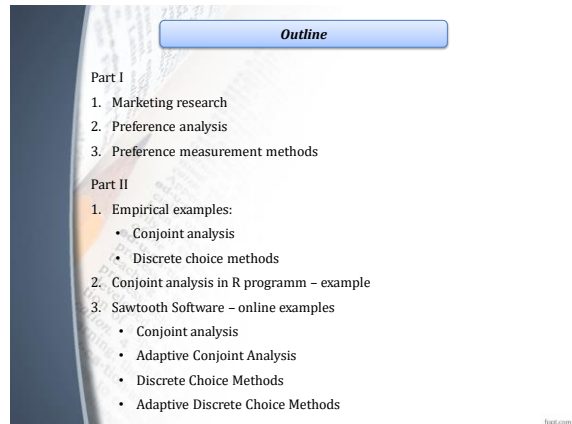


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Outline

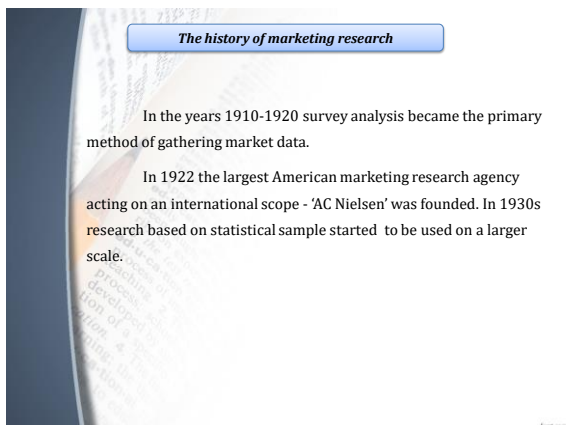
Part I

1. Marketing research
2. Preference analysis
3. Preference measurement methods

Part II

1. Empirical examples:
 - Conjoint analysis
 - Discrete choice methods
2. Conjoint analysis in R programm - example
3. Sawtooth Software - online examples
 - Conjoint analysis
 - Adaptive Conjoint Analysis
 - Discrete Choice Methods
 - Adaptive Discrete Choice Methods

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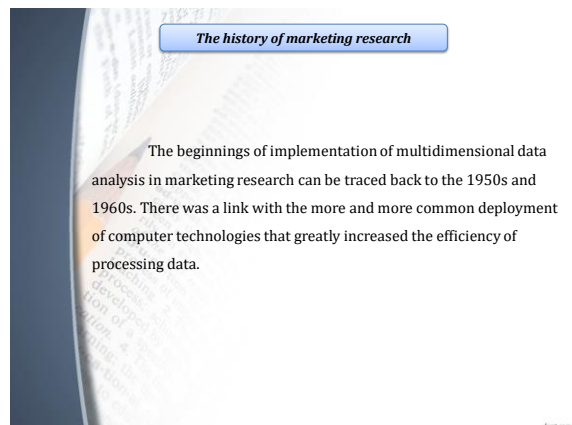


The history of marketing research

In the years 1910-1920 survey analysis became the primary method of gathering market data.

In 1922 the largest American marketing research agency acting on an international scope - 'AC Nielsen' was founded. In 1930s research based on statistical sample started to be used on a larger scale.

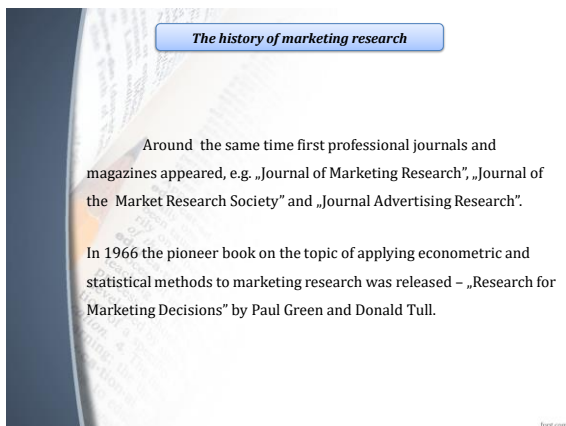
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The history of marketing research

The beginnings of implementation of multidimensional data analysis in marketing research can be traced back to the 1950s and 1960s. There was a link with the more and more common deployment of computer technologies that greatly increased the efficiency of processing data.

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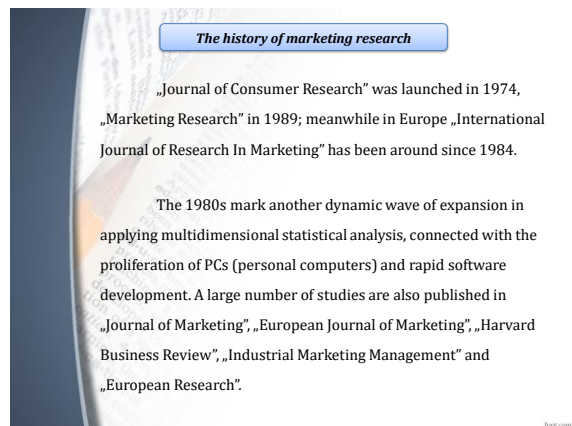


The history of marketing research

Around the same time first professional journals and magazines appeared, e.g. „Journal of Marketing Research“, „Journal of the Market Research Society“ and „Journal Advertising Research“.

