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2201N1633

Candidate's Seat No :_____

MBA 2 Sem.-3 & 5 Examination

Operation

TQM

January-2024

Time : 2-30 Hours] **[Max. Marks : 70**

Q.1 (A) Write a note on Principles of deeming philosophy. (10)

Q.1 (B) Write a note on Four stages of TQM. (4)

Q.2 (A) Write a note on Juran Triology. (8)

Q.2 (B) Write a note on Servqual Model. (6)

OR

Q.2 (A)

Write a note on following

(i) 5 S Model of Kaizen (6)

(ii) Gemba Kaizen (4)

Q.2 (B) Write a note on Q vs q. (4)

Q.3 (A) (14)

Absolute Singapore Pte Ltd. (ASPL) manufactures electronic components for washing machines in an assembly line. Recent market survey reports indicate erosion of its clientele. Feedback taken from customers suggest that the company's products were not of good quality. ASPL is concerned because its competitors have been able to achieve zero defect performance in terms of nil sale returns on account of quality and nil subsequent warranty cost. Therefore, the competitors enjoy huge customer loyalty.

To satisfy its customers, the company ASPL wants to improve its product quality. Consequently, it has decided to undertake Six Sigma study of its operations.

Below is the additional information given about ASPL's operations:

Yearly sales of electronic components are 25,000 units at Rs. 20,000 each. Of these, 1% sales are returned due to quality issues. These are scrapped and a replacement is made by the company. In addition, each product is under warranty for one year after sale. If a claim is accepted under warranty, service and replacement of parts is done free of cost. Current yearly warranty claims (these are separate from sales returns), which is also representative of the average yearly warranty claims, amount to Rs. 30,00,000 per

P.T.O.

annum.

Quality control check and inspection is carried out directly at the assembly line. There is no quality check done at any other point in the entire work flow. Total time spent on inspection is 2,000 hours in a year which costs the company`10,00,000 per annum. Inspection leads to 10% rejection i.e. 2,525 units. These units require only one cycle of rework, after which they are ready for sale. Rate of rework in the units rejected on inspection at the assembly line is 5 units in 1 hour. Cost of rework is Rs. 6,250 per hour. The variable cost of electronic component is Rs.12,500.

The Six Sigma team as part of its study found that rework on products was mainly due to the following reasons:

(1) Assembly line workers, including new hires, learnt on the job as to how to assemble the input material to produce the final electronic component. This lead to many errors due to lack of proper standardized training. Therefore, on account of these errors, the entire electronic component has to assembled again.

(2) Sub-standard quality of raw material is detected on inspection only at the assembly line. By this time, the defective material is already fitted into the final electronic component. Therefore, entire component has to be reworked upon to replace the defective raw material input.

Machines are outdated and are not entirely suitable for the current production methodology.

Proposed solutions to tackle these issues are as follows:

(1) Provide training to assembly line workers to train them on the production methodology. This training is expected to standardize work flow, thereby reducing errors. Such training programs will be held regularly to update the workers on new methodologies. These programs can also serve as employee feedback sessions about the actual working conditions at the assembly line. This two-way communication can improve and streamline the production process. Brainstorming can help detect or give heads up about potential problems in the production process. Total training hours in a year are expected to be 5,000 hours, costing Rs. 1,000 each hour.

(2) Currently poor quality of raw material input is detected only on inspection at the assembly line. This results in wastage of resources in terms of material, time and capacity. In addition to the existing inspection at the assembly line, a new functional area for quality planning and improvement is proposed to be set up. At the time of procurement, the department will determine the appropriate quality of raw material input, ensure that suppliers supply material as per these requirements as well as suggest alternatives that can help improve product quality. By ensuring quality of raw materials at the beginning of the production process, wastage of resources is reduced, if not can be eliminated. Cost of setting up such a facility will be Rs.1,50,00,000. In addition to this facility, inspection will continue at the

assembly line. This ensures complete quality check during the entire production cycle. At the same time, due to the introduction of this new functionality for quality control, the pressure on resources for inspection at the assembly line would reduce.

(3) Current machines should be replaced entirely with new machines. Old machines can be sold for negligible amount as scrap. New machines would cost Rs.3,60,00,000 having a life of three years.

Implementation of the above three solutions can have the following impact:

- Rework of products can be entirely eliminated.
- Sale returns will reduce from 1% to 0% due to better quality of products.
- Yearly warranty claims will reduce from Rs. 30,00,000 to nil per annum.
- With the introduction of the new facility, time required for inspection at the assembly line would reduce from 2,000 hours to 1,200 hours. Cost of inspection to do quality check at the assembly line would reduce from Rs.10,00,000 per annum to Rs.600,000 per annum.
- Due to better quality, ASPL can build better reputation with the customers which can further yield additional sales of 5,000 units per year.

- **You are the Consultant at ASPL. As part of the Six Sigma project implementation team, you are requested to EVALUATE proposals suggested by the Six Sigma team. The team has used the DMAIC technique to assess quality improvements.**
- **Consider cost of quality measurement too for evaluation**

OR

Q.3 (A) What is TPM ? also solve following.

KIWI Ltd. manufactures spare parts and can be called "high volume based" manufacturing environment. The company is using the system of TPM for maintaining and improving the integrity of manufacturing process. There are several different automated manufacturing machines located in the plant, through which manufacturing of spare parts are done and supplied to cater the demand in the market.A 12- hour shift is scheduled to produce a spare part in KIWI Ltd. as shown in the schedule below. The shift has three 15- minute breaks and a 10- minute clean up period.

Production Schedule for Automated machine NZ 10:

Cycle: 10 (seconds),

Spare parts Manufactured: 3,360,

SCRAP: 75,

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Unplanned Downtime: 36 minutes

Required :

CALCULATE OEE (Overall Equipment Effectiveness) and comment on it.

Q.3 (B) The following data give the measurement of axles of bicycle wheels. 12 samples were taken so that each samples contains the measurement of 4 axles. The measurements which were more than 5 inches are given here. Obtain trial Control limits for X Bar and R Charts and comment whether the process is under control or not.

Sample 1	139	140	145	144
Sample 2	140	142	142	139
Sample 3	142	136	143	141
Sample 4	136	137	142	142
Sample 5	145	146	146	146
Sample 6	146	148	149	144
Sample 7	148	145	146	146
Sample 8	145	147	146	144
Sample 9	140	139	141	138
Sample 10	140	140	139	139
Sample 11	141	137	142	139
Sample 12	138	140	144	138

n = 4, A2 = 0.73 , D3= 0 , D4 = 2.28

Q.4) (A)Write a note on benchmarking and reasons for Benchmarking. (7)

Q.4 (B) Write a note on FMEA and Stages of FMEA (Failure mode and effect analysis) (7)

OR

Q.4 (B)Write a note on Business Process Re-engineering. (7)

Q.5) Write a note on following. (Any 3) (14)

(i) Quality Audit

(ii) ISO 9000

(iii)ISO 14000

(iv)ISO 27001

(v)Quality function deployment

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