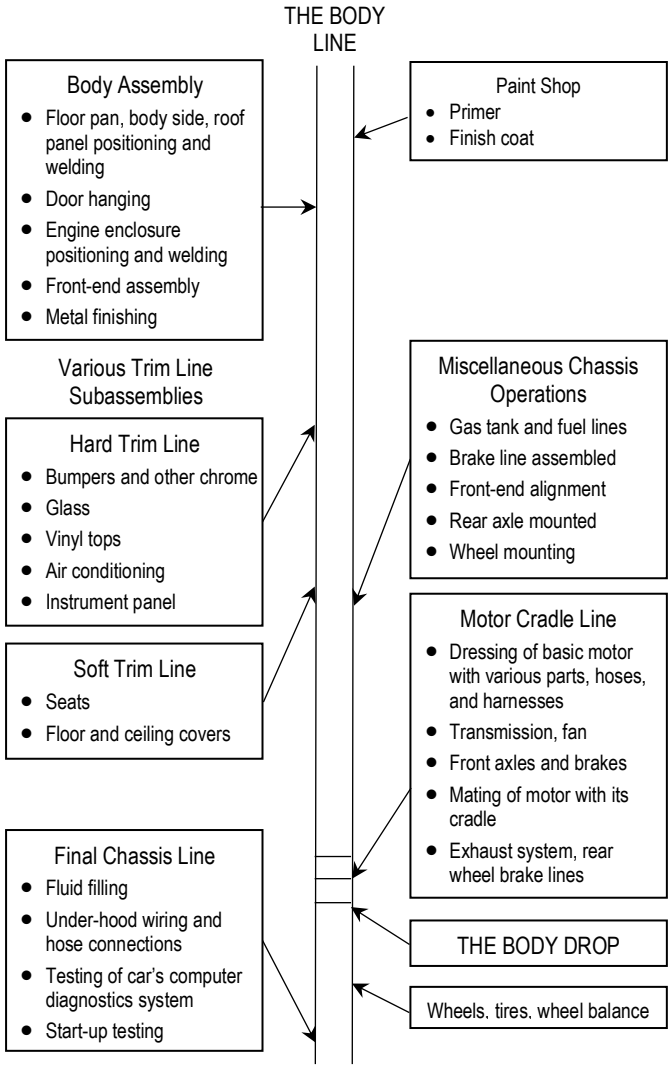
Assembly Line for Production or Service

d. *continuous flow* – is characterized by the rapid rate at which items move through the system. And it is characterized as follows:

- there us economy of scale in production, resulting to low per unit cost of production.
- the process is clear and very rigid.
- specialized equipment is used.
- the line flow layout is used.
- operations are highly capital intensive.
- the size of operations is very large.
- processing is fast.

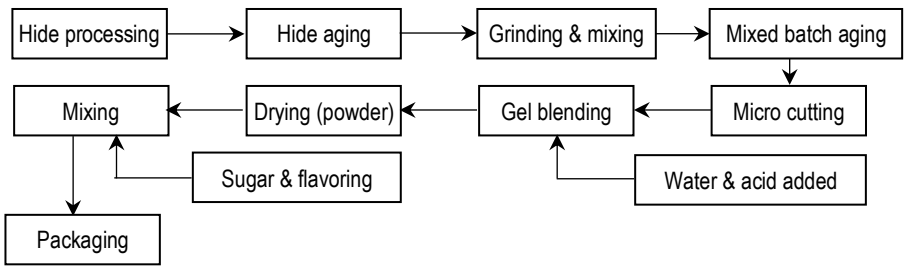
e. *machine-paced assembly line* – produces mostly standard products with machines playing a significant role. Among its features are as follows:

- the process is of clear, rigid pattern.
- specialized type of equipment is used.
- the line flow layout is used.
- capital equipment is a bigger cost item than labor.
- operation is large.
- the process is machine-paced.



Machine-Paced Assembly Line Process: Automobile Manufacturing

f. *batch/continuous flow hybrid* – is combination of the batch and the continuous flow. The typical size of operation is also very large giving opportunities for economies of scale.



A Simplified Production Process of a Gelatin Manufacturing Company using the Batch/Continuous Flow Hybrid

2. *Service processes* – refer to the provision of services to persons by hand or with machinery.
    a. *service factory* – offers limited mix of services which results to some economies of scale in operations. This also affords the company to compete in terms of price and speed of producing the service.
    b. *service shop* – provides a diverse mix of services. The layout used are those for job shops or fixed position and are adaptable to various requirements.
    c. *mass service* – provides services to a large number of people simultaneously. A unique processing method necessary to satisfy this requirement. The process layout used is typically fixed position where customers move through the layout.
    d. *professional service* – provides specialized services to other firms or individuals.

