

CHUKA**UNIVERSITY****UNIVERSITY EXAMINATIONS****FIRST YEAR EXAMINATION FOR THE AWARD OF MASTER OF SCIENCE
IN PROCUREMENT AND LOGISTICS****MPLM 821: PRODUCTION AND OPERATIONS MANAGEMENT****STREAMS: MPLM Y1S1****TIME: 3 HOURS****DAY/DATE: WEDNESDAY 12/4/2023****2.30 P.M. – 5.30 P.M.****INSTRUCTIONS :** Answer question ONE (COMPULSORY) and any other THREE questions**QUESTION ONE**

Read the case study below then answer the questions that follow

The Boeing Company, headquartered in Chicago, Illinois, is one of the two major producers of aircraft in the global market. The other major producer is European Airbus. Boeing produces three models in Everett, Washington : 747s, 767s and 777s. The planes are all produced in the same building. At any one time, there may be as many as six planes in various stages of production. Obviously the building has to be fairly large to accommodate such a huge undertaking. The windowless building has six huge doors along one side, each about 100yards wide and 40 yards high, large enough to allow a completed airplane to pass through. Boeing sells air planes to air lines and countries around the globe. There isn't a set price for the planes ; the actual price depends on what features the customer wants. Once the details have been settled and an order submitted, the customer requirements are sent to the design department. Design Designers formerly had to construct a mock-up to determine the exact dimension of the plane and to identify any assembly problems that might occur. That required time, materials, labor, and space. Now they use computers (CAD) to design air planes, avoiding the cost of the mock-ups and shortening the development time. The Production Process Once designs have been completed and approved by the customer, production of the plane is scheduled, and parts

and materials are ordered. Parts come to the plant by rail, airplane and truck, and are delivered to the major assembly area of the plane they will be used for.

The parts are scheduled so they arrive at the plant just prior to when they will be used in assembly, and immediately moved to storage areas close to where they will be used. Time-phasing shipments to arrive as parts are needed helps to keep inventory investment low and avoids having to devote space to store parts that won't be used immediately. There is a tradeoff, though, because if any parts are missing or damaged and have to be reordered, that could cause production delays. When missing or defective parts are discovered, they are assigned priorities according to how critical the part is in terms of disruption of the flow of work. The parts with the highest priorities are assigned to expeditors who determine the best way to replace the part. The expeditors keep track of the progress of the parts and deliver them to the appropriate location as soon as they arrive. In the meantime, a portion of the work remains unfinished awaiting the replacement parts, and workers complete other portions of the assembly. If the supplier is unable to replace the part in a time frame that will not seriously delay assembly, as a last resort, Boeing has a machine shop that can make the necessary part. The partially assembled portions of the plane, and in later stages, the plane itself, move from station as the work progresses staying about five days at each station.

Giant overhead cranes are used to move large sections from one station to the next, although once the wheel assemblies have been installed, the plane is towed to the remaining stations. Finished planes are painted in one of two separate buildings. Painting usually adds 400 to 600 pounds to the weight of a plane. The painting process involves giving the airplane a negative charge and the paint a positive charge so that the paint will be attracted to the airplane. Testing and Quality Control Boeing has extensive quality control measures in place throughout the entire design and production process. Not only are there quality inspectors, individual employees inspect their own work and the work previously done by others on the plane. Buyers' inspectors also check on the quality of the work. There are 60 test pilots who fly the planes. Formerly planes were tested to evaluate their flight worthiness in a wind tunnel, which required expensive testing and added considerably to product development time. Now new designs are tested using a computerized wind tunnel before production even begins, greatly reducing both time and cost. And in case you're wondering, the wings are fairly flexible ; a

typical wing can flap by as much as 22 feet before it will fracture. Re-engineering Boeing is re-engineering its business systems. A top priority is to upgrade its computer systems. This will provide better links to suppliers, provide more up-to-date information for materials management, and enable company representatives who are at customer sites to create a customized aircraft design on their laptop computer. Another aspect of the re-engineering involves a shift to lean production. Key goals are to reduce production time and reduce inventory.

Boeing wants to reduce the time that a plane spends at each workstation from 5 days to 3 days, a reduction of 40 percent. Not only will that mean that customers can get their planes much sooner, it will also reduce labor costs and inventory costs, and improve cash flow. One part of this will be accomplished by moving toward late-stage customization, or delayed differentiation. That would mean standardizing the assembly of planes as long as possible before adding custom features. This, and other time-saving steps, will speed up production considerably, giving it a major competitive advantage. It also wants to reduce the tremendous amount of inventory it carries (a 747 jumbo jet has about 6 million parts, including 3million rivets) One part of the plan is to have suppliers do more pre-delivery work by assembling the parts into kits that are delivered directly to the staging area where they will be installed on the aircraft instead of delivering separate parts to inventory. That would cut down on inventory carrying costs and save time. Boeing is also hoping to reduce the number of suppliers it has, and to establish better links and cooperation from suppliers. Currently Boeing has about 3,500 suppliers. Compare that with GM's roughly 2,500 suppliers, and you get an idea of how large this number is.

Questions :

- (i). Analyze Boeing strategy in the location selection and layout of the venue where the airplanes are manufactured.
(10 marks)
- (ii).What type of inventory management does Boeing embrace ? How dose Boeing manage its inventory ? Why is it important to manage inventory ? (10 marks)
- (iii).Describe and critique the company's strategy to overcome delays in manufacturing. (5 marks)
- (iv). What other strategies Boeing is planning to implement to cut cycle times ? (5 marks)

QUESTION TWO

- i) A Company's competitiveness will be affected by its location as it will impact on costs such as for transportation and labour. Assume that Tharaka Nithi County wants to set up soya milk processing plant. Advise on any three types of facility layouts likely to be adopted by the county. (6 marks)
- ii) Discuss any four factors to be considered in selecting the facility location. (8 marks)
- iii) Using well-articulated examples describe any three methods for product design (6 marks)

QUESTION THREE

- i) The total quality management, just in time and computer integrated manufacturing are the core modules of world class manufacturing that can be adapted to any specific manufacturing industry or enterprise. Using well explained examples elucidate the above statement. (12 marks)
- ii) Goods and services share many similarities. They are driven customers and provide value and satisfaction among customers. Describe four major differences between goods and services. (8 marks)

QUESTION FOUR

- i) New product design can provide a competitive advantage by bringing new ideas to the market quickly and satisfying customer needs. In light of the above discuss idea generation. (8 marks)
- ii) ISO 8402 states that quality is the totality of features and characteristics of the product that bears the ability to satisfy stated or implied needs. Garvin identified five approaches and eight dimensions of quality. Elaborate the statement supporting your argument with relevant examples. (12 marks)

QUESTION FIVE

- i) Stores play a vital role in the operations of company. It is in direct touch with the user departments in its day-to-day activities. Discuss atleast FIVE functions of stores. (10 marks)

- ii) Capacity planning is concerned with defining the long-term and the short-term capacity needs of an organization and determining how those needs will be satisfied. Describe FIVE reasons why capacity planning decisions are important. (10 marks)
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