Analysing the Buying Centre for Selling Software Products from AVL Automotive Powertrain Calibration Technologies:

Development of a Tailored Guideline and Application of Existing Methods

Diploma Thesis
written by
Markus Drescher

Technical University of Graz

Faculty of Mechanical Engineering and Economic Sciences

Institute of Business Economics and Industrial Sociology

O.Univ.-Prof. Dipl.-Ing. Dr.techn. Ulrich Bauer

Graz, Oktober 2013

In cooperation with:

AVL List GmbH

Supported by:

Institute of Business Economics and Industrial Sociology
Technical University Graz

EIDESSTATTLICHE ERKLÄRUNG

Ich erkläre an Eides statt, dass ich die vorliegende Arbeit selbstständig verfasst, andere als die angegebenen Quellen/Hilfsmittel nicht benutzt und die den benutzten Quellen wörtlich und inhaltlich entnommene Stellen als solche kenntlich gemacht habe.

Graz, am …… ……..

MARKUS DRESCHER
(Unterschrift)

STATUTORY DECLARATION

I declare that I have authored this thesis independently, that I have not used other than the declared sources / resources, and that I have explicitly marked all material which has been quoted either literally or by content from the used sources.

…… ……..

date MARKUS DRESCHER
(signature)

Acknowledgement

I would like to express my gratitude to all those who supported me to complete my diploma thesis.

In the first instance, I especially want to thank Mr Hans-Michael Kögeler and Mr Dave Rogers of AVL List GmbH, for giving me the possibility to write this thesis in an organisational environment and for helping me to specify the topic. Their intense supported during the whole process helped me to achieve my goals.

Furthermore, I have to thank Mr Nikolas Schuch, who shared his long-lasting experience with me and spent a lot of time supporting the practical part of the thesis. Moreover, I have to thank all sales employees of IC department and affiliates world-wide, for sharing their time, and especially their experiences and opinions with me.

In addition, I want to thank Mr Mats Ivarson, Nicolas Pereira and Daniel Veith who gave me feedback on the pre-test of the sales survey and thus helped to develop the final survey.

Finally, I would like to extend my sincerest thank to my supervisors of Institute of Business Economics and Industrial Sociology of TU Graz, Mrs Iris Uitz and Mr Volker Koch, who especially helped me to keep the formal requirements of the thesis and also supported me over this long period of time.

Abstract

This article deals with methods and theoretical approaches for analysing industrial buying behaviour, or as literature defines, the so-called buying centre analysis. In this context, the term buying centre (BC) describes a group of people, which are responsible for the industrial procurement process. Furthermore, the multi personal character of the BC causes inter alia an often complex and long-winded buying process, which is mostly difficult to understand for the selling company. Because of this, the theory of the BC stands in the centre point of this thesis. Moreover, the article describes qualitative and quantitative approaches of market research which aim to analyse a selected BC and prognosticate its buying decision, in respect to an underlying buying situation.

All in all, the topic of the thesis is motivated by the request of department Calibration Application (IC) of the company AVL List GmbH, in order understand and analyse the buying behaviour of an customer in a more efficient and systematic way. Thus, the target of the work is to develop a practical guidance for analysing the BCs of IC customers, and provide for the sales staff a standardised and qualitative approach to document the analysed data. Moreover, the application of a quantitative empirical market research instrument illustrates how to analyse and prognosticate the buying decision of a BC.

In a first step, a survey of the department internal sales staff is used to generate data about the actual situation in IC department. Especially the behaviour of IC sales people when analysing the customer as well as the specialities of IC customers BCs are pointed out in this step. Based on these data and referring to the theoretical concepts, a guideline for analysing the BC of IC department's customers is developed. The graphical illustration possibilities as well as the documentation templates, which are proposed therein, should support sales employees when storing the analysed data in a systematic way and facilitate the creation of customer-oriented sales strategies.

The second practical part of the thesis describes the application of an empirical-quantitative method to analyse the BC behaviour of a selected BC, the so-called multi-step-limit conjoint analysis (MeLimCA). Using this method of market research, the prognosis of the BC decision is based on a comparison of so-called group-related utility values which are derived for the competing products. Furthermore, as proposed by literature, the needed BC data are not created by a classical customer survey, rather they are generated by questioning company internal sales experts.