In 1966 the pioneer book on the topic of applying econometric and statistical methods to marketing research was released - „Research for Marketing Decisions“ by Paul Green and Donald Tull.

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The history of marketing research

„Journal of Consumer Research“ was launched in 1974, „Marketing Research“ in 1989; meanwhile in Europe „International Journal of Research In Marketing“ has been around since 1984.

The 1980s mark another dynamic wave of expansion in applying multidimensional statistical analysis, connected with the proliferation of PCs (personal computers) and rapid software development. A large number of studies are also published in „Journal of Marketing“, „European Journal of Marketing“, „Harvard Business Review“, „Industrial Marketing Management“ and „European Research“.

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Consumer preferences

One of the most important aspects of consumer behavior is its measurement and pinpointing his/her preferences. To the notion of preference the notion of utility is closely linked.

Utility is understood as subjectively perceived satisfaction derived from a certain consumption structure. Due to a fact that it is not possible to directly measure the level of satisfaction experienced by a consumer, the notion of preference was introduced.

The notion of consumer preference is understood as follows:

„preference is a subjective evaluation or evaluation system that influences a consumer making a given choice. Preference occurs when a consumer chooses a certain need, good or service over other needs, goods or services that are an option. The choice is usually determined by accepted value system“.

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The basic terms

1) Most important terms:

- Utility, and utility measurement
- Preferences
- Types of preferences: stated and revealed
- Data, data analysis, information
- Microeconometrics and microdata

2) Stated preferences measurement:

- Attributes, objects.
- Compositional, **decompositional**, mixed
- Decompositional approach: **Conjoint analysis methods** and **Discrete choice methods**.

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Economic context of preferences

1. **Homo oeconomicus** – the concept of rational choice (Adam Smith 1723-1790)
2. **Utility** – measure of fulfill needs and justification of the choice
3. **Preferences** – the consumer's ability to order and choose products and/or services offered on the market under given conditions
4. Category of **preferences** is used to measure (quantify) utility
5. **Revealed preferences** – these are real (historical) market decisions of consumers
6. **Stated preferences** – these are hypothetical (declared) market behaviors of consumers

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Data, micro data, data analysis, information

The data – represents the results of measurement (numbers, symbols). In context of preference evaluation we deal with microdata (from microeconometrics methods).

Data analysis – statistical and econometrical methods used do explore the data ("to mine" the information that is somewhere within the data)

Information – the factor decreasing our lack of knowledge (it reduces the uncertainty) about the object, phenomenon, process.

Data → Information → Knowledge → Wisdom

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Microeconometrics

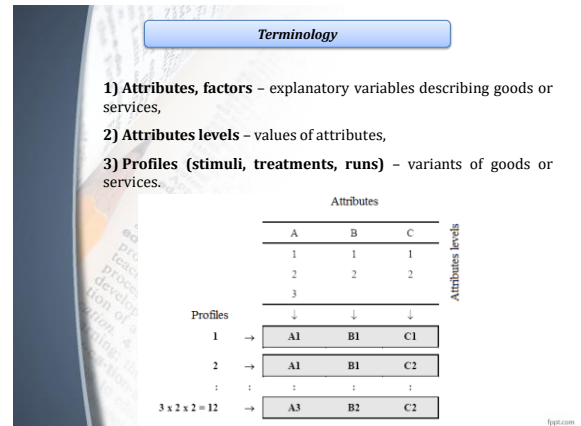
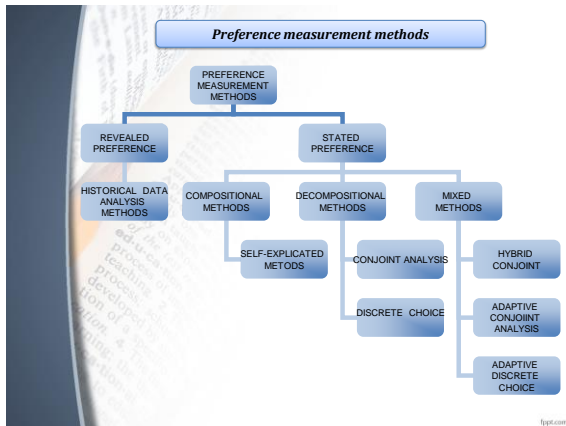
Microeconometrics is an interface between economics and statistics. It encompasses economic theory and statistical methods to analyze microdata, i.e. economic information about individuals, households, firms.
<http://www.nobelprize.org> (2000)

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Microeconometrics – distinguishing features

- Evaluation of individual behavior (consumers, companies, households, etc.).
- Microdata analysis at individual level. Low level of data aggregation allows to observe phenomenon that could not be seen from higher levels of data.
- Large number of observations (huge amount of microdata).

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Self-Explicated, Multi-Attribute Models

- Self-explicated models use a combination of the questions: “Which brands do you prefer?” and “How important is the brand?”
 - For each attribute (brand, price, performance, etc.) respondents rate or rank the levels within that attribute.
 - Respondents rate an overall importance for the attribute, when considering the various levels involved.
- Preference scores (utilities) can be developed by combining the preferences for levels with the importance of the attribute overall.
- Self-explicated models can be used to study many attributes and levels in a questionnaire.

Decompositional approach

The main aim of the research is to evaluate (estimate) consumer preferences according to presented objects – so trade-offs choices are needed.

