

Memorandum

To: Matt Ford
From: Yolanda Bunton
Date: 10/29/2007 (Revised)
Re: Car Wash Capacity Problem

Introduction

As requested, a capacity study on the car wash has been accomplished. Having a car wash with one or two lines was taking into consideration, along with the cost information, the average demand of 18 to 24, and the break-even point. Even the result change in selling price and variable cost was taking into consideration.

Summary

Profit/loss & Capacity: The recommended choice for the start of the car wash business is one wash line, which is based on the average demanded of 18 to 24 cars per hour. By processing 20 cars per hour with only one wash line, the profit will be high (\$7,000). On the other hand, the profit for two wash lines will be low (\$2,000).

Break Even: By having one wash line the break-even point of cars that need to be washed per week is 2,667, which means at least 11 cars per hour. However, with two wash lines the break-even point for cars that need to be washed per week is 4,333 and that at least 17 cars need to be washed per hour.

Optimistic Scenario: If the selling price was to raise up to \$9.00 from \$7.00 per car and the variable cost was to fall down to \$2.00 from \$4.00, then two wash lines would be recommended for the car wash business. With one was line that is processing at least 20 cars per hour, a profit of \$27,000 would be made. However, with two wash lines a profit of \$27,250 can be made by washing 23 cars per hour. The break even point for two was line is 1,857 cars per week, which mean that at least 7 cars per hour have to be washed.

Analysis

Data: The data that will be used in this capacity study is listed below. A projection of an average demand between 18 to 24 cars per hour and the operation per month is 250 hours. The following shows the cost per wash line and how many cars it can process per hour. The table also shows the fixed and variable expense per wash line. However, the equation for break even and profit will be used to calculate the figures. Also the revenue and cost equations will be used to calculate figures.

	<i>Car Wash with One Line</i>	<i>Car Wash with Two Lines</i>
Fixed Expenses	\$8,000	\$13,000
Variable Expense	\$4.00	\$4.00
Selling Price	\$7.00	\$7.00
Cars process per hour	20	20

Profit/loss & Capacity: Profits are higher with one wash line, than it is with two wash lines at the average demand of 18 to 24. Processing 20 cars per hour with one line the car wash business can make a profit of \$7,000. On the other hand, with two wash lines more than 24 cars would have to be process per hour to make a profit of \$7,000. (See Table 1: Schedule of Profit per Month)¹

Table 1: Schedule of Profit per Month

<i>Cars per Hour</i>	<i>One Wash Line</i>			<i>Two Wash Line</i>		
	<i>Revenue</i>	<i>Cost</i>	<i>Profit</i>	<i>Revenue</i>	<i>Cost</i>	<i>Profit</i>
18	\$31,500	\$26,000	\$5,500	\$31,500	\$31,000	\$500
19	\$33,250	\$27,000	\$6,250	\$33,250	\$32,000	\$1,250
20	\$35,000	\$28,000	\$7,000	\$35,000	\$33,000	\$2,000
21	-	-	-	\$36,750	\$34,000	\$2,750
22	-	-	-	\$38,500	\$35,000	\$3,500
23	-	-	-	\$40,250	\$36,000	\$4,250
24	-	-	-	\$42,000	\$37,000	\$5,000

* selling price X cars per hour X hours per month = revenue

* Fixed Expense + (Variable Expense X cars per hour X hours per month) = cost

*Revenue – Cost = Profit

Break Even: A break-even of 4,333 cars needs to be washed per week with two wash lines, which mean that 17 cars have to be washed per hour. On the other hand, to break-even with only one wash line 2,667 that means at least 11 cars per hour. (See Table 2: Break-Even per month)¹

Table 2: Break-Even per Month

	<i>One Wash Line</i>	<i>Two Wash Line</i>
<i>Break Even</i>	2,667 cars per week	4,333 cars per week
<i>Cars Needed per Hour</i>	11 washed cars per hour	17 washed cars per hour

• Fixed Expense/ (Revenue- Variable Expense) = Break-Even

• [Fixed Expense/ (Revenue- Variable Expense)] / Hours per month = Cars needed per month

¹ Formulas came from Stevenson (2005). *Operations management (8th ed.)*, Chapter 5

Optimistic Scenario: Through positive word of mouth from your customers the selling price could increase to \$9.00 from \$7.00 per car. With the use of new technology the variable cost could decrease to \$2.00 from \$4.00. Using the same calculations as the original data, another capacity study has been completed. With two wash lines a profit of \$27,250 can be made by washing 23 cars per hour. The break even point for two was line is 1,857 cars per week, which mean that at least 7 cars per hour have to be washed. However, with one was line that is processing at least 20 cars per hour, a profit of \$27,000 would be made. The information recommends that the car wash business should have two wash lines, instead of one. (See Table 3: Schedule of Profit per Month and Table 4: Break-Even per Month)

Table 3: Schedule of Profit per Month

<i>Cars per Hour</i>	<i>One Wash Line</i>			<i>Two Wash Line</i>		
	<i>Revenue</i>	<i>Cost</i>	<i>Profit</i>	<i>Revenue</i>	<i>Cost</i>	<i>Profit</i>
18	\$40,500	\$17,000	\$23,500	\$40,500	\$22,000	\$18,500
19	\$42,750	\$17,500	\$25,250	\$42,750	\$22,500	\$20,250
20	\$45,000	\$18,000	\$27,000	\$45,000	\$23,000	\$22,000
21	-	-	-	\$47,250	\$23,500	\$23,750
22	-	-	-	\$49,500	\$24,000	\$25,500
23	-	-	-	\$51,750	\$24,500	\$27,250
24	-	-	-	\$54,000	\$25,000	\$29,000

Table 4: Break-Even per Month

	<i>One Wash Line</i>	<i>Two Wash Line</i>
<i>Break Even</i>	1,143 cars per week	1,857 cars per week
<i>Cars Needed per Hour</i>	5 washed cars per hour	7 washed cars per hour

Limitations

The information provided and calculations are based on the average demand of 18 to 24 cars process per hour. Car wash businesses have to think about when and how will they make the most profit. A possible factor to consider is season change because there are not many people who would wash their car during the winter, due to snow and the salt on the ground. By having one wash line, the car wash business is not at risk if it process at least 20 cars per hour because of the average demanded is 18 to 24 cars per hour. The only way there should be two was lines is when the expected demand for the car wash business increase.