Finally, the results show the following: As the prognosticated buying decision of the exemplarily analysed BC (the BC for a historical buying situation has been analysed) corresponds to the real situation, the results are rated with a high logical value. Therefore, it was derived that also the intermediate results of the MeLimCA method – for example the relative importance of product attributes for different BC members – can be trusted. The intermediate data can then be used by sales employees to create BC-member-related sales strategies, or inform the product management about the ideal product for an analysed BC.

In the end of the paper, an additional point of the thesis discusses the possible application of a software tool of IC department for the data evaluation in the framework of the MeLimCA.

Kurzfassung

Die vorliegende Diplomarbeit beschäftigt sich mit Methoden und theoretischen Ansätzen zur Analyse von industriellem Kaufverhalten, oder wie es in der einschlägigen Literatur betitelt wird, mit der sogenannten Buying Center Analyse. Hierbei beschreibt der Ausdruck Buying Center (BC), ein industrielles Einkaufsgremium, welches im Normalfall aus mehreren Personen besteht und für den Beschaffungsprozess im Kollektiv verantwortlich ist. Der multipersonale Charakter des BC‘s ist unter anderem dafür verantwortlich, dass die Kaufentscheidung zu einem komplexen und oft langwierigen Prozess mutiert, welcher in der vorliegenden Arbeit theoretisch erörtert wird. Des Weiteren werden qualitative und quantitative Ansätze der Literatur beschrieben, die darauf abzielen, das BC eines potentiellen Kunden zu analysieren sowie dessen Kaufentscheidung, bezüglich einer konkreten Kaufsituation, zu prognostizieren.
Die Thematik der Diplomarbeit ist motiviert durch das Anliegen der Abteilung Calibration Application (IC) der Firma AVL List GmbH, ihrer Kunden, und insbesondere deren Kaufverhalten, besser verstehen und dokumentieren zu können. Aus diesem Grund ist es Ziel der Arbeit einen systematischen qualitativen Leitfaden zur BC Analyse für die Produkte ihrer Abteilung zu entwickeln, um den internen Vertriebsmitarbeiter eine standardisierte Vorgehensweise sowie eine einheitliche Dokumentation der Kundendaten zu ermöglichen. Im Weiteren soll die Anwendung eines ausgewählten Marktforschungsinstruments zeigen, wie die Kaufentscheidung in empirisch quantitativer Art und Weise, analysiert und prognostiziert werden kann.
Beginnend mit einer internen Vertriebsbefragung, werden im ersten Schritt des praktischen Teils der Arbeit zuerst Daten über die aktuelle Vorgehensweise der Vertriebsmitarbeiter bei der Kundenanalyse sowie Besonderheiten des Kaufverhaltens von IC Kunden generiert. Basierend auf diesen Daten, und in Anlehnung an die in der Literatur beschriebenen Konzepte, wird anschließend eine für die Abteilung IC angepasste Guideline zur Analyse von BCs, entwickelt. Die darin vorgeschlagenen Darstellungsmöglichkeiten von BC Daten sowie die systematische Dokumentation von Kundeninformationen soll die zukünftige Entwicklung von kundenspezifischen Verkaufsstrategien erleichtern.
In einem zweiten Schritt beschreibt der praktische Teil der Arbeit die empirisch-quantitative BC Analyse nach der sogenannten Mehrstufige Limit-Conjoint Analyse (MeLimCA). Mit Hilfe dieses Marktforschungsinstrumentes wird der gruppenbezogene Gesamtnutzen (der Gesamtnutzen für ein selektiertes BC) für verschiedene multiattributive Produkte der Produktgruppe [redacted], generiert. Der Vergleich dieser Nutzwerte erlaubt im Anschluss die Prognose der BC Entscheidung. Wie von der Literatur empfohlen werden die dafür benötigten Input Daten nicht durch eine klassische Kundenbefragung, sondern durch die Befragung von internen Vertriebsexperten generiert.
Schlussendlich zeigen die Ergebnisse der BC Analyse folgendes: Da die prognostizierte Kaufentscheidung des analysierten BC mit der Realität übereinstimmt wird den Ergebnissen ein hoher Wahrheitswert zugeschrieben. Somit wird angenommen, dass auch den Zwischenergebnissen der MeLimCA – zum Beispiel die relativen Wichtigkeiten der einzelnen Produkt Attribute für die einzelnen BC Mitglieder – zu vertrauen ist. Die auf diese Weise generierten Daten unterstützen einerseits die Vertriebsmitarbeiter bei der Erarbeitung von kundenspezifischen Strategien zur Durchdringung des BCs, und liefern andererseits dem Produktmanagement Informationen über das ideale Produkt für den analysierten Kunden (Komposition der Produktattribute). Schlussendlich wird eine allgemeine Anwendungsempfehlung der MeLimCA und ein Konzept für die Anwendung der MeLimCA in der Abteilung IC präsentiert. Des Weiteren werden zukünftige Anwendungsmöglichkeiten und Umsetzungsmöglichkeiten der vorgestellten Methode und Guideline aufgezeigt.
Im letzten Schritt der Arbeit wird die Verwendung eines Software Produktes der Abteilung IC zur Datenauswertung im Rahmen der MeLimCA diskutiert.

