



Introduction to Marketing Analytics

Outline

- The new realities of marketing decision making
- Marketing Engineering (ME)
- The role of models in ME
- Allegro exercise

Challenges faced by today's marketing decision makers

- **Global, hypercompetitive business environment.**
More demanding customers served by a greater number of competitors on a global scale.
- **Exploding volume of data**
“We’re drowning in data. What we lack are true insights.”
- **Need for faster decision making**
Information overload and lack of time, yet decisions have to be made all the time.
- **Higher standards of accountability**
Marketing expenditures have to be justified in the same way as other investments.

Need for better marketing decision making

- Intuitive decision making
 - Instinct, gut feelings, past experience, established practices;
 - In a world characterized by rapid change, information overload, greater accountability, etc. intuition is unlikely to generate superior results;
- Data-based and model-supported decision making
 - Marketing Engineering

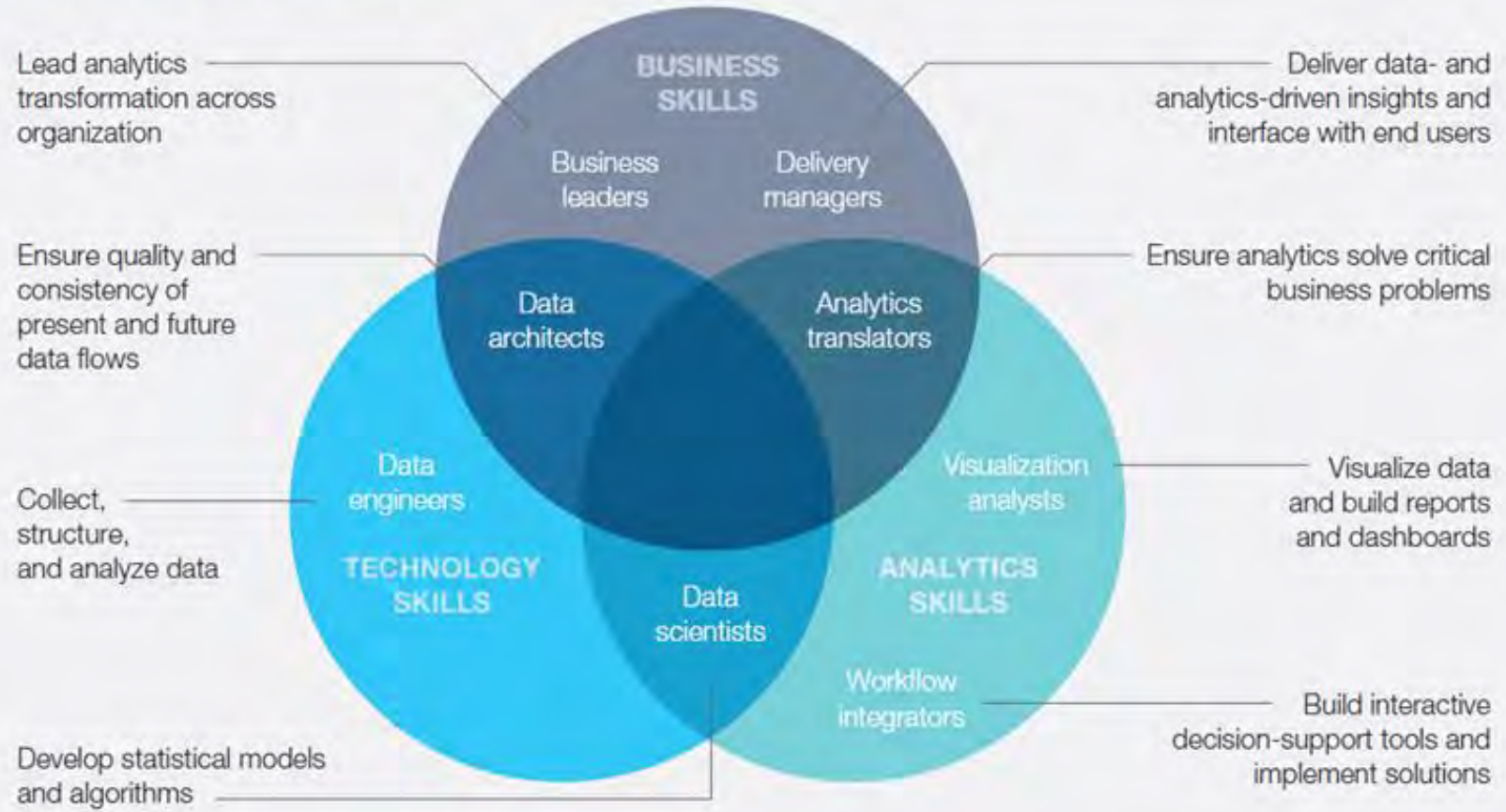
Marketing Engineering (ME)

“a systematic approach to harness data and knowledge to drive effective marketing decision making and implementation through a technology-enabled and model-supported interactive decision process.” (LRB, p. 2).