The variables that are describing objects are called **attributes** or **factors** and their realizations (values) are called **levels**.

Attributes and factors are used to generate different variants of products or services (called **profiles, stimuli, runs**). The maximum number of profiles depends on the number of attributes and levels (multiplication of all the levels).

Respondents evaluate profiles according to their preferences. These values are called total utilities (empirical utilities). They are used to **decompose** total utility of a profile to obtain part-worth utilities for each level of each attribute.

Decompositional approach

Conjoint analysis originated in mathematical psychology by psychometricians and has been developed since mid-sixties also by researchers in marketing and business. Conjoint analysis is a statistical method for finding out how consumers make trade-offs and choose among competing products or services. It is also used to predict (simulate) consumers' choices for future products or services.

Discrete choice methods – their general concept results from random utility theory. The process of selecting the profiles is of probabilistic nature, as the behavior of consumers is not always predictable and consistent. This means that – under identical conditions and from identical set of options – consumer choices may differ in time.

What is Conjoint Analysis (CA)?

- Conjoint measurement theory proposed by Luce and Tukey in psychology in 1964.
- Research technique developed in the early 1970s.
- It was applied in marketing researches in 1971 by Green and Rao.
- Measures how buyers value components of a product/service bundle.
- Dictionary definition - “Conjoint: Joined together, combined.”
- Marketer’s catch-phrase - “Features **CONSIDERED JOINTLY**”.

Conjoint measurement and conjoint analysis

The main purpose of the conjoint analysis is to estimate part-worth utilities for attribute levels. Part-worth utilities are estimated for each respondent separately and as average values for the whole sample.

Estimated part-worth utilities allow to estimate following values:

- Total theoretical utilities of profile for all respondents.
- Average total utilities in the sample.
- Average attribute importance.
- Average total utilities in the segments (clusters) of respondents.

Conjoint analysis model can be estimated:

- **At individual level** (number of models is equal to the number of respondents).
- **At aggregated level** (one model for whole sample is estimated).

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Data gathering

There are four main methods of data gathering:

1. Conjoint analysis
 - Full profile method.
 - Pairwise attribute comparison.
 - Pairwise profile comparison.
2. Discrete choice methods
 - Choice from the full profile sets.

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Data gathering - example

Attributes and levels:

1. Country (5)
 - a) Poland
 - b) Germany
 - c) Italy
 - d) Great Britain
 - e) France
2. Price (3)
 - a) up to 10 PLN
 - b) 10 - 20 PLN
 - c) above 20 PLN
3. Type of coffee (3)
 - a) instant
 - b) ground
 - c) beans
4. Package (3)
 - a) glass
 - b) folic
 - c) Can
5. Weight (3)
 - a) 100 g
 - b) 250 g
 - c) 500 g

Number of profiles:
 $5 \times 3 \times 3 \times 3 \times 3 = 405$ - full factorial design
 16 - fractional factorial design

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Data gathering - conjoint analysis

Full profile method

No	COUNTRY	PRICE	TYPE OF COFFEE	PACKAGE	WEIGHT	RATING
1	Germany	10-20 PLN	instant	glass	100 g	
2	Poland	up to 10 PLN	ground	folic	250 g	
3	Italy	above 20 PLN	beans	folic	250 g	
...	
12	France	above 20 PLN	instant	can	500 g	
13	Poland	up to 10 PLN	ground	folic	100 g	
14	Germany	above 20 PLN	ground	glass	100 g	
15	G. Britain	10-20 PLN	beans	can	500 g	
16	Poland	up to 10 PLN	instant	glass	50 g	

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Data gathering - conjoint analysis

Pairwise attribute comparison

		PRICE		
		up to 10 PLN	10-20 PLN	above 20 PLN
PACKAGE	glass			
	folic			
	can			

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Data gathering - conjoint analysis

Pairwise profile comparison

PROFILE A		PROFILE B	
COUNTRY	Poland	COUNTRY	Germany
PRICE	10-20 PLN	PRICE	above 20 PLN
TYPE OF COFFEE	instant	TYPE OF COFFEE	ground
PACKAGE	glass	PACKAGE	folic
WEIGHT	100 g	WEIGHT	250 g

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Data gathering

In the traditional conjoint analysis **full profile method** is usually used. It uses the whole set of possible elements (combination of all attributes and levels).

In this method **consumer evaluates the profiles** according to his/her own preferences regarding attributes and levels. The respondent may rank the profiles or indicate the attractiveness of profile.

Experiment planning methods are used to reduce the total number of profiles (due to human perception limitations).

Important early articles

- Luce, Duncan and John Tukey (1964), "Simultaneous Conjoint Measurement: A New Type of Fundamental Measurement," *Journal of Mathematical Psychology*, 1, 1-27
- Green, Paul and Vithala Rao (1971), "Conjoint Measurement for Quantifying Judgmental Data," *Journal of Marketing Research*, 8 (Aug), 355-363
- Johnson, Richard (1974), "Trade-off Analysis of Consumer Values," *Journal of Marketing Research*, 11 (May), 121-127
- Green, Paul and V. Srinivasan (1978), "Conjoint Analysis in Marketing: New Development with Implications for Research and Practice," *Journal of Marketing*, 54 (Oct), 3-19
- Louviere, Jordan and George Woodworth (1983), "Design and Analysis of Simulated Consumer Choice or Allocation Experiments," *Journal of Marketing Research*, 20 (Nov), 350-367

