Case

Gladstone Toys, Inc., sells a variety of new and innovative children's toys. Management learned that the preholiday season is the best time to introduce a new toy, because many families use this time to look for new ideas for December holiday gifts. When Gladstone discovers a new toy with good market potential, it chooses an October market entry date.

In order to get toys in its stores by October, Gladstone places one- time orders with its manufacturers in June or July of each year. Demands for children's toys can be highly volatile. If a new toy catches on, a sense of shortage in the market place often increases the demand to high levels and large profits can be realized. However, new toys can also flop, leaving Gladstone stuck with high levels of inventory that must be sold at reduced prices. The most important question the company faces is deciding how many units of a new toy should be purchased to meet anticipated sales demand. If too few are purchased, sales will be lost; if too many are purchased, profits will be reduced because of low prices realized in clearance sales.

For the coming season, Gladstone plans to introduce a new product called Weather Teddy. This variation of a talking teddy bear is made by a company in Taiwan. When a child presses Teddy's hand, the bear begins to talk. A built-in barometer selects one of five responses that predict the weather conditions. The responses range from "It looks to be a very nice day! Have fun" to "I think it may rain today. Don't forget your umbrella." Tests with the product show that, even though it is not a perfect weather predictor, its predictions are surprisingly good. Several of Gladstone's managers claimed Teddy gave predictions of the weather that were as good as many local television weather forecasters.

As with other products, Gladstone faces the decision of how many Weather Teddy units to order for the coming holiday season. Members of the management team suggested order quantities of 15000, 18000, 24000 or 28000 units. The wide range of ordered quantities suggested indicates considerable disagreement concerning the market potential. The product management team asks you for an analysis of the stock-out probabilities for various order quantities, an estimate of the profit potential, and to help make an order quantity recommendation. Gladstone expects to sell Weather Teddy for $24 based on a cost of $16 per unit. If inventory remains after the holiday season, Gladstone will sell all surplus inventory for $5 per unit. After reviewing the sales history of similar products, Gladstone's senior sales forecaster predicted an unexpected demand of 20,000 units with a .95 probability that demand would be between 10,000 units and 30000 units.

Managerial Report

Prepare managerial report that addresses the following issues and recommends an order quantity for the Weather Teddy product.

1. Use the sales forecaster’s prediction to describe a normal probability distribution that can be used to approximate the demand distribution. Sketch the distribution and show its mean and standard deviation.
2. Compute the probability of a stock-out for the order quantities suggested by members of the management team.
3. One of the Gladstone’s managers felt that the profit potential was so great that the order quantity should have a 70% chance of meeting demand and only a 30% chance of any stock-outs. What quantity would be ordered under this policy.
4. Provide your own recommendation for an order quantity. Provide a rationale for your recommendation.