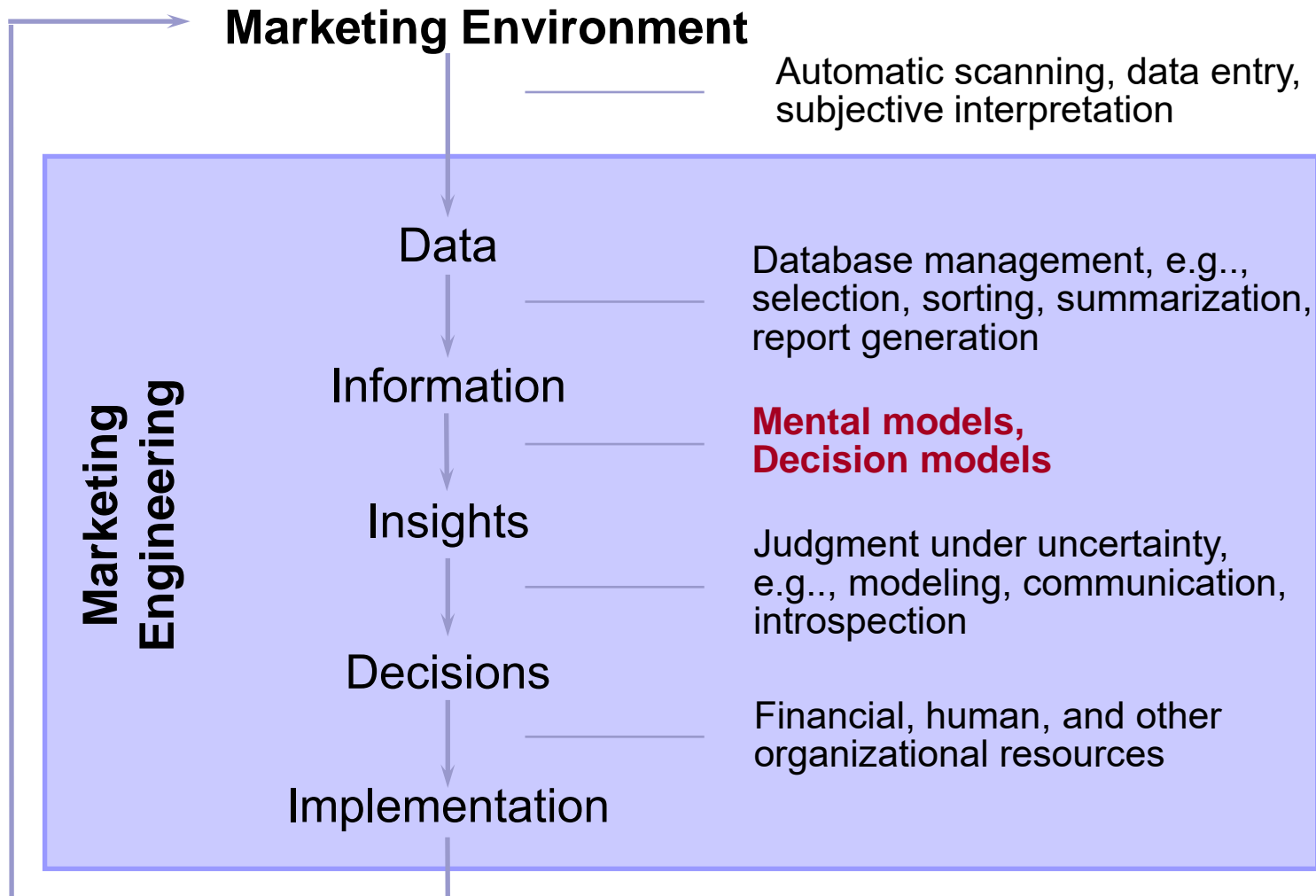
Skills needed for Marketing Engineering

Analytics roles and responsibilities





Marketing Engineering



Models are the core of ME: What is a Model?

- Models are stylized representations of reality that structure our thinking about how the world works;
- Models indicate which factors should be considered and which factors can be ignored;
- By focusing on the relevant factors and their interrelationship reality can be simplified;
- Models are useful because they facilitate top-down processing (as opposed to bottom-up processing);

Issues in using models

- assembling an arsenal of models for a domain of interest;
- retrieving relevant mental models in a given situation;
- being aware of the limitations of mental models (they may overrepresent and underrepresent, or even malrepresent, things);

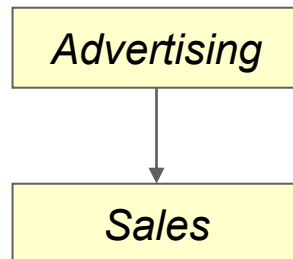
“No model is true, but some models are useful.”

Types of models

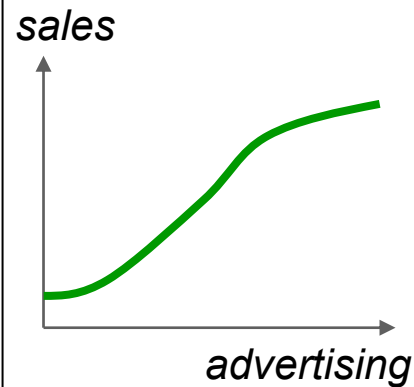
Verbal

“Sales are a function of advertising”

Box and Arrow



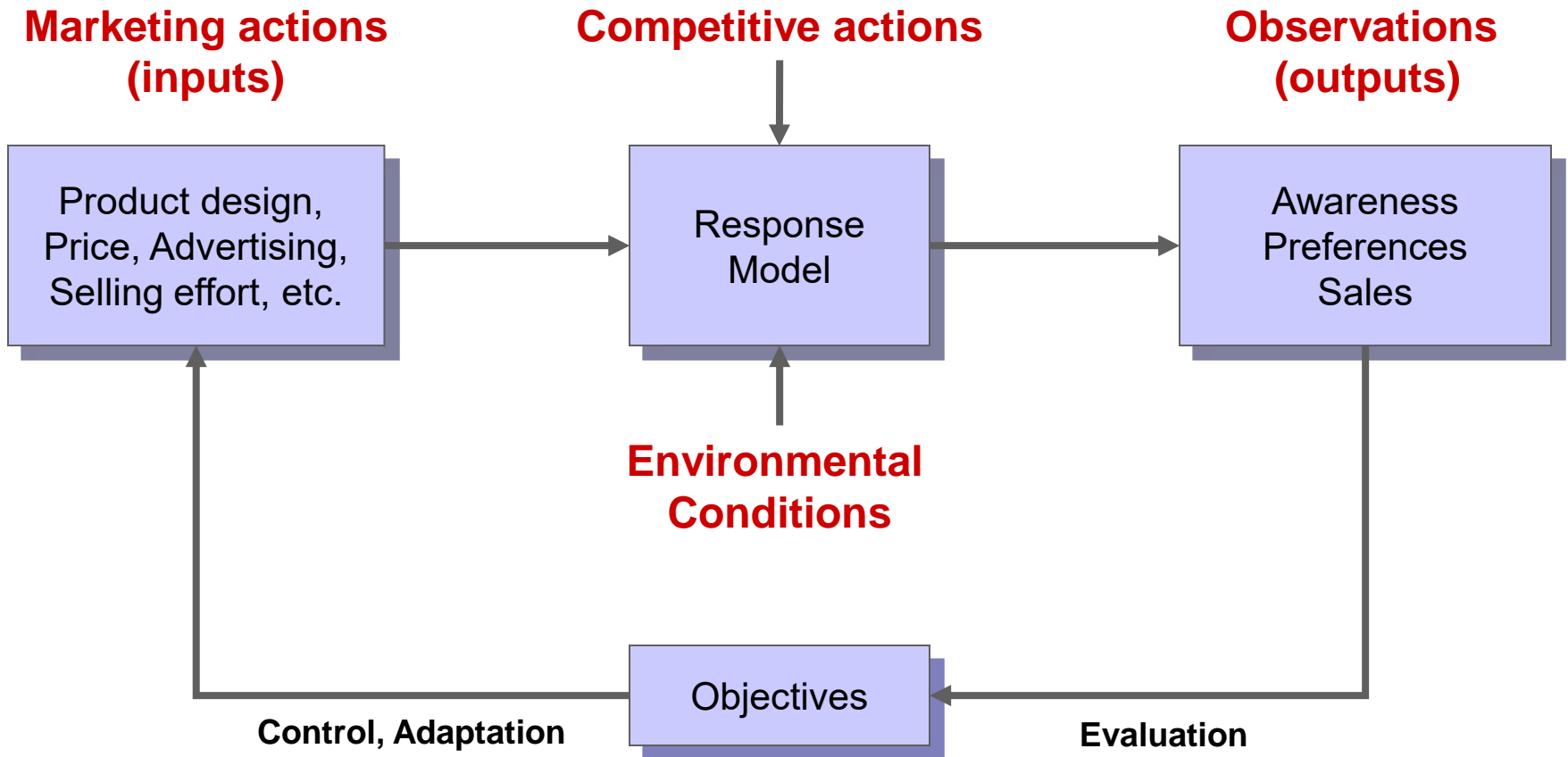
Graphical



Mathematical

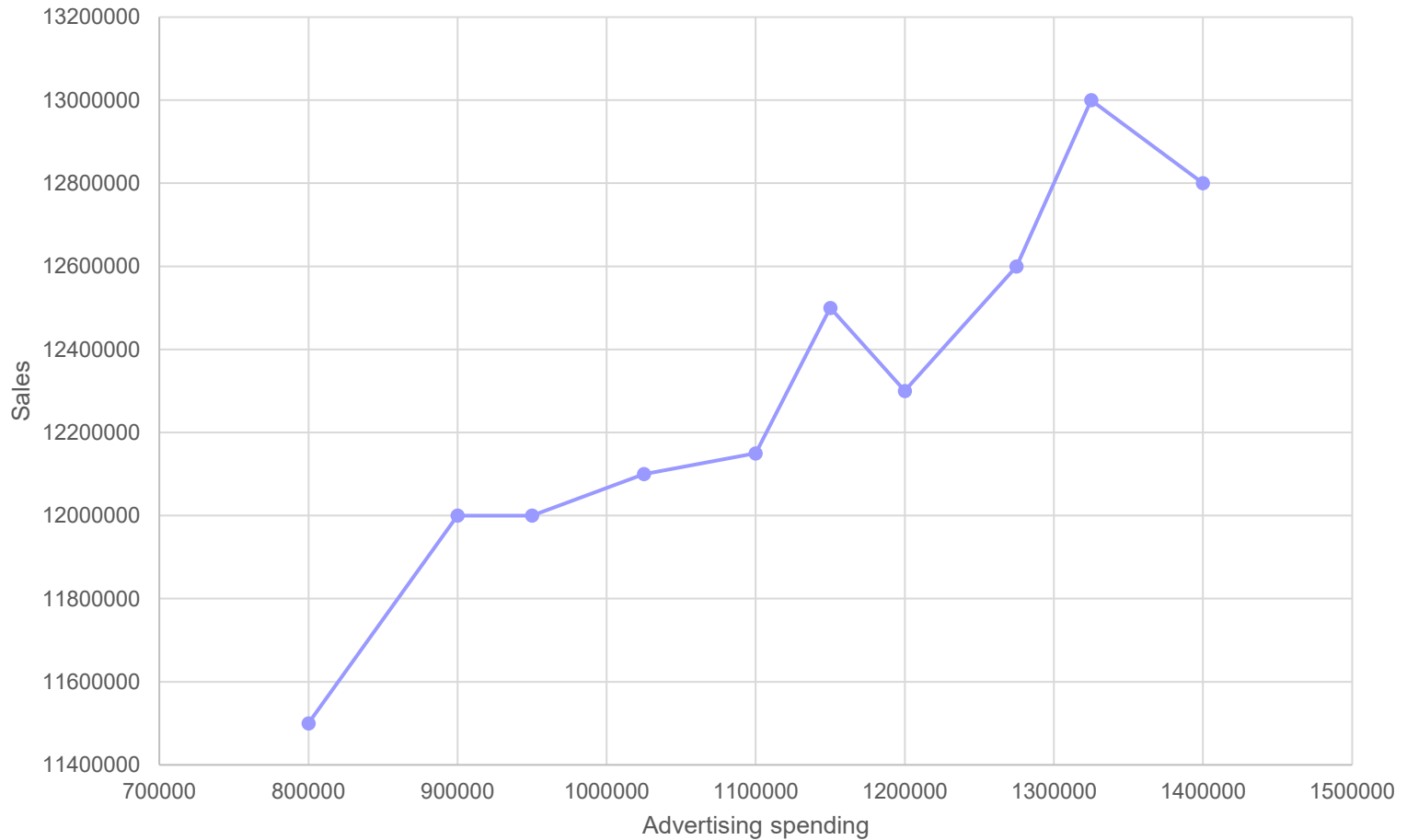
$$S = a + bA + e$$

Response models in the decision loop



A simple (linear) response model

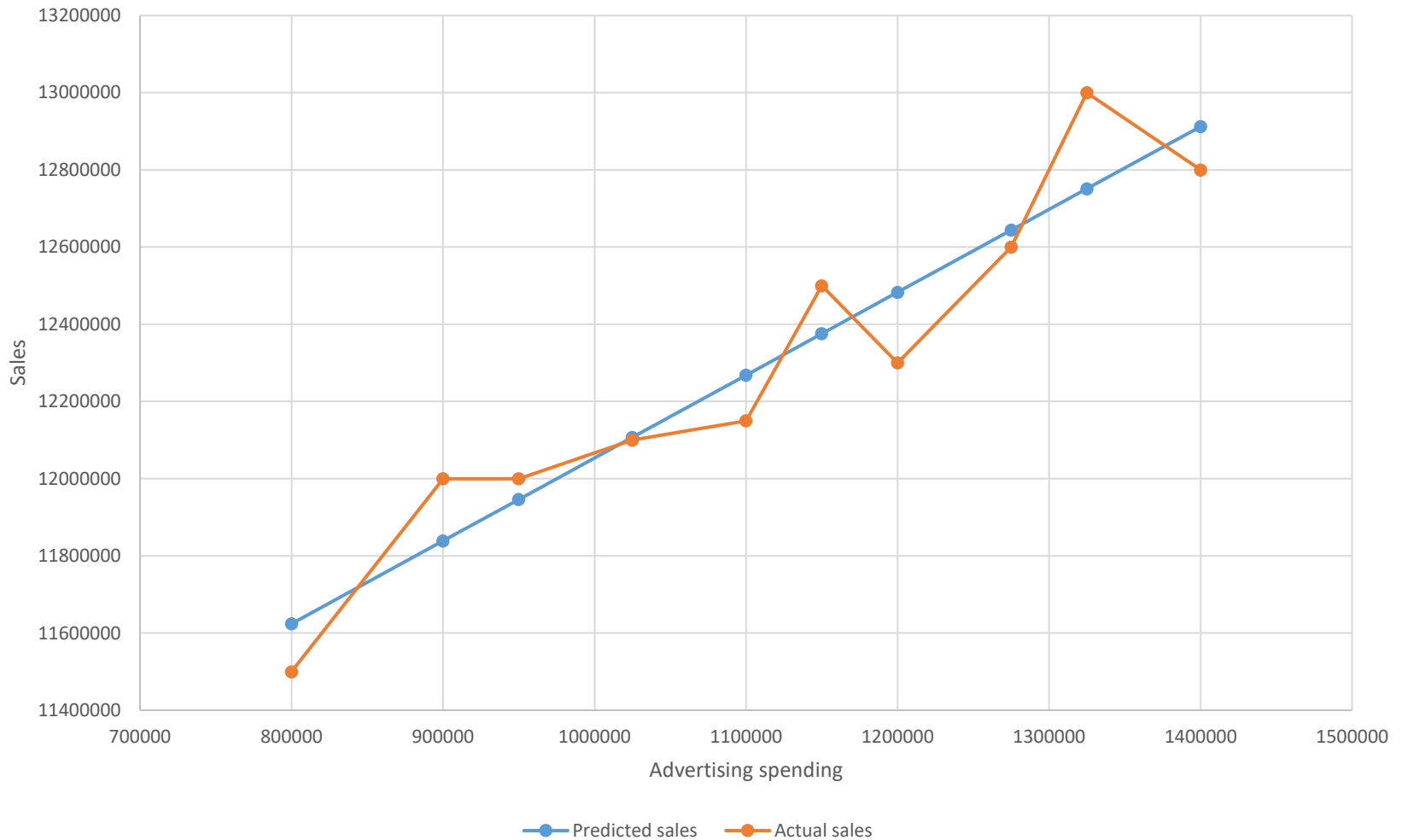
Sales as a function of advertising spending





A simple (linear) response model

Actual and predicted sales as a function of advertising spending



A simple (linear) response model

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.95
R Square	0.90
Adjusted R Square	0.88
Standard Error	151514.77
Observations	10

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	1568596189164	1568596189164	68	0
Residual	8	183653810836	22956726354		
Total	9	1752250000000			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	9906547.3	292891.1	33.8	0.0	9231139.1	10581955.5
Advertising	2.1	0.3	8.3	0.0	1.5	2.7

How to build a model

- **Specify the model**
 - Variables (*which ones to include*)
 - Relationships, interactions, dynamics (*how they are linked*)
- **Calibrate the model**
 - Statistical estimation with real (historical) data
 - Experimentation
 - Managerial judgments
- **Validate the model**
 - Face validity (*does it make sense?*)
 - Global fit (R^2 , *model fit*)
 - Variable significance (*correct signs, t-tests*)
- **Apply the model**
 - Ease of use
 - Usefulness



Allegro

Resource allocation "smart sheet" exercise

Introduction

Following are two business plan spreadsheets for the same company, Allegro. You have just been assigned to be the brand manager and must formulate a plan for next year. As you will see, the projected profits for 2006 are higher than the plan for 2007. To make a good impression, you need to develop a plan that will deliver higher profits in 2007. Your job is to use each spreadsheet to determine the optimal level of price, advertising, and selling.

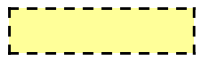
How to use this spreadsheet

Start with the Simple spreadsheet. It is a traditional spreadsheet. Use this as an aid to help you think about optimal spending levels, and how this might affect market shares and net profits.

Go to the second spreadsheet. It is a "smart" spreadsheet where projected market share is a function of price, advertising and distribution spending. If you change the planned price, sales (and contribution margin) will change.

Not surprisingly, as you lower price, volume increases, but the contribution margin decreases. As you increase advertising or selling effort sales volume increases. These response functions came from managerial judgment, but could just as easily come from statistical analysis of past data.

Assume these estimates are reasonably good; however, change them if you think it is a good idea.



*Bright yellow indicates a cell you **should** change.*



*Faded yellow indicates a cell you **are allowed** to modify. Do this only if you have good reasons to do so.*

