

Acme TechnoWidget Company

The Acme TechnoWidget Company (ATW) produces and sells widgets. Its salesforce is assigned to four major sectors: Government, military, education and private. It produces two products, the Standard widget and the Deluxe widget.

Market research has established that the annual demand for widgets depends on each sector's Standard widget price. The Pricing Director explains:

We start by setting a global base price. Then, for each sector, we tell our salesforce that they can offer a rebate. For instance, we offer a 70% rebate to the education sector and it's 10% for the private sector because purchases are usually made by researchers with limited funds. The military sector gets a 20% rebate and the government 40%. This is not made public: all our price lists show the base price, but our clients in each sector are aware of the rebate they can get.

Each sector reacts differently to a change of price. We consulted with a market research expert and she came up with multiple demand functions, one for each sector. The demand function estimates a sector's annual demand for a given base price. The demand function has the form B/Price^A . The parameters A and B are different for each sector, and Price is the sector's price, after the rebate. This table shows the values the expert gave us:

Sector	Government	Military	Private Sector	Education
Rebate Percentage	40%	20%	10%	70%
DemParA	3.59	3.46	3.18	4.11
DemParB	22000000000	22000000000	22000000000	22000000000

The price of the Deluxe widget is 45% higher than the Standard widget.

The Sales Manager explains the sales pattern:

The annual demand of each Sector is split between the Standard and Deluxe products, but the distribution is very different in each sector. For instance, in the education sector, with its limited funds, the split is 80%-20% and it is 25%-75% in the military sector. I guess these guys always go for the best, and they have higher budgets. The distribution is 65%-35% for the government sector and 40%-60% for the private sector. The ratios are then applied to the sector's annual demand to get the annual demand by product.

Another interesting pattern is the distribution of sales during the year. We noticed that our clients buy more just before the end of their fiscal year, when some want to spend their budget surpluses, and the beginning, when others have new funds allotted. Each sector has a different pattern, and we noticed that it is pretty stable year after year.

	Government	Military	Private Sector	Education
Jan	9%	8%	12%	6%
Feb	10%	9%	11%	8%

Mar	12%	10%	9%	9%
Apr	12%	12%	7%	10%
May	11%	13%	6%	12%
Jun	9%	11%	4%	12%
Jul	7%	9%	5%	11%
Aug	6%	7%	6%	9%
Sep	5%	6%	8%	7%
Oct	5%	4%	9%	6%
Nov	6%	5%	11%	5%
Dec	8%	6%	12%	5%
Total	100%	100%	100%	100%

Sales to a sector are not uniformly distributed by region. For example, there are more universities in the South-West than in the West. The following table shows the distribution of a sector's sales by region. With it, we can calculate the expected monthly sales per product per region, which helps our Logistics Department do its planning.

	Government	Military	Private Sector	Education
N	25%	52%	22%	24%
SE	18%	13%	21%	15%
SW	18%	18%	17%	32%
E	22%	0%	25%	17%
W	17%	17%	15%	12%
Total	100%	100%	100%	100%

The costs of producing a widget are \$48 and \$72 for the Standard and the Deluxe widget respectively. The monthly fixed costs for this year are \$20000. Delivery costs depend solely on the region and are shown in this table:

Region	North	South-East	South-West	East	West
Unit Delivery Cost	\$10.25	\$9.73	\$9.58	\$8.26	\$11.02

The company CEO wants to see the following results:

- The monthly unit sales per product per region.
- The monthly sales amount and unit sales per product.
- The monthly unit sales and profit.
- The total profit.

Acme TechnoWidget Company Formula Diagram

