

Orion is a global company that sells copiers. Orion currently sells ten variants of a copier, with all inventory kept in finished-goods form. The primary component that differentiates the copiers is the printing subassembly. An idea being discussed is to introduce commonality in the printing subassembly so that final assembly can be postponed and inventories kept in component form.

Currently, each copier costs \$ 1,000 in terms of components. Introducing commonality in the print subassembly will increase component costs to \$ 1,025. One of the ten variants represents 80 percent of the total demand. Weekly demand for this variant is normally distributed, with a mean of 1,000 and a standard deviation of 200.

Each of the remaining nine variants has a weekly demand of 28 with a standard deviation of 20. Orion aims to provide a 95 percent level of service. Replenishment lead time for components is four weeks. Copier assembly can be completed in a matter of hours. Orion manages all inventories using a continuous review policy and uses a holding cost of 20 percent.

1. How much safety inventory of each variant must Orion keep without component commonality?
2. What is the annual holding cost?
3. How much safety inventory must be kept in component form if Orion uses common components for all variants?
4. What is the increase in component cost using commonality is commonality justified across all variants?
5. At what cost of commonality will complete commonality be justified?
6. Now consider the case in which Orion uses component commonality for only the nine low-demand variants. How much reduction in safety inventory does Orion achieve in this case?
7. What are the savings in terms of annual holding cost is this more restricted form of commonality justified?
8. At what cost of commonality will commonality across the low-volume variants be justified?