The Allegro exercise: Simple sheet

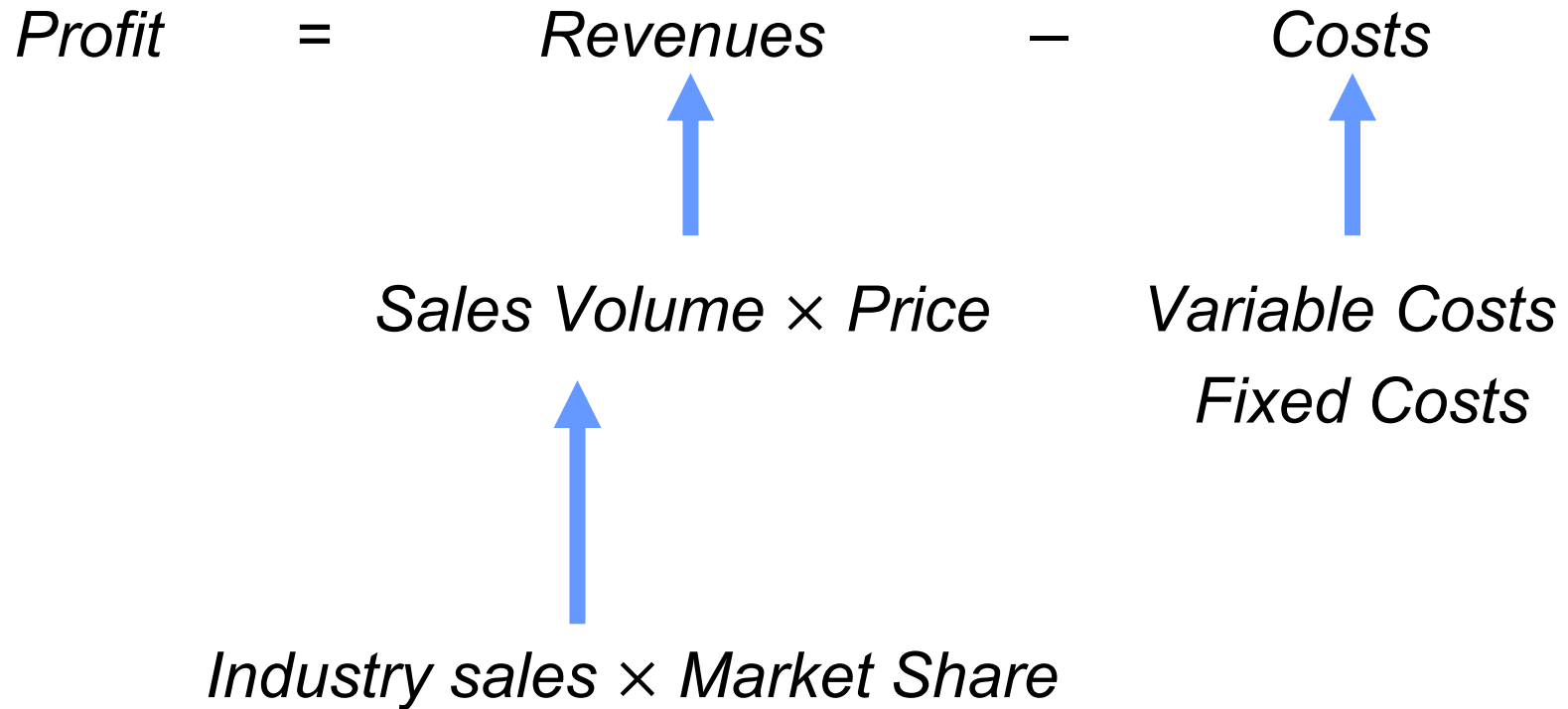
Allegro Market Simple Sheet

	This year (current)	Next year (projected)
Industry Sales, in Units	2,200,000	2,345,700
Company Market Share	3.0%	3.0%
Price per Unit	\$250	\$250
Variable Cost per Unit	\$150	\$150
Gross Margin per Unit	\$100	\$100
Sales Volume in Units	66,000	69,678
Sales Revenue	\$16,500,000	\$17,419,532
Gross Contribution Margin	\$6,600,000	\$6,967,813
Overhead	\$3,500,000	\$3,900,000
Net Contribution Margin	\$3,100,000	\$3,067,813
Advertising	\$900,000	\$900,000
Sales Force and Distribution	\$1,000,000	\$1,000,000
Marketing Research	\$100,000	\$100,000
Net Profit	\$1,100,000	\$1,067,813

Marketing Mix Decisions

	This year (current)	Next year (projected)
Price per Unit	\$250	\$250
Advertising	\$900,000	\$900,000
Sales Force and Distribution	\$1,000,000	\$1,000,000

The profit equation



Questions

- Using the Simple Sheet, what happens when Allegro cuts advertising and selling effort to 0\$ and raises price to \$500/unit? Comment.
- Repeat exercise 1 using the Smart Sheet.
- Using the Smart Sheet, what is the profit maximizing level of advertising, selling effort and price? (Hint: Requires Solver) Would you recommend the firm implement this policy? Why or why not?
- What if the firm's goal was not to maximize profit, but to maximize market share while maintaining profit at no lower than last year's level. (Hint: Requires Solver—and be sure to start with a feasible level of profit). Compare this policy to the one you found in the previous question.
- Comment on the strengths and limitations of a response function approach (Smart sheet) like this in practice.



The Allegro exercise: Simple sheet (Q1)

Allegro Market Simple Sheet

	This year (current)	Next year (projected)
Industry Sales, in Units	2,200,000	2,345,700
Company Market Share	3.0%	3.0%
Price per Unit	\$250	\$500
Variable Cost per Unit	\$150	\$150
Gross Margin per Unit	\$100	\$350
Sales Volume in Units	66,000	69,678
Sales Revenue	\$16,500,000	\$34,839,064
Gross Contribution Margin	\$6,600,000	\$24,387,345
Overhead	\$3,500,000	\$3,900,000
Net Contribution Margin	\$3,100,000	\$20,487,345
Advertising	\$900,000	\$0
Sales Force and Distribution	\$1,000,000	\$0
Marketing Research	\$100,000	\$100,000
Net Profit	\$1,100,000	\$20,387,345

- a
- b
- c
- d
- e = c - d
- f = a x b
- g = c x f
- h = e x f
- i
- j = h - i
- k
- l
- m
- n = j - k - l - m

Marketing Mix Decisions

	This year (current)	Next year (projected)
Price per Unit	\$250	\$500
Advertising	\$900,000	\$0
Sales Force and Distribution	\$1,000,000	\$0

Questions

- Using the Simple Sheet, what happens when Allegro cuts advertising and selling effort to 0\$ and raises price to \$500/unit? Comment.
- Repeat exercise 1 using the Smart Sheet.
- Using the Smart Sheet, what is the profit maximizing level of advertising, selling effort and price? (Hint: Requires Solver) Would you recommend the firm implement this policy? Why or why not?
- What if the firm's goal was not to maximize profit, but to maximize market share while maintaining profit at no lower than last year's level. (Hint: Requires Solver—and be sure to start with a feasible level of profit). Compare this policy to the one you found in the previous question.
- Comment on the strengths and limitations of a response function approach (Smart sheet) like this in practice.