Pros and cons of conjoint analysis

Advantages:

- Allows to choose preference measurement scale,
- Easy experiment design (unlike in the discrete choice methods),
- Allows to estimate utilities at individual (respondent) level,
- Individual utilities make the market segmentation much easier,

Disadvantages:

- The profile evaluation done by respondent does not reflect real choices,
- The number of attributes is limited,
- Sometimes fractional factorial design can not be used,

Data gathering – discrete choice methods

Choice from the full profile sets

COUNTRY	PRICE	TYPE OF COFFEE	PACKAGE	WEIGHT	CHOICE
Poland	above 20 PLN	instant	glass	100 g	1
Germany	up to 10 PLN	instant	folic	100 g	2
Italy	10-20 PLN	ground	can	250 g	3
G. Britain	10-20 PLN	beans	folic	500 g	4
France	above 20 PLN	instant	glass	200 g	5
None of the above					6

Discrete choice methods – characteristics

Second method that represents decompositional approach is the discrete choice method. It was introduced by Louviere and Woodworth for marketing research problems in 1983.

In 2000 James Heckman and Daniel McFadden received Nobel prize in economics:

- James Heckman for development of theory and analysis methods - samples,
- Daniel McFadden for development of theory and analysis methods - **discrete choice**.

When using discrete choice methods researcher does not ask respondent (consumer) to rank or order profiles but allows him/her to choose one of them or resign from choice.

Discrete choice methods – characteristic

Discrete choice methods are based on probabilistic models, which describe the probability that a profile from a set of profiles will be chosen.

The choice of the profiles is affected by the attributes and respondent characteristics. These variables are usually discrete (they are categories and nominal variables).

The main aims of estimation of a discrete choice model are:

- estimation of choice probabilities for profiles,
- estimation of attributes importance,
- respondent (customer) segmentation,
- preference forecasting.

Discrete choice methods - characteristic

Discrete choice model can be estimated at:

- aggregate level (one model for all sample),
- segment level (number of models is equal number of segments; may be used latent class model),
- individual level (using hierarchical Bayes model).

Results of estimation discrete choice model may be used to:

- elicitation (identification) consumers preferences,
- market share analysis,
- forecasting consumer preferences,
- consumers segmentation.

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Hazard ratio

In the process of estimation we receive (like in conjoint analysis) - total utilities of profiles, part-worth utilities of attributes levels and **hazard ratio**. Hazard ratio helps to assess obtained results:

- if hazard ratio is greater than 1 we assume that the attribute is a stimulant for a probability of choice,
- if hazard ratio is lower than 1 we assume that the attribute is a destimulant for a probability of choice,
- if hazard ratio is equal to 1 we assume the attribute has no significant influence on the probability of choice.

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Discrete choice methods strengths

- Questions closely mimic what buyers do in real world: choose from available products or "choose none" option
- Paper or Computer/Web based interviews possible (no dedicated software in needed)

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Discrete choice methods weaknesses

- Usually requires larger sample sizes than with CA or ACA
- Tasks are more complex, so respondents can process fewer attributes (6 or less)
- Complex tasks may encourage response simplification strategies
- Analysis more complex than with CA or ACA

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Similarities and differences between conjoint analysis and discrete choice method

Element	Conjoint analysis	Discrete choice method
Theoretical background	conjoint measurement	random utility concept
Number of attributes	up to 10 (usually up to 6)	6-8
Number of levels	up to 15	9-15
Questionnaire	pen and paper, PC-aided	pen and paper, PC-aided
Data gathering	full profile, pairwise, attribute comparison	choice made from sets of profiles
Scale of measurement	ratio, interval, ordinal	nominal
Model	linear, additive	linear or not, additive, considering interactions
Estimation	OLS, LINMAP, MONANOVA, PREFMAP, CSP	MNL, MNP, CLM, HB, NCLA
Estimation level	individual, segment	individual, segment, aggregate
Where can it be applied?	segmentation, market share simulation	market share simulation, estimation of demand

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Conjoint analysis vs. Discrete choice methods

Conjoint analysis

Pros:

- allows to choose scale of measurement,
- simplicity of experiment design,
- allows to estimate part-worth at individual level,
- part-worth estimated at individual level make the market segmentation much easier.

Cons:

- they are far away from real market choices,
- they do not allow to resign from making a choice,
- limited number of attributes.

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Pros and cons of decompositional methods

Discrete choice methods

Pros:

- a) they are closer to real market choices,
- b) allow to resign from making a choice,
- c) estimates model parameters at aggregate level (it allows to estimate market shares for new profiles).

Cons:

- a) gathered data provides less information,
- b) needs much more data (observations),
- c) they do not allow to estimate different models for each respondent (segmentation can not be done without e.g. latent class analysis).

