ProSeBiCA

Development of New Library Services by Means of Conjoint Analysis

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Motivation

Implications of the (self-) image of academic libraries as service-orientated institutions:

- Service development must be in line with user needs.
- User preference and acceptance have to be regarded as vital criteria for the assessment of library services.

Hence, this requires the implementation of marketing research techniques in order to

- establish and improve customer relationship management (CRM)
- create profound knowledge about the users and their needs ("customer intelligence")
- implement appropriate control tools for the library management

“However, by constantly assessing actual and potential customer wants and needs, prioritizing customer markets, and identifying the competition, libraries can (and must) enter the fray of a world that is customer-driven.”

(Christie Koontz, 2002)
Subject of the ProSeBiCA Project

ProSeBiCA is the German acronym for “prospective control of academic library services by means of conjoint analysis”.

Goals:
- Identification and assessment of possible future library services that presumptively satisfy user or rather customer needs
- Development of a comprehensive analysis and simulation framework for the whole range of library services based on preference measurement
- Empirical validation of a large-scale conjoint analysis design

Managerial perspectives:
- Preference-based library service development (short-term perspective)
- Preference-based strategic positioning of the library as a whole (long-term perspective)
Basics of Conjoint Analysis

What is conjoint analysis (CA)?
- Multivariate research technique developed in the 70s
- Measures how respondents (consumers) value attributes/components of a certain product/service bundle
- One of the most popular methods in marketing research

Main “streams” of CA:
- Traditional full-profile conjoint analysis
- Adaptive conjoint analysis *(ACA)*
- Choice-based conjoint analysis *(CBC)*, or discrete choice modeling

Current research foci:
- Improving parameter estimation (e.g. Hierarchical Bayes (HB))
- Consideration of large sets of attributes
- Online surveying (web-based CA)
ACA and CBC – The Principles

What is adaptive conjoint analysis (ACA)?
- Combination of
  - self-explicated approach (relative desirability of attribute levels and relative importance of attributes) and
  - trade-off CA (paired-comparisons of subsets of attributes)
- Pairwise conjoint questions focus on attributes of most importance to respondents, and are customized to be relevant and informative

What is choice-based conjoint analysis (CBC)?
- Technique to measure the preference for pre-defined combinations of attribute levels (full-profile CA)
- Based on econometric choice modeling (e.g. multinomial logit or HB)
- Enables realistic simulations of individual choice behavior

The omnipresent problem: Service bundles offered by libraries are mostly characterized by numerous attributes and attribute levels.
Practical Implementation

- Funded by the German Research Foundation (DFG)
- Carried out by the Bielefeld University Library and the Department of Business Administration & Economics
- ACA and CBC as the methodological basis

Milestones:

<table>
<thead>
<tr>
<th>Step</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idea generation step</td>
<td>Mar – Aug 2004</td>
</tr>
<tr>
<td>ACA survey Bielefeld University</td>
<td>Oct – Dec 2004</td>
</tr>
<tr>
<td>CBC survey Bielefeld University</td>
<td>May – June 2005</td>
</tr>
<tr>
<td>ACA + CBC survey Cottbus University</td>
<td>Nov – Jan 2005/06</td>
</tr>
<tr>
<td>Consolidation of results and preparation of CA guidelines</td>
<td>Feb – June 2006</td>
</tr>
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</table>
The ProSeBiCA ACA Model

AL services

Core business

Provision of media

Communication

Learning environment

Additional services

29 attributes and 118 levels, described by texts and images

Service areas

“attributes”

Service blocks

“levels”

29 attributes and 118 levels, described by texts and images
ACA Survey at Bielefeld University

Four question types: attribute preference levels, attribute importances, paired-comparison trade-off questions, calibration concepts

Example: Rating of attribute preference levels for “media stock”

- Expansion of printed objects
- Expansion of digital objects
- Contents of reading lists
- Educational software
- TV and radio archive
- E-books
The sample

- # of participants: \( N = 2,120 \) (students: 1,685; scientists: 174; others: 261)
- Sample representativeness: high (\( p < 0.1 \) for all demographics)

Demographics & additional questions: all

- Provision of media: 37 levels (\( N = 578 \))
- Communication: 24 levels (\( N = 455 \))
- Learning and working environment: 42 levels (\( N = 540 \))
- Additional services: 15 levels (\( N = 547 \))

General preferences
Distinction according to a-priori segments
Allocation according to benefit segments
Evaluation of service concepts by means of averaged part-worth utilities (PWU) – general preferences

Example 1: “Media stock related services”

- Expansion of printed objects: 0.263
- Expansion of digital objects: 0.159
- Contents of reading lists: 0.134
- E-books: -0.022
- Educational software: -0.147
- TV and radio archive: -0.152
Example 2: “Online publishing related services”

This result strongly supports the library’s activities in the field of open access and meets expectations to a great extent, but …
Preference for the academic search engine does not meet the expectations, i.e. innovations in this field need strong promotion, particularly in a “Google world”.