Introduction to Marketing Analytics

The Allegro exercise: Smart sheet (Q2)

Allegro Market Smart Sheet

	This year (current)	Next year (projected)
Industry Sales, in Units	2,200,000	2,345,700
Company Market Share	3.0%	0.0%
Price per Unit	\$250	\$500
Variable Cost per Unit	\$150	\$150
Gross Margin per Unit	\$100	\$350
Sales Volume in Units	66,000	0
Sales Revenue	\$16,500,000	\$0
Gross Contribution Margin	\$6,600,000	\$0
Overhead	\$3,500,000	\$3,900,000
Net Contribution Margin	\$3,100,000	-\$3,900,000
Advertising	\$900,000	\$0
Sales Force and Distribution	\$1,000,000	\$0
Marketing Research	\$100,000	\$100,000
Net Profit	\$1,100,000	-\$4,000,000

Marketing Mix Decisions

	This year (current)	Next year (projected)
Price per Unit	\$250	\$500
Advertising	\$900,000	\$0
Sales Force and Distribution	\$1,000,000	\$0

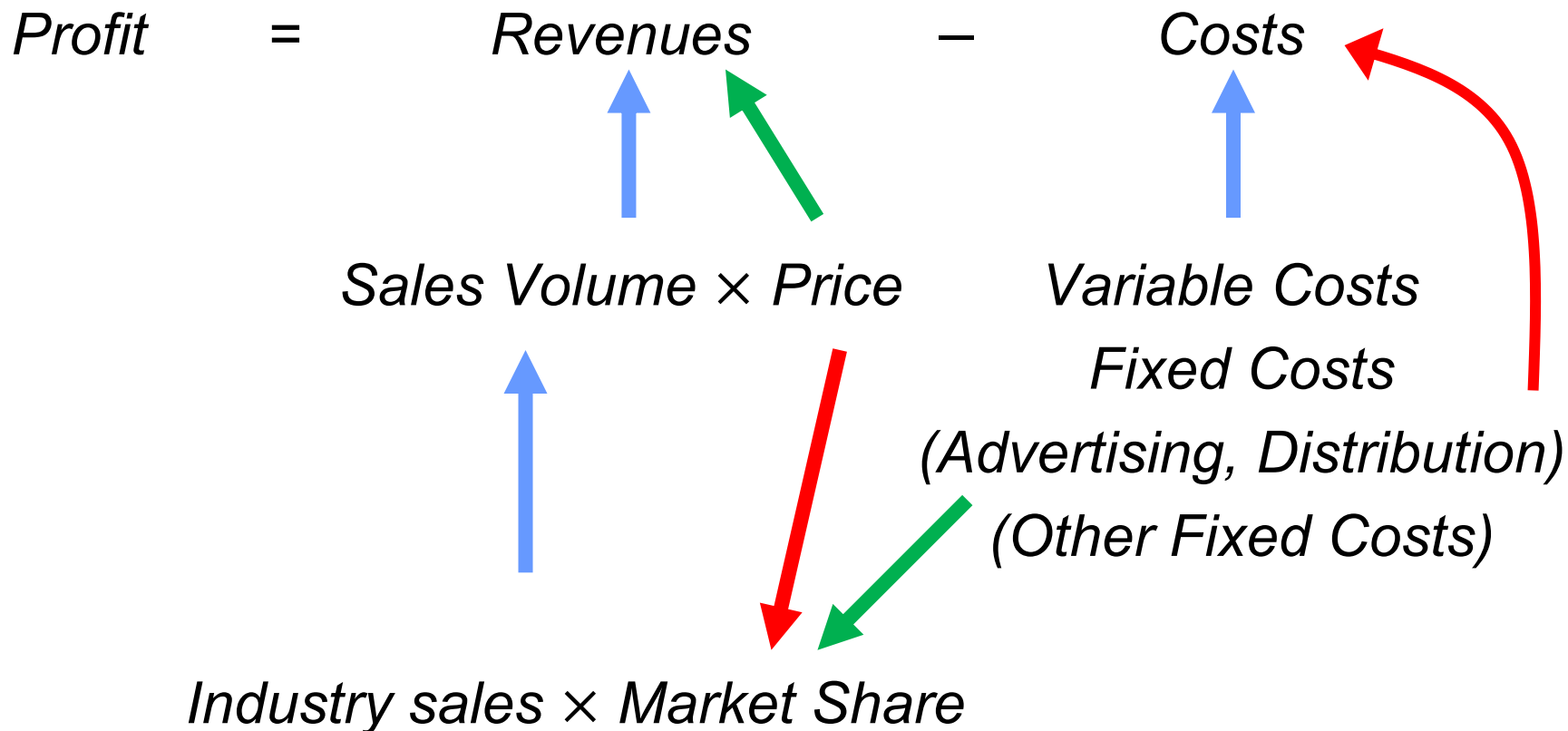
Managerial Judgmental Inputs

What increase in sales will we see with a.....

...1% decrease in price?	2.20%
...1% increase in advertising?	0.2%
...1% increase in sales effort?	0.1%



The profit equation



Questions

- Using the Simple Sheet, what happens when Allegro cuts advertising and selling effort to 0\$ and raises price to \$500/unit? Comment.
- Repeat exercise 1 using the Smart Sheet.
- **Trial and error using the Smart Sheet.**
- Using the Smart Sheet, what is the profit maximizing level of advertising, selling effort and price? (Hint: Requires Solver) Would you recommend the firm implement this policy? Why or why not?
- What if the firm's goal was not to maximize profit, but to maximize market share while maintaining profit at no lower than last year's level. (Hint: Requires Solver—and be sure to start with a feasible level of profit). Compare this policy to the one you found in the previous question.
- Comment on the strengths and limitations of a response function approach (Smart sheet) like this in practice.