Important Parts of Productive Systems

1. *Product design* – refers to the process of creating a set of product specifications appropriate to the demands of the situation.
2. Production planning and scheduling
    a. *Production planning* – a forecasting the future sales of a given product, translating this forecast into the demand it generates for various production facilities and arranging for the procurement of these facilities.
    b. *Production scheduling* – is the phase of production control involved in developing timetables that specify how long each operation in the production process.
3. *Purchasing and materials management* – refers to the approach that seeks efficiency of operation through integration of all materials acquisition, movement, and storage activities on the firm.
4. *Inventory control* – is the process of establishing and maintaining appropriate levels of reserve stocks of goods. The proper inventory controls are the following:
    - determining reorder point and reorder quantity
    - determining economic order quantity
    - the use of just-in-time (JIT) method of inventory control
    - the use of the material requirement planning (MRP) method of planning and controlling inventories
5. *Work flow layout* – is the process of determining the physical arrangement of the production system. A good work-flow layout will have the following benefits:
    - minimize investment in equipment
    - minimize overall production time
    - use existing space most effectively
    - provide for employee convenience, safety and comfort
    - maintain flexibility of arrangement and operation
    - minimize material handling cost
    - minimize variation in types of material-handling equipment
    - facilitate the manufacturing (or service) process
    - facilitate the organizational structure

6. *Quality control* – refers to the measurement of products or services against standards set by the company.

References/Additional Resources/Readings

Medina, Roberto G. (2016). Engineering Management. Rex Book Store, Inc., Manila, Philippines.

Stoner, J.A. et.al. (1987). Management, 3rd Edition. Prentice-Hall, Inc.

Wheeler, Thomas F (1990). Computer and Engineering Management, McGraw-Hill.

Activity Sheet

ACTIVITY 10

Name: _____Course/Year/Section: _____ Score: _____

CASE STUDY 10: GE Turns Old into New Kentucky

"In this plant," says Ray Rissier, "we have proved that it is possible to take a 30-year-old facility and transform it into a competitive new unit; and we have also shown that you can take a labor force with a strong union that resisted change and convince it that change is necessary."

Rissier is manager of the modernization project at General Electric's dishwasher plant in Louisville, Kentucky. All around him, one of the showpieces of modern-day U.S. factory engineering is humming away to the smooth rhythms of a largely automated production line. It is a rhythm that is currently tapping out dollars in abundance for GE, as the combination of increased market share and an expanding domestic economy bring back memories of the industry's peak year in 1973.

Like several other U.S. factories that have recently arisen on the foundations of the mature old manufacturing industries, the plant represents a renaissance in U.S. methods and productivity. Its startup has been accompanied by a quantum leap in productivity and what amount s to a revolution in quality. With the same number of workers as before the changeover, the plant now produces 25 percent more units in a year, giving GE about 30 percent of the market. As far as quality is concerned, Rissier says the plant has delivered virtually a tenfold improvement as measured by customer complaints in the first year of warranty.

The chance in the plant goes back to 1979, when GE, faced with intense pressure on profit margins generally in household appliances, was asking itself if it wanted to continue at all in that sector. Unlike Westinghouse, however, GE decided to stay. "Our name on household appliances is a pervasive reminder of the company in virtually every household in America," says Rissier. GE also saw that to survive as an effective force it had to improve both quality and productivity. These objectives were partly prompted by the market environment, which had become steadily tougher. But they also derived indirectly from the threat of Japanese competition. The market had been educated by Japanese products to demand better quality; and GE had good reason to believe that after the highly successful foray of the Japanese electrical companies into television and audio, they were lining up kitchen products as well.

Because the dishwasher division is a relatively small one, it was able to go for a radical – and risky – method of reorganizing, involving the production, workers in the design of the product line and the production process. The reorganization got off to a good start when the normally militant work force came into the discussions early and threw its weight behind the plan. The project has thus been much less bothered by disputes than others in the past – strikes at the entire Louisville complex, which embraces a variety of products, have fallen from 400,000 people-hours a year to less than 50,000.