Example 3: “Search facilities related services”
CBC Survey at Bielefeld University

One question type: comparison of full profiles, including a NONE option

If these were your only options, which one would you choose? Choose by clicking one of the buttons below.

<table>
<thead>
<tr>
<th>Innovation strategy</th>
<th>Reactive</th>
<th>Selective</th>
<th>Progressive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add-on services with costs</td>
<td>Provision to a slight extent</td>
<td>Provision to a medium extent</td>
<td>Provision to a large extent</td>
</tr>
<tr>
<td>Degree of specialization</td>
<td>No exposed service specialization</td>
<td>Service specialization in selected fields</td>
<td>Focus on a few top performance services</td>
</tr>
<tr>
<td>Level of support</td>
<td>Unsupported working</td>
<td>Assisted work</td>
<td>Task delegation to librarians</td>
</tr>
<tr>
<td>Degree of digitization</td>
<td>Completely digitalized library</td>
<td>Conventional library</td>
<td>Completely digitalized library</td>
</tr>
<tr>
<td>Presentation of services</td>
<td>In a pragmatic and functional way</td>
<td>In an entertaining and animating way</td>
<td>In a pragmatic and functional way</td>
</tr>
</tbody>
</table>

NONE: I wouldn’t choose any of these options.
### CBC Survey at Bielefeld University

**PWU’s and related “strategy path”:**

<table>
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<th>Add-on services with costs</th>
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<tr>
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<td>No exposed service specialization</td>
<td>Unsupported working</td>
<td>Conventional library</td>
<td>In a pragmatic and functional way</td>
</tr>
<tr>
<td>0.663</td>
<td>0.486</td>
<td>0.231</td>
<td>0.303</td>
<td>1.205</td>
<td>0.300</td>
</tr>
<tr>
<td>Selective</td>
<td>Provision to a medium extent</td>
<td>Service specialization in selected fields</td>
<td>Assisted work</td>
<td>Completely digitized library</td>
<td>In an entertaining and animating way</td>
</tr>
<tr>
<td>0.582</td>
<td>0.676</td>
<td>0.791</td>
<td>0.746</td>
<td>-1.205</td>
<td>-0.300</td>
</tr>
<tr>
<td>Progressive</td>
<td>Provision to a large extent</td>
<td>Focus on a few top performance services</td>
<td>Task delegation to librarians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.081</td>
<td>-1.161</td>
<td>-1.021</td>
<td>-1.049</td>
<td>1.21</td>
<td>0.30</td>
</tr>
</tbody>
</table>

**Normalized span (NS)**

**Basis: HB estimation**

(N = 1,672)
Transferability

The surveys have shown that CA can be successfully adapted to the basic conditions of Bielefeld University Library, but further questions still remain to be answered:

**Contents:**
Are the available results unique to Bielefeld?
Is it possible to derive some general advice for the development of new library services?

**Method:**
Is the analysis and simulation framework flexible enough to be used by other academic libraries (in Germany)?

To answer these questions a reference survey was conducted at Cottbus University

… by co-operating with the local Information, Communication & Media Center and the Chair of Marketing & Innovation Management
The Combined Surveys at Cottbus University

- Full range ACA and CBC survey
  - with few, slight modifications (e.g. illustrations)
  - German and English implementations
- # of participants: \( N = 1,128 \)
  (students: 843; scientists: 141; others: 144)
- Sample representativeness: high \( (p < 0.1 \) for most demographics)

- Demographics & additional questions: all
  ACA survey:  Provision of media: \( N = 196 \)
  Communication: \( N = 196 \)
  Learning and working environment: \( N = 201 \)
  Additional services: \( N = 184 \)

  CBC survey:  \( N = 351 \)
Contrasting Bielefeld and Cottbus Study

Degree of Convergence:

- Average rank correlation between Bielefeld ACA and Cottbus ACA (for shared attributes): \( r = 0.85 \)
- … and between Bielefeld CBC and Cottbus CBC: \( r = 0.96 \)

Implications for service development:

- Individual preferences are partly determined by local conditions (e.g. the fields of study)
- Generalizability of the ACA results:
  - lowest for “learning and working environment” \( (r = 0.68) \)
  - highest for “communication” \( (r = 0.94) \)
- High cross-study homogeneity for scientists’ preferences

Implications for strategic positioning:

- Generalizability of the CBC results can be taken for granted
- Outstanding significance of the “degree of digitization”
### Some Simulation Results

**ACA-based utilization probabilities:**

<table>
<thead>
<tr>
<th></th>
<th>Students (N = 1,581)</th>
<th>Scientists (N = 167)</th>
<th>Others (N = 232)</th>
<th>Total (N = 1,980)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bielefeld</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worst Profile</td>
<td>35.95 %</td>
<td>32.66 %</td>
<td>36.63 %</td>
<td>35.96 %</td>
</tr>
<tr>
<td>Best Profile</td>
<td>72.31 %</td>
<td>70.87 %</td>
<td>70.82 %</td>
<td>72.16 %</td>
</tr>
<tr>
<td>Real Library</td>
<td>60.29 %</td>
<td>64.83 %</td>
<td>60.10 %</td>
<td>60.74 %</td>
</tr>
</tbody>
</table>

⇒ (Relative) Improvement potential: **31.55 %**

<table>
<thead>
<tr>
<th></th>
<th>Students (N = 732)</th>
<th>Scientists (N = 123)</th>
<th>Others (N = 119)</th>
<th>Total (N = 974)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cottbus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worst Profile</td>
<td>36.28 %</td>
<td>30.02 %</td>
<td>37.31 %</td>
<td>35.93 %</td>
</tr>
<tr>
<td>Best Profile</td>
<td>72.82 %</td>
<td>71.01 %</td>
<td>73.05 %</td>
<td>72.87 %</td>
</tr>
<tr>
<td>Real Library</td>
<td>59.28 %</td>
<td>56.91 %</td>
<td>57.83 %</td>
<td>58.62 %</td>
</tr>
</tbody>
</table>

⇒ (Relative) Improvement potential: **38.58 %**
The “Ideal” Bielefeld University Library

Core business

Provision of media

Communication

Learning environment

Additional services

AL services

\[ f(\text{Core}) = 0.75 \]
\[ f(\text{M}) = 0.59 \]
\[ f(\text{C}) = 0.15 \]
\[ f(\text{L}) = 0.26 \]
\[ f(\text{A}) = 0.25 \]

PWU_{M2,2} = 0.165
NS = 0.07

PWU_{C4,1} = 0.411
NS = 0.18

PWU_{L5,4} = 0.283
NS = 0.14

PWU_{A1,3} = 0.251
NS = 0.12

“Best” profile
Concluding Remarks

Methodical implications:

➢ The abstractness/intangibility of many services is a special challenge in conducting CA in libraries.

➢ ACA can be integrated in a hierarchical framework to account for the large-number-of-attributes-problem ($r_{ACA,AHP} \geq 0.95$).

➢ CBC enables realistic strategy simulations without “economic” risk.

Managerial implications:

➢ Local conditions determine local preferences, so me-too innovations can only be the second best option for new service development. (further evidence: “public library study 2005”; $N = 2,015$)

➢ The ProSeBiCA approach cannot guarantee the success of new service ideas, but it can help to anticipate their presumptive acceptance.
Concluding Remarks

Open challenges (from a scientific point of view):

- Prediction of demand volumes
- More comprehensive consideration of costs and satiation effects
- Representation of interactions between different service areas
- Temporal monitoring of preference and acceptance
Future Prospects

Depending on the availability of adequate resources, we would like to

... adapt the ProSeBiCA approach to other library systems, e.g. in the US

... “synchronize” the ProSeBiCA approach with the techniques offered by
CAPM and LibQUAL+, where possible

... improve customer intelligence by integrating preference, circulation,
and administrative data within a data warehouse

... build an interactive website providing tools for data-based decision
support and monitoring

More information at www.prosebica.de
ProSeBiCA Papers (Selection)