Questions

- Using the Simple Sheet, what happens when Allegro cuts advertising and selling effort to 0\$ and raises price to \$500/unit? Comment.
- Repeat exercise 1 using the Smart Sheet.
- Using the Smart Sheet, what is the profit maximizing level of advertising, selling effort and price? (Hint: Requires Solver) Would you recommend the firm implement this policy? Why or why not?
- What if the firm's goal was not to maximize profit, but to maximize market share while maintaining profit at no lower than last year's level. (Hint: Requires Solver—and be sure to start with a feasible level of profit). Compare this policy to the one you found in the previous question.
- Comment on the strengths and limitations of a response function approach (Smart sheet) like this in practice.

Using Solver for Optimization

Solver Parameters

Set Objective:

To: Max Min Value Of:

By Changing Variable Cells:

Subject to the Constraints:

- SDS22 >= 0
- SDS23 >= 0
- SDS24 >= 0

Make Unconstrained Variables Non-Negative

Select a Solving Method:

Solving Method
Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

Buttons: Add, Change, Delete, Reset All, Load/Save, Options, Help, Solve, Close

The Allegro exercise: Smart sheet (Q3)

Allegro Market Smart Sheet

	This year (current)	Next year (projected)
Industry Sales, in Units	2,200,000	2,345,700
Company Market Share	3.0%	2.7%
Price per Unit	\$250	\$275
Variable Cost per Unit	\$150	\$150
Gross Margin per Unit	\$100	\$125
Sales Volume in Units	66,000	63,571
Sales Revenue	\$16,500,000	\$17,481,989
Gross Contribution Margin	\$6,600,000	\$7,946,358
Overhead	\$3,500,000	\$3,900,000
Net Contribution Margin	\$3,100,000	\$4,046,358
Advertising	\$900,000	\$1,589,271
Sales Force and Distribution	\$1,000,000	\$1,033,026
Marketing Research	\$100,000	\$100,000
Net Profit	\$1,100,000	\$1,324,061

- a
- b
- c
- d
- e = c - d
- f = a x b
- g = c x f
- h = e x f
- i
- j = h - i
- k
- l
- m
- n = j - k - l - m

Marketing Mix Decisions

	This year (current)	Next year (projected)
Price per Unit	\$250	\$275
Advertising	\$900,000	\$1,589,271
Sales Force and Distribution	\$1,000,000	\$1,033,026



Questions

- Using the Simple Sheet, what happens when Allegro cuts advertising and selling effort to 0\$ and raises price to \$500/unit? Comment.
- Repeat exercise 1 using the Smart Sheet.
- Using the Smart Sheet, what is the profit maximizing level of advertising, selling effort and price? (Hint: Requires Solver) Would you recommend the firm implement this policy? Why or why not?
- What if the firm's goal was not to maximize profit, but to maximize market share while maintaining profit at no lower than last year's level. (Hint: Requires Solver—and be sure to start with a feasible level of profit). Compare this policy to the one you found in the previous question.
- Comment on the strengths and limitations of a response function approach (Smart sheet) like this in practice.

Solver Parameters



Set Objective:

To:

Max

Min

Value Of:

By Changing Variable Cells:

Subject to the Constraints:

- \$C\$17 >= \$B\$17
- \$C\$22 >= 0
- \$C\$23 >= 0
- \$C\$24 >= 0

Add

Change

Delete

Reset All

Load/Save

Make Unconstrained Variables Non-Negative

Select a Solving Method:

Options

Solving Method

Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

Help

Solve

Close

The Allegro exercise: Smart sheet (Q4)

Allegro Market Smart Sheet

	This year (current)	Next year (projected)
Industry Sales, in Units	2,200,000	2,345,700
Company Market Share	3.0%	3.8%
Price per Unit	\$250	\$244
Variable Cost per Unit	\$150	\$150
Gross Margin per Unit	\$100	\$94
Sales Volume in Units	66,000	88,467
Sales Revenue	\$16,500,000	\$21,611,347
Gross Contribution Margin	\$6,600,000	\$8,341,344
Overhead	\$3,500,000	\$3,900,000
Net Contribution Margin	\$3,100,000	\$4,441,344
Advertising	\$900,000	\$1,964,533
Sales Force and Distribution	\$1,000,000	\$1,276,811
Marketing Research	\$100,000	\$100,000
Net Profit	\$1,100,000	\$1,100,000

Marketing Mix Decisions

	This year (current)	Next year (projected)
Price per Unit	\$250	\$244
Advertising	\$900,000	\$1,964,533
Sales Force and Distribution	\$1,000,000	\$1,276,811

Questions

- Using the Simple Sheet, what happens when Allegro cuts advertising and selling effort to 0\$ and raises price to \$500/unit? Comment.
- Repeat exercise 1 using the Smart Sheet.
- Using the Smart Sheet, what is the profit maximizing level of advertising, selling effort and price? (Hint: Requires Solver) Would you recommend the firm implement this policy? Why or why not?
- What if the firm's goal was not to maximize profit, but to maximize market share while maintaining profit at no lower than last year's level. (Hint: Requires Solver—and be sure to start with a feasible level of profit). Compare this policy to the one you found in the previous question.
- Comment on the strengths and limitations of a response function approach (Smart sheet) like this in practice.



Assignment for next class

- Read LRB Chapter 3
- Download Segmentation.pptx or Segmentation.pdf
- Read the Segmentation Tutorial (Enginius)