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Part II

Empirical application

1. Empirical examples:
 - Conjoint analysis
 - Discrete choice methods
2. Conjoint analysis in R programm – example
3. Sawtooth Software – online examples
 - Conjoint analysis
 - Adaptive Conjoint Analysis
 - Discrete Choice Methods
 - Adaptive Discrete Choice Methods

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Example CA

Preference analysis for university customers (students)

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The research

- I. **The product:**
Customer (students) preferences
- II. **Attributes and levels:**
 1. **Communication with teachers (X₁):**
a) e-mail, b) individual meetings, c) phone.
 2. **Teaching material provided (X₂):**
a) on paper, b) via mail, c) other (i.e. own notes)
 3. **How the problem is presented (X₃):**
a) chalk and board, b) foil projector, c) multimedia projector.
 4. **Communication with administration of the university (X₄):**
a) e-mail, b) phone, c) individual.
 5. **Elicitation forms for students (X₅):**
a) individual projects, b) case studies, c) exercises, tasks to solve at home.
- All profiles:** $3 \times 3 \times 3 \times 3 \times 3 = 243$
- III. **Profiles:** 18 profiles obtained with R software (fractional design).

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Profiles

No.	Communication with teachers	Teaching material	Presentation	Communication with administration	Elicitation forms
1	individual	other	chalk and board	e-mail	individual projects
2	phone	e-mail	multimedia projector	e-mail	individual projects
3	phone	paper	foil projector	phone	individual projects
4	individual	e-mail	multimedia projector	phone	individual projects
5	e-mail	paper	chalk and board	individual	individual projects
6	e-mail	other	foil projector	individual	individual projects
7	individual	paper	chalk and board	e-mail	case studies
8	e-mail	e-mail	foil projector	e-mail	case studies
9	phone	other	chalk and board	phone	case studies
10	e-mail	other	multimedia projector	phone	case studies
11	individual	e-mail	foil projector	individual	case studies
12	phone	paper	multimedia projector	individual	case studies
13	phone	other	foil projector	e-mail	exercises, tasks
14	e-mail	paper	multimedia projector	e-mail	exercises, tasks
15	e-mail	e-mail	chalk and board	phone	exercises, tasks
16	individual	paper	foil projector	phone	exercises, tasks
17	phone	e-mail	chalk and board	individual	exercises, tasks
18	individual	other	multimedia projector	individual	exercises, tasks

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Total utility of a profile

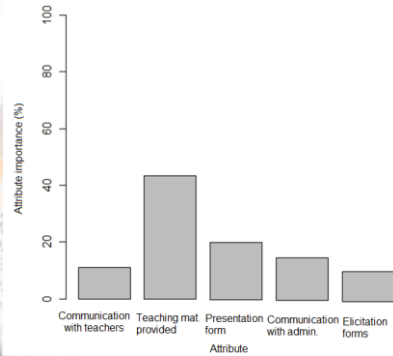
No.	Communication with teachers	Teaching material	Presentation	Communication with administration	Elicitation forms	Total utility
1	individual	other	chalk and board	e-mail	individual projects	5.13
2	phone	e-mail	multimedia projector	e-mail	individual projects	6.36
3	phone	paper	foil projector	phone	individual projects	5.68
4	individual	e-mail	multimedia projector	phone	individual projects	6.20
5	e-mail	paper	chalk and board	individual	individual projects	5.40
6	e-mail	other	foil projector	individual	individual projects	5.12
7	individual	paper	chalk and board	e-mail	case studies	5.39
8	e-mail	e-mail	foil projector	e-mail	case studies	6.14
9	phone	other	chalk and board	phone	case studies	4.57
10	e-mail	other	multimedia projector	phone	case studies	5.24
11	individual	e-mail	foil projector	individual	case studies	5.72
12	phone	paper	multimedia projector	individual	case studies	5.36
13	phone	other	foil projector	e-mail	exercises, tasks	5.07
14	e-mail	paper	multimedia projector	e-mail	exercises, tasks	6.02
15	e-mail	e-mail	chalk and board	phone	exercises, tasks	5.84
16	individual	paper	foil projector	phone	exercises, tasks	5.49
17	phone	e-mail	chalk and board	individual	exercises, tasks	5.47
18	individual	other	multimedia projector	individual	exercises, tasks	5.11

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Part-worth utilities

No.	Attribute	Level	Part-worth
1	Communication with teachers	e-mail	0,114
		individual	0,011
		phone	-0,125
2	Teaching material provided	paper	0,012
		e-mail	0,460
		other	-0,472
3	How the problem is presented?	chalk and board	-0,209
		foil projector	-0,010
		multimedia projector	0,219
4	Communication with university administration	e-mail	0,175
		phone	-0,028
		individual projects	0,119
5	Elicitation forms for students	case studies	-0,107
		exercises, tasks to solve	-0,011

Attribute importance



Final remarks

- The most attractive profile was the 2-nd profile (phone contact with teacher, e-mail form of material, multimedia projector used to present the material, e-mail used to contact the administration).
- The least attractive was 9-th profile (phone contact with teacher, other form of material (i.e. own notes), chalk and board used to present the problem, and phone used to contact the administration).
- The most important attribute is the form of the materials provided, then how this material was presented, communication (with teachers and administration), elicitation forms for students.

Example CA

Preference analysis of bank customers (banking products)

Research design

I. The product:
Bank account choices of bank customers

II. Attributes and levels:

- Bank account access via mobile devices (X_1):
a) yes, b) no.
- Bank account commission (X_2):
a) yes, b) no.
- Credit card payment return (X_3):
a) yes, b) no.
- Fee for withdrawal in foreign ATM machines (X_4):
a) yes, b) no.
- Credit card free of charge (X_5):
a) yes, b) no.

III. Profiles: respondents were asked to make a choice between 28 pairs of profiles (fractional factorial design prepared with R software). Full factorial design contains 32 profiles, fractional factorial design – 8 profiles. Respondents were asked to make a choice between 28 pairs of pro- files (fractional factorial design prepared with R software).

