

### A Note on Productivity

The Productivity category examines the productivity of your workforce through the course of the simulation. There are three criteria:

1. **Sales/Employee.** You can earn up to 50 points by having high sales volume per employee (Sales/Employee = Total Sales dollars / Complement).
2. **Profit/Employee.** You can earn another 50 points by having high profits per employee (Profit/Employee = Net Profit / Complement).
3. **Turnover rate.** If the Human Resources module is switched on, you can lose points for a higher than expected turnover rate.

Sales/Employee is scaled based upon historical results in past semesters with Capstone®. If you reach or exceed these targets, you earn 50 points:

	Threshold Sales/ Employee	Target Sales/ Employee
Year 1	\$80,000	\$160,000
Year 2	\$90,000	\$180,000
Year 3	\$100,000	\$200,000
Year 4	\$112,500	\$225,000
Year 5	\$125,000	\$250,000
Year 6	\$140,000	\$280,000
Year 7	\$157,500	\$315,000
Year 8	\$177,500	\$355,000

You earn points for anything above the threshold. For example, in Year 1, if your sales are \$80,000 or below, you earn nothing for Sales/Employee. At \$120,000/Employee, you earn 25 points, and at \$160,000/Employee you earn 50 points.

#### **You can improve Sales/Employee several ways:**

- Excellent forecasting. Complements are tied to the production schedule. If you use employees to put inventory into the warehouse instead of a customer's hands, you add nothing to Sales yet have an increased complement.
- Higher Automation. Increasing automation levels reduces complement.
- If the HR module is switched on, you have opportunities to improve productivity. Over six years, you could increase productivity by over 20%, and therefore reduce complement.

Profit/Employee is scaled based upon historical results with Capstone®. The threshold is \$0/Employee. If your profits are negative, you earn no points. If you reach or exceed these targets, you earn 50 points:

	<b>Target Profit/ Employee</b>
Year 1	\$10,000
Year 2	\$12,000
Year 3	\$14,500
Year 4	\$17,500
Year 5	\$21,500
Year 6	\$26,000
Year 7	\$32,000
Year 8	\$39,000

For example, in Year 1, if you have negative profits, you earn no points. At \$5,000/Employee you earn 25 points, and at \$10,000 and above you earn 50 points.

**You can improve Profit/Employee many ways**, since there are many ways to improve profits. From a productivity standpoint, reducing complement will improve Profit/Employee.

However, there is one counter-intuitive relationship you should recognize. To improve Profits/Employee, you would expect to always reduce complement. But consider two Cases (see below).

<i>REVENUE</i>	<b>Case 1</b>	<b>Case 2</b>
Sales	\$110,050	\$135,300
<i>VARIABLE COSTS</i>		
Direct Labor	\$31,215	\$38,330
Direct Material	\$44,637	\$55,151
Inventory Carry	<u>\$1,413</u>	<u>\$1,390</u>
Total Variable Costs	\$77,264	\$94,871
<i>Contribution margin</i>	\$32,786	\$40,429
<i>PERIOD COSTS</i>		
Depreciation	\$7,587	\$7,587
SG&A: R&D	\$1,958	\$1,958
Promotion	\$4,100	\$4,100
Sales	\$4,070	\$4,070
Admin	<u>\$848</u>	<u>\$1,186</u>
Total Period Costs	\$18,562	\$18,901
Net Margin	\$14,223	\$21,528
Other (Fees, Write Offs, TQM)	\$0	\$0
EBIT	\$14,223	\$21,528

Interest	\$5,395	\$5,395
Taxes	\$3,090	\$5,647
Profit Sharing	\$115	\$210
Net Profit	\$5,624	\$10,277

Complement	707	854
Sales/Employee (\$000)	\$156	\$158
Profits/Employee (\$000)	\$8	\$12
Employee Turnover	10.0%	10.0%

### CASES

Both cases were produced with the Capstone.xls. In Case 2 we increase Sales by \$25M. To build the additional units, Complement increases by 147 workers, a whopping 21%. Yet Profits/Employee actually increase from \$8 thousand/Employee to \$12 thousand/Employee.

How can this be? The secret lies in the Period Costs. As Complement increases, Period Costs stay about the same, and Expenses/Employee actually fall. This reflects the more general principle that you want to work resources, including fixed expenses, as hard as possible.

Let's look at another example. Suppose you are running 100% First Shift, but can sell another 20% if you run on Second Shift. The Second Shift labor costs are 50% higher and you require a larger Complement. However, notice that the First Shift has already paid for Period Costs. Anything you produce on Second Shift gets a free ride on the fixed expenses. It is possible that your Second Shift units are more profitable than the First Shift units.

When the HR and Labor Negotiation decisions are turned off, you will not lose points for having a Turnover rate higher than 10%. However, if one or the other is active, you will lose 10 points for every percentage point above 10%. Employee turnover can be kept at 10% by spending money in Recruiting and Training hours. It is driven up by Overtime and dissatisfaction with the labor contract.