

Chapter 7

Marketing Experimental Research



“No great marketing decisions have ever been made on qualitative data”

JOHN SCULLEY

CONTENTS

- **GENERAL CONCEPTS AND CHARACTERISTICS**
 - CAUSALITY
 - TYPES OF VARIABLES IN CAUSAL RESEARCH
 - CONTROLLING EXTRANEIOUS VARIABLES
 - TYPES OF VALITY
 - EXPERIMENTATION
- **THE ANALYSIS OF VARIANCE**
- **TYPES OF EXPERIMENTAL DESIGNS**
 - PLANNING AND DEVELOPMENT OF MARKETING EXPERIMENTAL RESEARCH
- **APPLICATIONS AND LIMITS OF EXPERIMENTAL RESEARCH**

- Experimental research involves 4 design elements:
 1. Manipulation of the independent variable
 2. Selection and measurement of the dependent variable
 3. Selection and assignment of experimental subjects or test units
 4. Control over extraneous variables

• CAUSALITY

We can never prove causality 100%

3 conditions must be met:

1. **Concomitant variation:** a cause X and an effect Y exist together or vary together.
2. **Time order of occurrence:** The causing event must occur either before or simultaneously with the effect.
3. **Elimination of other possible causal factors.** The variable investigated should be the only possible explanation.

- **Types of variable in causal research**
 1. **Independent variable (or treatment):** values manipulated by the researcher and which effects are measured and compared. E.g. price levels...
 2. **Test units:** individuals, organizations... whose effect over the independent variable is being examined.
 3. **Dependent variable:** measures of effect
 4. **Control variable:** conditions that make the design a true experiment.
 5. **Extraneous variables**

- **Types of variable in causal research**

5. **Extraneous variables (or continuous variables):** uncontrolled variables that may affect the dependent variables and test units.

They can be classified as:

1. History
2. Maturation
3. Testing effects
4. Instrumentation
5. Statistical Regression
6. Selection Bias
7. Mortality

• Types of variable in causal research

5. Extraneous variables (or continuous variables):

1. History

External events that happen at the same time and can affect the dependent variables.

E.g. sales levels – effectiveness of a promotion; History: economic conditions

2. Maturation

Changes in test units due to the passing of time

E.g. test units become older, bored...

3. Testing effects

A prior observation affects a latter observation.

E.g. commercial advertising on attitudes towards a brand

4. Instrumentation

Changes in the measuring instruments, in the observer or in the scores themselves

5. Statistical Regression

Test units with extreme scores move closer to the average score during the course of the experiment

6. Selection Bias

Improper assignment of test units to treatment conditions

7. Mortality

Loss of test units



- Controlling extraneous variables:

- ★ Randomization

Device for equally distributing the effects of extraneous variables to all conditions

- ✓ Random assignment of test units to experimental groups by using random numbers.
 - ✓ Treatment conditions are also assigned randomly to experimental groups
 - ✓ It may not be effective when sample size is too small
 - ✓ Effectiveness: comparison across the experimental groups

- **Types of validity in causal research**

- ★ Internal validity

Measure of accuracy: extent to which an observed effect can be attributed to an independent variable and not to other factors.

- ✓ Control of extraneous variables are a necessary condition for establishing internal validity

- ★ External validity

Extent to which an observed effect can be generalized to particular populations and situations.

- ✓ Test markets have higher levels than other designs

• Experimentation

★ Experiment

A researcher manipulates one or more independent variables and measures their effects in one or more dependent variables, while controlling for extraneous variables.

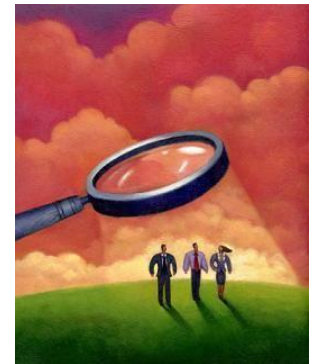
★ Experimental design

Procedures specifying:

- ✓ Test units
- ✓ Independent variables
- ✓ Dependent variables
- ✓ Control for extraneous variables

★ Hawthorne effect

People may behave differently when they know they are being observed



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 - TYPES OF VALIDITY
 - EXPERIMENTATION
- **THE ANALYSIS OF VARIANCE**
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- ANOVA

Technique for analyzing the difference in the mean for two or more populations.

Null Hypothesis: $\mu_1 = \mu_2 = \mu_3 = \dots \mu_k$ (K= number of groups)

Hypothesis 1: At least one μ is different.

One-way ANOVA

Involves one grouping variable: only one independent variable is involved

(Independent sample t-test, special case of anova)

Imagine:

Job satisfaction (dependent variable) based on a grouping variable (sex). Statistically, we would see whether the mean for men and women is different from 0.

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 - CONTROLLING EXTRANEIOUS VARIABLES
 - TYPES OF VALIDITY
 - EXPERIMENTATION
- THE ANALYSIS OF VARIANCE
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EXPERIMENTAL DESIGNS

4 main types of experimental designs:

1. Pre-experimental designs
2. True experimental designs
3. Quasi experimental designs
4. Statistical designs

1. Pre-experimental designs

Main characteristic: absence of randomization

Pre-experimental
designs

- One-shot case study
- One group pretest-posttest
- Static group

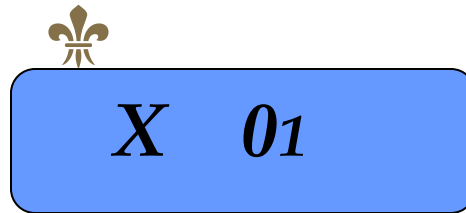


1. Pre-experimental designs

1.1 One-shot case study

A single group of test units is exposed to a treatment X , and then a single measurement on the dependent variable is taken (01). The test units are selected arbitrarily by the researcher.

It could be symbolized as:



E.g. X =promotion; 01 =measurement of sales after the promotion

Test unit participate because of voluntary self-selection or arbitrary assignment, not because of random assignment.

Pre-experimental designs

1.1 One-shot case study:

Disadvantages:

1.No comparison

There are no basis for comparison between O1 and what would have happened when X was absence

2.Extraneous variables

The levels of O1 may be affected by extraneous variables (history, etc)
E.g. test units become older, bored...

3.When?

More appropriate for exploratory than for conclusive research

4.Internal validity

May suffer from internal validity, but sometimes they are the only possibility

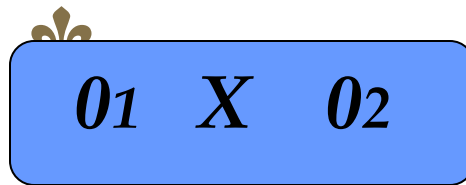
1. Pre-experimental designs

1.2 Pre-test post-test design

A group of test units is measured twice. There is no control group and no randomization.

A pre-treatment measure is taken (01), the group is exposed to the treatment(X), and a second measure is taken(02).

It could be symbolized as:



Treatment effect (TE): $02-01$

Disadvantages: extraneous variables (maturation, mortality) are uncontrolled

1. Pre-experimental designs

1.3 Static group design

It is a two-group experimental design:

- The Experimental group (EG): exposed to treatment
- The Control group (CG): not exposed to treatment

Each subject belongs only to one of the groups.

Measurements are only made post-treatment and test units are not assigned at random.

It could be symbolized as:

EG: X	01
CG:	02

Treatment effect (TE): 01-02

(The difference could also be due to extraneous variables e.g. maturation, mortality)

1. Pre-experimental designs

1.3 Static group design disadvantages

- ✓ **Selection bias:** Because test groups are not randomly assigned, the two groups (EG & CG) may differ before the treatment.
- ✓ **Mortality:** more test units may withdraw from the experimental than from the CG, especially if the treatment is unpleasant.
- ✓ E.g. effectiveness of a commercial

2. True experimental designs

Main characteristic: randomization

The researcher randomly assigns test units to either group (EG or CG).

There are three main types:

True-experimental
designs

- Pre-test post-test control group design
- Post-test only control group design
- Solomon four group design



2. True experimental designs

2.1 Pretest-posttest control group design

(Before-After with control group):

Test units are randomly (R) assigned to either the experimental or the control group.

-pre-treatment measure is taken on each group.

-CG is not exposed to experimental treatment.

It could be symbolized as:

EG:	R	01	X	02
CG:	R	03		04

Treatment effect (TE): (02-01)-(04-03)

(This design controls for most extraneous variables. Selection bias is eliminated by randomization)

2. True experimental designs

2.1 Pretest-posttest control group design

(Before-After with control group):

Important assumptions:

- ✓ **01=03:** Otherwise there would not be internal validity. Randomization is supposed to reduce the effect of selection bias.
- ✓ **Extraneous variables:** their effect is supposed to be equal for both groups.

2. True experimental designs

2.2. Post-test only control group design

(After only with control group):

Sometimes pre-test is impossible (pharmaceutical co.).

It could be symbolized as:

<i>EG:</i>	<i>R</i>	<i>X</i>	<i>01</i>
<i>CG:</i>	<i>R</i>		<i>02</i>

Treatment effect (TE): 01-02

(Disadvantages: Sensitive to selection bias, mortality, and maturity)

Advantages: Less time consuming, smaller sample size, cheaper than other designs)

2. True experimental designs

2.3. Solomon four group design

The researcher, in this case, is concerned with examining the changes in the attitudes of individual respondents and controls for interactive testing effects, as well as controlling for all the other extraneous variables.

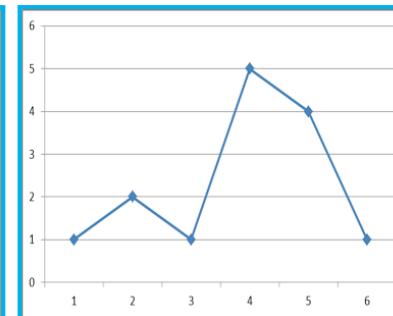
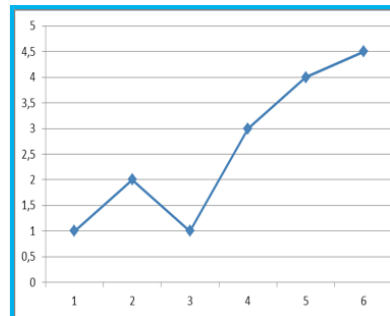
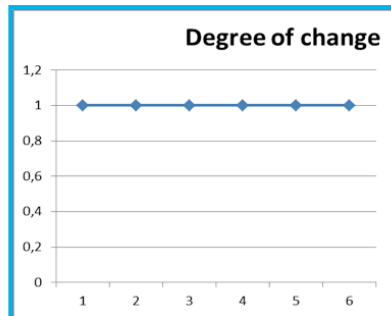
The limitations or disadvantages include that these designs are quite expensive and very time-consuming.

3. Quasi-experimental designs

Quasi-experimental designs

Time Series

Multiple Time Series



3. Quasi-experimental designs

3.1. Time Series

Periodic measurements on the dependent variable for a group of test units is taken. The treatment is administered by the researcher or occurs naturally. After the treatment, periodic measurements are continued to determine the treatment effect

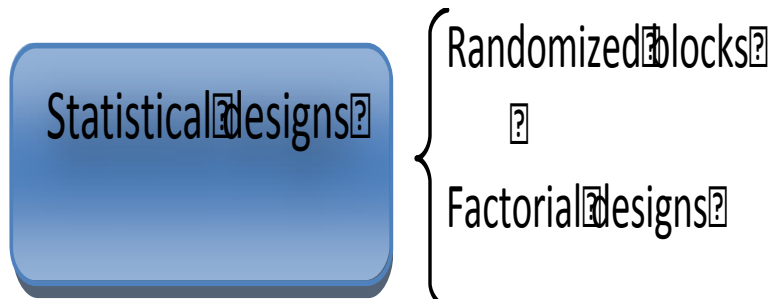
It could be symbolized as:

01 02 03 04 05 *X* 06 07 08 09 010



- No randomization of test units to treatment
- Example: Political tracking polls (*X*=speech)

4. Statistical designs



4. Statistical designs

4.1. Randomized blocks

- Researcher's attempt to control extraneous variables .

- When there is only one major external variable (e.g. sales, respondents' income level) that might influence the dependent variable, randomized block designs are very useful.

- Test units are blocked (or grouped) on the basis of the external variable

4. Statistical designs

4.2. Factorial designs

- Measures the effect of two or more independent variables at various levels .

- It allows for **interaction** between variables .

- The number of treatments (factors) and the number of levels of each treatment identify the factorial design.

Thus, 3x3 design means that there are two factors each having three levels. The treatments do not need to have the same number of levels, for example, a 2x3x2 design means that there are three factors, two of them with two levels and one of them with three levels.

4. Statistical designs

4.2. Factorial designs

Advantages: they allow the researcher to investigate two or more independent variables simultaneously, and to measure interaction effects (Zikmund et al., 2013).

For **example**, a human resource manager may want to measure the effect of the salary and holidays on the percentage of employee satisfaction. We may have, for instance, a 3x2 design as follows:

Salary	Holidays	
	15 Days	20 Days
35,000€	1	4
40,000€	2	5
45,000€	3	6

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APPLICATIONS

TEST MARKETING: experiment that is conducted in actual business conditions (test markets). Burger King, McDonalds, Starbucks...

Typically, the 4Ps are set as independent variables and sales as dependent variable so that an appropriate marketing strategy can be identified and implemented. The two major objectives of test marketing are basically :

- To determine market acceptance of a new product
- To test alternative levels of marketing mix variables.

APLICACIONES AND LIMITS OF EXPERIMENTAL RESEARCH

- Test marketing procedures may be classified as:
 - ★ Standard test markets
 - ★ Controlled and minimarket tests
 - ★ Simulated test marketing.



★ Standard test markets

A procedure where products are sold through the standard distribution channels, and no special considerations are given to these products simply because they are being test marketed .

The decisions to be made by the researcher include:

- the criteria to use when selecting test markets
- the number of test markets to use
- and the duration of the test (10 mths).

★ Controlled test markets

The entire test-marketing program is conducted by an external research company (e.g. Audits and Surveys, etc) which guarantees the distribution of the product in retail outlets that represent a pre-determined percentage of the product.

-The controlled test market includes both minimarket (or forced distribution) tests and the smaller controlled store panels

★ Simulated test markets

It is a quasi-test market in which respondents are preselected.

- Typically, simulated test marketing may be conducted first, followed by controlled test marketing, then standard test marketing and
- If results are positive, national introduction of the proposed new product or whatever element of the marketing activity under consideration.

LIMITS

★ Time

★ Cost. Does it pay off?

★ Administration

Sometimes, experiments are quite difficult to administer:

-It may be impossible to control for the effects of the extraneous variables, particularly in a field experiment.

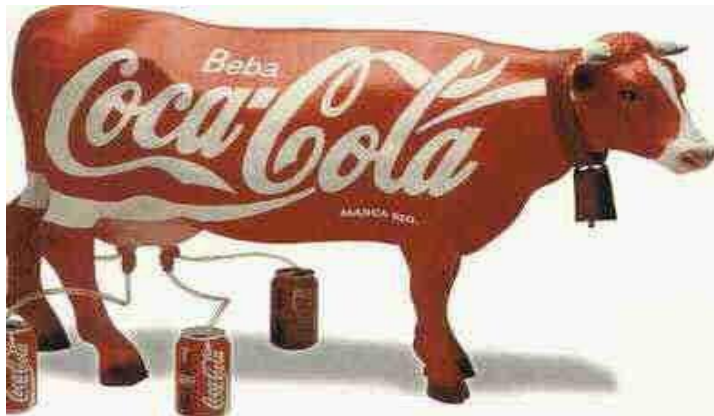
-Field experiments may interfere with a company's ongoing operation, and getting third parties involved such as wholesalers or retailers may be difficult in some situations.

-Additionally, competitors may deliberately alter or contaminate the results of a field experiment.

EXAMPLE

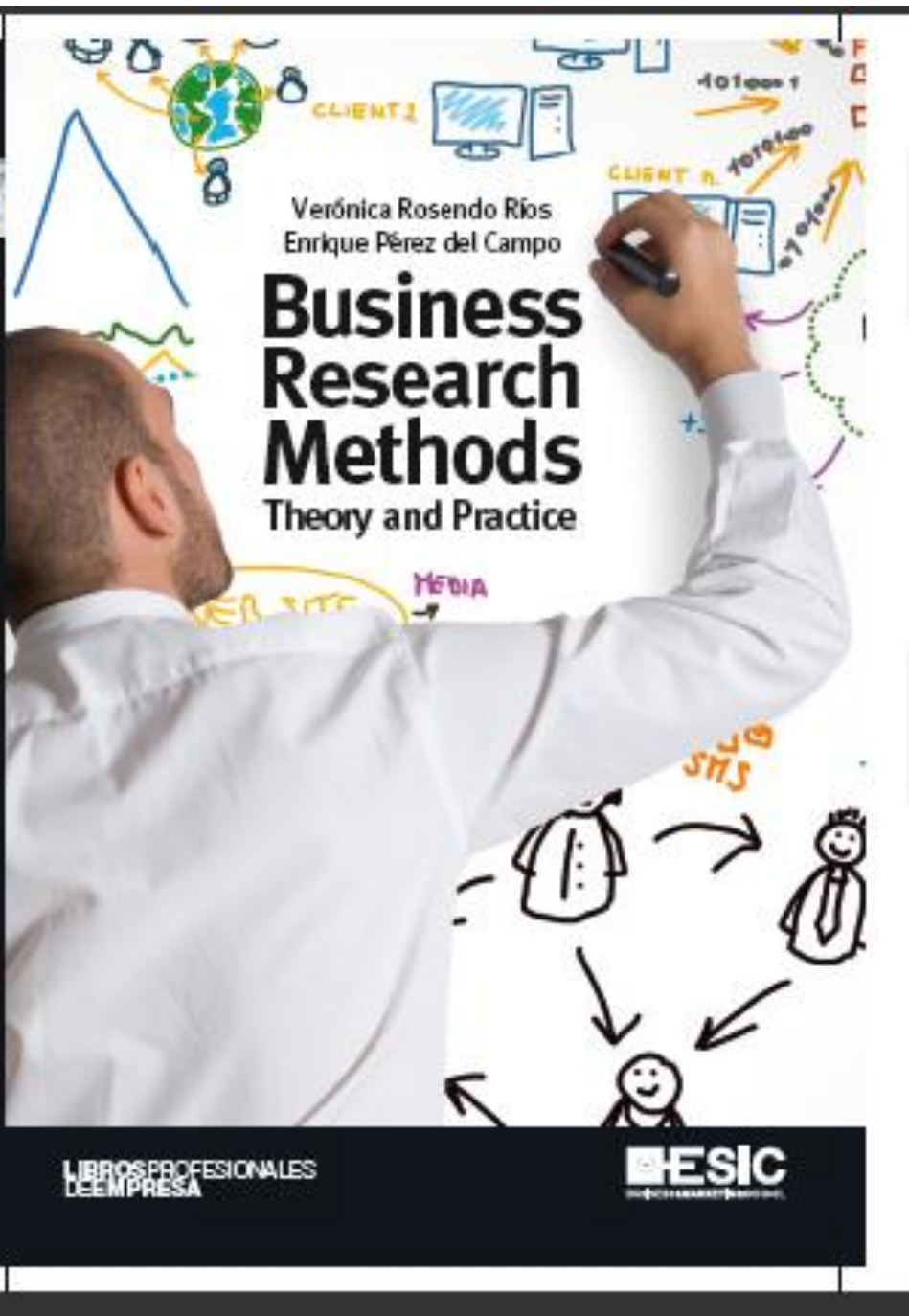
In 2008-9 Coke test-marketed aluminum bottles for Coke Classic, Diet Coke and Coke Zero.

- In 2009-10 Coca-Cola was reportedly test-marketing a new carbonated milk drink in New York called **'Vio'**. It's available in four flavours: very berry, peach mango, tropical colada and citrus burst, and is positioned as a refreshment drink rather than a milk nutritional product.
- Early marketing materials seen by FoodBev.com described Vio as, 'The world's first vibrancy drink – so delicious and effervescent, you just have to try it to believe it'.



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Chapter 7

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Business Research Methods
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