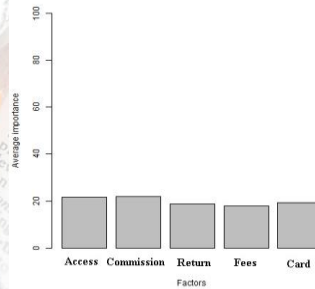
Research design

PROFILE	BANK ACCOUNT ACCESS VIA MOBILE DEVICES	BANK ACCOUNT COMMISSION	CREDIT CARD PAYMENT RETURN	FEE FOR WITHDRAWAL IN FOREIGN ATM MACHINES	CREDIT CARD FREE OF CHARGE
1	no	no	yes	yes	yes
2	yes	yes	no	yes	yes
3	no	yes	yes	no	yes
4	yes	no	no	no	yes
5	yes	no	yes	yes	no
6	no	yes	no	yes	no
7	yes	yes	yes	no	no
8	no	no	no	no	no

Total utilities of the profiles

PROFILE	BANK ACCOUNT ACCESS VIA MOBILE DEVICES	BANK ACCOUNT COMMISSION	CREDIT CARD PAYMENT RETURN	FEE FOR WITHDRAWAL IN FOREIGN ATM MACHINES	CREDIT CARD FREE OF CHARGE	TOTAL UTILITY (RANK)
1	no	no	yes	yes	yes	8
2	yes	yes	no	yes	yes	2
3	no	yes	yes	no	yes	4
4	yes	no	no	no	yes	6
5	yes	no	yes	yes	no	5
6	no	yes	no	yes	no	3
7	yes	yes	yes	no	no	1
8	no	no	no	no	no	7

Attributes importance



Remarks

- 1.The most important attribute is access to bank account via mobile devices and the commission.
- 2.The most attractive profile was the 7-th profile: bank account with access via mobile devices, with some commission, but with returns for credit card usage. This account does not allow to withdraw money for free from foreign ATM machines and credit card is not free of charges.

Example CA

Preference analysis of tea consumers (in R programm)

Exmple in R programm

Preference analysis of tea consumers
Attributes and levels:

1. Price
 - a) low
 - b) average
 - c) high
2. Type
 - a) black
 - b) green
 - c) red
3. Kind
 - a) bags
 - b) granulated
 - c) leaf
4. Aroma
 - a) yes
 - b) no

Number of all profile: $3 \times 3 \times 3 \times 2 = 54$
Fractional design: 13.



Example

CA Sample Survey

http://www.sawtoothsoftware.com/demos/cva/cgi-bin/ciwweb.pl?hid_studyname=cva&hid_pagenum=0



Example

ACA Sample Survey

http://www.sawtoothsoftware.com/demos/aca/cgi-bin/ciwweb.pl?hid_studname=aca&hid_pagenum=0

Example CBC

Light beer consumer preference analysis with application of SAS/STAT software.

Research characteristics

Attribute	Levels
Country of origin	Poland, Germany, Czech Republic, Holland, Denmark
Price range	Up to 2.00 PLZ, 2.00-4.00 PLZ, above 4.00 PLZ
Alcohol content	Up to 1.0%, 1.8-5.0%, above 5.0%
Packaging type	Bottle, can, mug
Packaging volume	0.33 l, 0.5 l, above 0.5 l

Research characteristics

- Factor experiment:
 - full-factorial: 3⁴ sets (20 variables with 3 levels)
 - candidate set: 19 683 sets
 - saturated (minimal) design size: 20*(3-1)+1=41 sets
 - used in the research design size: 45 sets
 - efficiency of factorial design: D=85.96
- Design of the research:
 - number of blocks: 3
 - number of sets per block: 15
 - number of profiles per set: 6 (5 + „no choice” option)
- Number of questionnaires:
 - distributed: 300
 - filled in (used): 235

Designing the choice experiment

1. Select your preferred profile of light beer or 'no choice' option

Country of origin	Price range	Alcohol content	Packaging type	Packaging volume	Option no.
Poland	2.00-4.00 PLZ	above 5.0%	mug	above 0.5 l	1
Germany	above 4.00 PLZ	up to 1.0%	can	0.5 l	2
Czech Republic	above 4.00 PLZ	up to 1.0%	can	0.33 l	3
Denmark	2.00-4.00 PLZ	1.8-5.0%	bottle	0.5 l	4
Holland	up to 2.00 PLZ	up to 1.0%	mug	0.33 l	5
None of the above					6

Designing the choice experiment

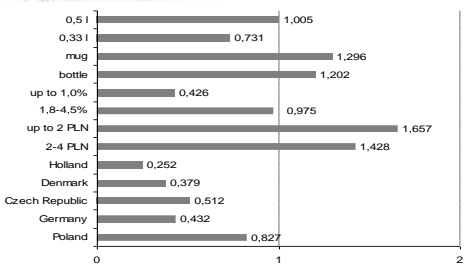
Results

Variable Label	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	
Country of origin	Poland	1	-0.19039	0.08048	5.5779	0.0182	0.827
	Germany	1	-0.84030	0.08626	94.8857	<.0001	0.432
	Czech Republic	1	-0.66955	0.08359	64.1529	<.0001	0.512
	Denmark	1	-0.96916	0.09008	115.7588	<.0001	0.379
	Holland	1	-1.37733	0.09538	206.5386	<.0001	0.252
none	0	0	0	0	0	0	
Price range	2-4 PLN	1	0.36644	0.05740	38.5609	<.0001	1.428
	up to 2 PLN	1	0.50510	0.05521	83.7052	<.0001	1.657
	above 4 PLN	0	0	0	0	0	0
Alcohol content	none	0	0	0	0	0	0
	1,8-4,5%	1	-0.02562	0.05012	0.2614	0.6092	0.975
	above 5.0%	1	-0.85350	0.05995	202.7177	<.0001	0.426
Packaging type	none	0	0	0	0	0	0
	bottle	1	0.18360	0.05470	11.2653	0.0008	1.202
	mug	1	0.25960	0.05625	21.3002	<.0001	1.296
Packaging volume	none	0	0	0	0	0	0
	0,33 l	1	-0.31304	0.05465	32.8142	<.0001	0.731
	above 0,5 l	1	0.00462	0.05182	0.0080	0.9289	1.005

Results

Country of origin	Price range	Alcohol content	Packaging type	Packaging volume	Probability
<i>Highest probabilities of choice</i>					
Poland	up to 2 PLN	above 5.0%	mug	above 0.5 l	0.0104
Poland	up to 2 PLN	1.8-4.5%	mug	above 0.5 l	0.0102
Poland	up to 2 PLN	above 5.0%	bottle	0.5 l	0.0097
Poland	up to 2 PLN	1.8-4.5%	bottle	above 0.5 l	0.0094
Poland	2-4 PLN	above 5.0%	mug	above 0.5 l	0.0090
<i>Lowest probabilities of choice</i>					
Holland	above 4 PLN	up to 1.0%	bottle	above 0.5 l	0.0008
Denmark	above 4 PLN	up to 1.0%	can	0.33 l	0.0007
Holland	2-4 PLN	up to 1.0%	can	0.33 l	0.0007
Holland	above 4 PLN	up to 1.0%	can	above 0.5 l	0.0006
Holland	above 4 PLN	up to 1.0%	bottle	0.33 l	0.0006

Results – hazard ratio



Results

- Consumption of nationally-brewed beer dominates on the Polish beer market.
- Choice of beer profile is determined (in the order of importance) by:
 - price range,
 - packaging type,
 - packaging volume,
 - alcohol content,
 - country of origin.
- Choice probabilities is positively stimulated by:
 - price range up to 2 PLN ,
 - price range of 2-4 PLN ,
 - packaging type – mug ,
 - packaging type – bottle ,
 - packaging volume – 0.5 l .

Example CBC

Travel agency customer preference analysis with application of SAS/STAT software.

Research characteristics

The research

Revealed preferences of travel agencies customers – the choices concerning different holiday offers.

The aim

Identification of attribute levels which have most important impact on the choice – they decide which offer will be chosen.

Recognizing the structure of choices holiday offers (deals).

Attributes and levels

Attributes	Levels
The place	sea, lake, mountains, sightseeing, does not matter
Accommodation	camping (B), apartment (B), hotel (B&B)
Travel by	car, bus, plane
The price	less than 1500 PLN (375 €) per week, from 1500 to 3000 PLN (375-750 €) per two weeks, more than 3000 PLN (750 €) per two weeks
Country	in Poland, in Europe, outside Europe

The experiment

Full factorial design: $3^{4 \times 5}$ sets (5 profiles described by 4 attributes – 3 levels each)

Total number of sets in full design: 3 486 784 401

Minimal experiment size: $20 \times (3 - 1) + 1 = 41$ sets

In the research 45 sets were used

Efficiency of the experiment: $D = 85,96$

The experiment

Number of blocks used: 3

Number of profiles in each block 15

Number of profiles: 6 (5 profiles describing holiday offer + option „None of them”)

Number of evaluated profiles: $3 \times 15 \times 6 = 270$

The research – questionnaire

Number of questionnaires:
distributed: 440,
used in the research: 394.

Number of questionnaires in each block:
block 1 – 130,
block 2 – 130,
block 3 – 134.

Totally we get 35 460 observations
(15 sets * 6 profiles * 394 respondents)

Sample of the profiles one of the sets

PLACE	ACCOMMODATION	TRANSPORT	PRICE	COUNTRY	I WILL CHOOSE
sea	camping (B)	car	above 3000 PLN (for 2 weeks)	outside Europe	1
lake	apartment (B)	plane	1500 to 3000 PLN (for 2 weeks)	in Europe	2
mountains	apartment (B)	plane	1500 to 3000 PLN (for 2 weeks)	in Poland	3
sightseeing	camping (B)	bus	less than 1500 PLN (per week)	in Europe	4
any	hotel (B&B)	plane	above 3000 PLN (for 2 weeks)	in Poland	5
			None of them		6

The gathered data

1	1	5	5	5	5	5	5	5	5	5	5	5	5	5		
4	1	2	2	2	2	2	2	2	2	2	2	2	2	2		
7	1	4	1	5	2	3	1	6	5	5	3	4	4	1	2	1
10	1	3	3	6	6	6	3	6	6	3	6	3	6	6	6	3
13	1	1	1	5	3	1	2	1	3	2	5	4	2	2	4	5
16	1	6	6	2	1	4	3	5	1	3	6	2	1	1	6	5
19	1	4	3	3	2	3	1	2	5	5	1	1	4	1	2	2
22	1	4	6	6	2	3	3	6	5	1	1	2	5	1	2	4
25	1	6	2	6	2	2	6	2	6	6	6	6	6	6	6	6
28	1	4	4	3	2	3	3	2	5	1	1	2	5	1	5	1

Parts of the data set

375	3	6	1	1	1	6	3	3	2	5	4	1	1	6	3	1
378	3	6	1	2	2	6	2	3	2	5	4	6	1	6	2	2
381	3	5	2	1	6	4	2	2	6	4	2	1	6	6	1	1
384	3	6	2	2	1	6	2	2	2	6	3	2	1	5	4	6
387	3	5	5	5	1	4	3	2	1	5	3	1	2	5	4	4
390	3	6	1	2	1	6	1	2	1	5	3	2	1	5	1	2
391	3	6	3	4	1	6	3	3	2	6	3	3	2	6	2	4
392	3	6	2	1	6	1	4	2	6	2	2	1	6	2	3	1
393	3	6	5	3	1	6	1	2	2	6	6	1	2	6	6	1
394	3	6	2	1	2	6	2	1	2	6	2	1	1	5	2	5

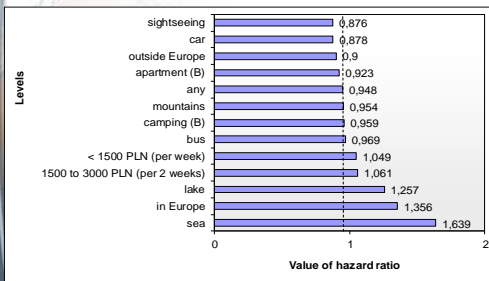
The results

Variable	D	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	
Place	Sea	1	0.49417	0.06153	64.5034	<.00001	1.639
	Lake	1	0.22887	0.06435	12.6484	0.0004	1.257
	Mountains	1	-0.04748	0.06408	0.5355	0.4643	0.954
	Sightseeing	1	-0.13182	0.06522	4.0856	0.0433	0.876
Accommodation	Any	1	-0.05339	0.06591	0.6561	0.4179	0.948
	None	0	0				
	Apartment (B)	1	-0.08058	0.03836	4.4135	0.0337	0.923
	Camping (B)	1	-0.04234	0.03896	1.1813	0.2771	0.959
Transport	None	0	0				
	Bus	1	-0.03180	0.03738	0.7239	0.3949	0.969
	Car	1	-0.12988	0.03938	10.8751	0.0010	0.878
	Plane	0	0				
Price	None	0	0				
	Less than 1500 PLN (week)	1	0.04791	0.03924	1.4909	0.2221	1.049
	1500 to 3000 PLN (2 weeks)	1	0.05903	0.03991	2.1882	0.1391	1.061
	Above 3000 PLN (2 weeks)	0	0				
Country	None	0	0				
	outside Europe	1	-0.10509	0.03928	7.1568	0.0075	0.900
	in Europe	1	0.30420	0.03692	67.8793	<.00001	1.356
	in Poland	0	0				

Estimated choice probabilities

Place	Accommodation	Transport	Price	Country	Probability
The highest probability					
sea	hotel (B&B)	plane	< 1500 PLN (per 1 week)	in Europe	0,0076
sea	hotel (B&B)	bus	1500 to 3000 PLN (per 2 weeks)	in Europe	0,0075
sea	camping (B)	plane	1500 to 3000 PLN (per 2 weeks)	in Europe	0,0074
The lowest probability					
any	apartment (B)	car	< 1500 PLN (per 1 week)	outside Europe	0,0024
sightseeing	apartment (B)	bus	> 3000 PLN (per 2 weeks)	outside Europe	0,0023
sightseeing	camping (B)	car	< 1500 PLN (per 1 week)	outside Europe	0,0022

Hazard ratio



Final remarks

- The stimulating impact on the choice probability have:
 - Place: sea,
 - Country: in Europe,
 - Place: lake,
 - Price from 1500 to 3000 PLN (per 2 weeks),
 - Price less than 1500 PLN (per week).
- Following attributes have the impact on the choice: place, country, price, accommodation and transport
- Attribute levels that were not presented have no significant influence on the choice probability.



Example

CBC Sample Survey

http://www.sawtoothsoftware.com/demos/cbc/cgi-bin/ciwwweb.pl?hid_studynum=cbc&hid_pagenum=0



Example

CBC Sample Survey

http://www.sawtoothsoftware.com/surveys/baseball/cgi-bin/ciwwweb.pl?hid_studynum=baseball&hid_pagenum=0



Example
ACBC Sample Survey
http://www.sawtoothsoftware.com/demos/acbc/cgi-bin/ciwweb.pl?hid_studyname=acbc&hid_pagenum=0

lypt.com



Example
ACBC Sample Survey
http://www.sawtoothsoftware.com/demos/acbc_house/cgi-bin/ciwweb.pl?hid_studyname=acbc_house&hid_pagenum=0

lypt.com



Example
ACBC Sample Survey
http://www.sawtoothsoftware.com/demos/acbc_dine/cgi-bin/ciwweb.pl?hid_studyname=acbc_dine&hid_pagenum=0

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Thank You!

Dziękuję bardzo.

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