On the production side, engineers solved a problem that had baffled them for two decades. Because of the large range of machines manufactured by the company, the assembly process was necessarily complex and required a degree of dexterity apparently beyond the reach of

automation. The solution occurred in a flash one day when a GE team was visiting a plant in Japan and noticed that all the manufacturing processes that introduced elements – usually decorative trim and electronic controls – to differentiate products from one another had been pushed to the end of the line. Using this principle, GE was able to go back and redesign the entire plant and the whole product range so that only in the last few steps is individualized assembly needed on each washer.

The revamp was helped by the use of a GE-developed weight-bearing plastic, Permatuf, that virtually did away with steel and porcelain in the construction of the central washing tub and provided the base for the new dishwasher design. It also created a concept around which to organize the plant, since it led the GE engineers toward standardization of the basic washtub. By simplifying the design at this point, the company was able to automate a major part of the manufacturing process.

As a result, manufacturing has been enormously accelerated. The tubs are manufactured at the beginning of the three-mile-long production line, then meander around the plant of robotized assembly lines to emerge as finished machines on an average of 18 hours. Before the change, the machines were much heavier, were made of more parts, and took six days to make. In addition, virtually all plastic and metal parts are now made at the point of use, reducing inventory costs despite the higher rate of output.

GE uses a variety of computerized optical devices, including laser bar-code readers, to track units on the production line and automatically divert washers in need of repair or testing to a special holding area. An optical alignment system installs the dishwasher doors to tolerances of a few thousandths of an inch.

GE admits that the impressive results of these changes have not been exposed to the criteria of Japanese competition, now regarded as the iron test of U.S. technology. But GE's next step will be a million-dollar investment in the refrigeration business, where its ability will be directly measured against the Japanese. Sanyo has established a plant in California, and GE believes that the Japanese company has sufficient experience in the Japanese refrigerator market to make it a tough competitor. "In dishwashers we did what we had to do to remain ahead even though we did not absolutely need to do it," says Roger Schipke, senior vice-president. "But in refrigerators we know that we have to be competitive on a world-class basis because the Japanese competitors market their products worldwide. We believe at the moment that we can go into the lead."

Source: Terry Dodsworth, "Turning the Old into the Dynamic New," Financial Times, September 1984.

Questions:

1. Why did GE revamp its dishwasher plant?
2. What changes were made, and how did they increase productivity?
3. How has Japanese competition influenced GE's operations strategy in household appliances?
4. In your opinion, are foreign-made goods of higher quality than American-made goods? Support your opinion with specific examples.

Assignment

ASSIGNMENT 10

Name: _____Course/Year/Section: _____ Score: _____

Direction: Write your answer clear and concise.

1. What is meant by “operation”? Does the term cover the production of farm products?

2. Why is operation management an important activity? Who are qualified to become operations managers?

3. What is a service factory? Give an example.

4. What is the batch flow process? What possible advantages does it offer?

5. Why is the machine-paced assembly line very popular among large corporation?

Assessment (Rubrics)

Each question will be graded based on these five (5) points rubrics.

LEVEL	DESCRIPTION
5 - Outstanding	Well written and very organized. Excellent grammar mechanics. Clear and concise statements. Excellent effort and presentation with detail. Demonstrates a thorough understanding of the topic.
4 - Good	Writes fairly clear. Good grammar mechanics. Good presentation and organization. Sufficient effort and detail.
3 - Fair	Minimal effort. Minimal grammar mechanics. Fair presentation. Few supporting details
2 - Poor	Somewhat unclear. Shows little effort. Poor grammar mechanics. Confusing and choppy, incomplete sentences. No organization of thoughts.
1 - Very Poor	Very poor grammar mechanics. Very unclear. Does not address topic. Limited attempt.

Learner's Feedback Form

Name of Student: _____
Program : _____
Year Level : _____ Section: _____
Faculty : _____
Schedule : _____

Learning Module : Number: _____ Title : _____

How do you feel about the topic or concept presented?

☐ I completely get it. ☐ I'm struggling.
☐ I've almost got it. ☐ I'm lost.

In what particular portion of this learning packet, you feel that you are struggling or lost?

_____
_____
_____

Did you raise your concern to you instructor? ☐ Yes ☐ No

If Yes, what did he/she do to help you?

_____
_____
_____

If No, state your reason?

_____
_____
_____

To further improve this learning packet, what part do you think should be enhanced?

_____
_____
_____

How do you want it to be enhanced?

_____
_____
_____

NOTE: This is an essential part of course module. This must be submitted to the subject teacher (within the 1st week of the class).