

Operations management review questions

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



Question # 1 [15 Marks] Bob Richards, the production manager of Zychol Chemicals, is preparing his quarterly report, which is to include a productivity analysis for his department. One of the inputs is production data prepared by Sharon Walford, his operation analyst. The report, which she gave him this morning, showed the following.

-	2011	2012
Production (units)	4, 500	6, 000
The raw material used (barrel of petroleum by-products)	700	900
Labor hour	22, 000	28, 000
Capital cost applied to the department (\$)	375, 000	620, 000

Bob new his labor cost per hour has increased from an average of \$13 per hour to an average of \$14 per hour, primarily due to a move by management to become more competitive with a new company that had just opened a plant in the area. He also knew that his average cost per barrel of the raw material had increased from \$320 to \$360. He was concerned about the accounting procedures that increased his capital cost from \$375, 000 to \$620, 000, but earlier discussions with his boss suggested that there was nothing that could be done about the allocation. Bob wondered if his productivity had increased at all.

He called Sharon into the office and conveyed the above information to her and asked her to prepare this part of the report. Discussion Question:

1. Prepare the productivity part of the report for Mr. Richards. He probably expects some analysis of productivity inputs for all factors, as well as a multifactor analysis for both years with the change in productivity (up or down) and the amount noted.
2. Assume additional information related to the cost of production was available. The cost per unit for 2011 was \$120 and for 2012 was \$125. Considering the increase in the cost is there a change in multifactor productivity growth?

Solution Q1:

Question # 2 [15 Marks] Forecasts based on average. Given the following data: (Stevenson page 96)

Period	Number of Complaints
1	60
2	65
3	55
4	58
5	64

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Prepare a forecast using each of these approaches:

1. The appropriate naive approach. [2 marks]
2. A three-period moving average. [3 marks]
3. A weighted average using the weight of 0. (most recent), 0. 3 and 0. 2. [4 marks]
4. Exponential smoothing with a smoothing constant of 0. 4. [6 marks]

Solution Q2:

Question # 3 [15 Marks] Using seasonal relatives, Apple's Citrus Fruit Farm ships boxed fruit anywhere in the Middle East. Using the following information, forecast shipments for the first four months of next year.

Period	Number of Complaints
1	60
2	65
3	55
4	58
5	64

The monthly equation being used is $Y_t = 402 + 3t$ Where $t = 0$ corresponds to January of two years ago $Y_t =$ Number of boxes of fruits expected to ship in month t .

Solution Q3:

Question # 4 [15 Marks] Consider the following two techniques for forecasting F1 and F2. The actual and the two sets of the forecast are as follows

Period	Demand	F1	F2
1	68	66	66
2	75	68	68
3	70	72	70
4	74	71	72
5	69	72	74
6	72	70	76
7	80	71	78

1. Calculate the MAD, for each set of the forecast. Given your results, which technique appears to be more accurate? Explain

2. Calculate the MSE, for each set of the forecast. Given your results, which technique appears to be more accurate?
3. Calculate the MAPE, for each set of the forecast. Given your results, which technique appears to be more accurate?

Solution Q4:

Question # 5 [10 Marks] Rick Wing, a salesperson for Wave Soldering Systems, Inc. (WSSI), has provided you with a proposal for improving the temperature control on your present machine. The machine uses a hot-air knife to cleanly remove excess solder from printed circuit boards; this is a great concept, but the hot-air temperature control lacks reliability. According to Wing, engineers at WSSI have improved the reliability of the critical temperature controls. The new system still has the four sensitive integrated circuits controlling the temperature, but the new machine has a backup for each. The four integrated circuits have reliabilities of 0.90, 0.92, 0.94, and 0.96. The four backup circuits all have reliability of 0.90.

1. What is the reliability of the new temperature controller?
2. If you pay a premium, Wing says he can improve all four of the backup units to 0.93. What is the reliability of this option?

Solution Q5:

Question # 6 [15 Marks] A weather satellite has an expected life of 16 years from the time it is placed into the earth's orbit. Determine its probability of failure after each of the following lengths of service. (Assume Exponential distribution is appropriate.) [2.5 marks each a, b, c, and d]

1. More than 9 years

2. Less than 12 years
3. More than 9 years but less than 12 years
4. At least 21 years

Solution Q6:

Question # 7 [15 Marks] An office manager has received a report from a consultant that includes a section on equipment replacement. The report indicates the scanners have a service life-time that is Normally distributed with a mean of 41 months and a standard deviation of 4 months. On the basis of this information, determine the percentage of scanners that can be expected to fail in the following time periods.

1. Before 38 months of service
2. Between 40 and 45 months of service
3. Within 2 months of the mean life

Solution Q7: