

Chapter 8:

QuickTronics Production Planning

QuickTronics set up a large assembly factory in Batam, Indonesia, that focused on the assembly of smartphones. The Indonesian government had offered incentives leading many manufacturers to locate their factories in Batam. Many component suppliers were located close to the QuickTronics plant and sent small batches to the factory on a regular basis. Assembled phones were stored in a warehouse from where they were shipped in response to customer orders from Asia, Europe, and America. The supply chain team at QuickTronics had worked with its customers to develop a monthly forecast of demand, as shown in [Table 8-13](#). Demand for smartphones peaked in the fourth quarter of the year.

TABLE 8-13 DEMAND FORECAST FOR SMARTPHONES (IN '000s)

Month	Demand
January	8,000
February	10,000
March	11,000
April	11,000
May	11,000
June	12,000
July	13,000
August	14,000
September	15,000
October	17,000
November	19,000
December	19,000

Smartphone assembly was handled by teams of 10 workers each. Each team had the capacity to assemble 125 phones per hour. The capacity of each factory was determined by the number of assembly teams deployed. Each factory operated for 20 days a month, 8 hours a day. Assembly workers were paid 4,000 Rupiah/hour during regular time. They could be asked to work up to an additional 10 hours per month as overtime. Overtime was paid at the rate of 6,000 Rupiah/hour. If QuickTronics chose to layoff workers, each layoff cost the company 800,000 Rupiah and each hiring cost 400,000 Rupiah. It cost 50,000 Rupiah to carry a phone in inventory from one month to the next. Quicktronics could also choose to delay a customer order by stocking out in a given month and filling the stockout from next month's production. Given the importance of keeping up with customer demand in this market, each unit delayed in this manner cost 100,000 Rupiah in discounts offered to customers to keep them happy. The company had a policy of ensuring that there were no stockouts in December so the new year started out without any unfilled orders. The material cost for each phone was 500,000 Rupiah.

The factory ended December with 667 assembly teams and a million phones in inventory. The production plan at the factory attempted to meet demand in [Table 8-13](#) at the lowest possible cost while ensuring that the factory ended December of the coming year with the same labor and inventory as the previous December.

QUESTIONS

1. What is the annual cost of the current plan where Rudy maintains a workforce of 667 throughout the year? How much should the factory produce each month? What is the maximum inventory under this plan?
2. How much can Rudy reduce cost by if he gives himself the flexibility of hiring and firing teams as desired? How much should the factory produce each month? What is the maximum inventory under this plan?

1. What is the annual cost of the current plan where Rudy maintains a workforce of 667 throughout the year? How much should the factory produce each month? What is the maximum inventory under this plan?

The annual cost of the plan, in which Rudy employs 667 teams all year, is Rupiah **84,877,415,100,000**. A monthly production of **7,000,000** phones in January, **11,262,500** phones in February, and **14,173,750** phones (March-December each) are anticipated from the factory. This plan allows for a maximum inventory of **14,305,000** units in August.

Decision Variables:

Wt: In this case, the workforce size is fixed at 667.

Ht, Lt: The number of employees hired and let go, is 0 because there are 667 employees overall.

Ot: Overtime not stated, but assumed to be optimized within the limitations over time.

It: The calculated and best-fit inventory at the end of the term, given the limitations.

St: Stockout, with zero being assumed since demand will be met.

Pt: Production level, which is determined by overtime and labor capacity.

Objective Function:

Since there are no stockouts in the goal, the stock-out cost in this plan is zero. The overall cost is:

Hiring and Layoff Cost: There are no hires or layoffs in this plan, so the hiring and layoff costs are zero.

Regular Time Cost: Determined using the workforce's fixed wage.

Overtime Costs: Determined by the number of hours worked in overtime.

Inventory Cost: The price associated with keeping inventory may include warehousing expenses and the cost of capital invested in inventory.

Material Cost: The price of the supplies required for manufacturing.

Constraints:

Limitations guarantee the plan's viability:

There are no active hiring or layoff constraints because the workforce is stable.

The maximum number of hours per worker is probably what limits overtime.

The requirement to meet demand without stockouts and to have the same amount of inventory at the end of the year limits inventory levels.

Production levels need to be as low as possible while still meeting demand and preventing stockouts.

2. How much can Rudy reduce cost by if he gives himself the flexibility of hiring and firing teams as desired? How much should the factory produce each month? What is the maximum inventory under this plan?

Cost Savings through Hiring and Firing Flexibility:

When Rudy keeps 667 employees on board for the entire year, the total cost comes to Rp 84,877,415,100,000. With hiring and firing flexibility, the total cost comes down to **Rp 80,402,209,000,000**. The cost savings brought about by this flexibility are:

The total cost with flexibility is equal to Rp 84,877,415,100,000 - Rp 80,402,209,000,000.