Table of Content

List of Abbreviations

ABCM	Advanced Buying Centre Map
ABM	Affiliate Business Manager
AM	Account Manager
AVL	Anstalt für Verbrennungskraftmaschinen List
B2B	Business-to-Business
BBCM	Basic Buying Centre Map
BC	Buying Centre
BDM	Business Development Manager
BM	Business Manger
CA	Conjoint Analysis
[redacted]	[redacted]
DMU	Decision Making Unit
DoE	Design of Experience
ECU	Engine Control Unit
EoO	Evaluation of Options
EV	Experience Value
FNN	Fast Neural Network
FoD	Focus of Dissatisfaction
FoP	Focus of Power
FoR	Focus of Receptivity
FPM	Free Poly Model
GAM	Global Account Manager
HCU	Hybrid Control Unit
HiL	Hardware in the Loop
IC	Department Calibration Application
INN	Intelligent Neural Network
IT	[redacted]
ITS	Division Instrumentation and Test Systems
KAM	Key Account Manager
LCA	Limit-Conjoint Analysis
MCT	[redacted]

MeLimCA	Multi-Step Limit Conjoint Analysis
OBB	Organisational Buying Behaviour
OEM	Original Equipment Manufacturer
OLS-Regression	Ordinary Leas Squares-Regression
PE	[redacted]
RBM	Regional Business Manager
RoC	Resolution of Concerns
RoN	Recognition of Needs
RSM	Response Surface Modeling
SBCM	Strategic Buying Centre Map
SE	Sales Engineer
SFDC	Salesforce.com
TCA	Traditional Conjoint Analysis
TCU	Transmission Control Unit
TR	[redacted]
TSS	Technical Sales Support
xCU	Any possible Control Unit

1 Introduction

This diploma thesis examines approaches of Business-to-Business (B2B) market research in order to support the target company in selling its products. Especially the area of organisational buying behaviour (OBB) research is subject matter of the work. The thesis was developed on behalf of AVL List GmbH and in cooperation with the Institute of Business Economics and Industrial Sociology of Technical University of Graz. This chapter will give the reader an introduction of the company and especially the business sector for which the thesis is conducted for. Furthermore, challenges and potentials in the area of marketing and sales, which the department is facing at the moment, will be pointed out in a description of the initial situation. Based on these findings, objectives for this thesis will be derived. The chapter is closed with the conceptual formulation and a description of the scope of analysis.

1.1 AVL List GmbH

AVL List GmbH is a globally acting company in the area of powertrain development as well as the associated measurement and simulation technology. All these working areas are supported by various software products, especially the sector of powertrain calibration. In this field of technique, calibration means the development of data sets for control units of the powertrain, for example the Engine Control Unit (ECU). For decades, the department *'Calibration Applications'* (IC), which is part of the division *'Instrumentation and Test Systems'* (ITS) of AVL headquarter Graz, is developing software solutions for the holistic calibration process, from data management, over automated test design and model based optimisation, to post processing and generation of the final calibration data. Today, the software solutions are sold world-wide and a growing impact on the company's total turnover over the last years is noticeable (see Figure 1).

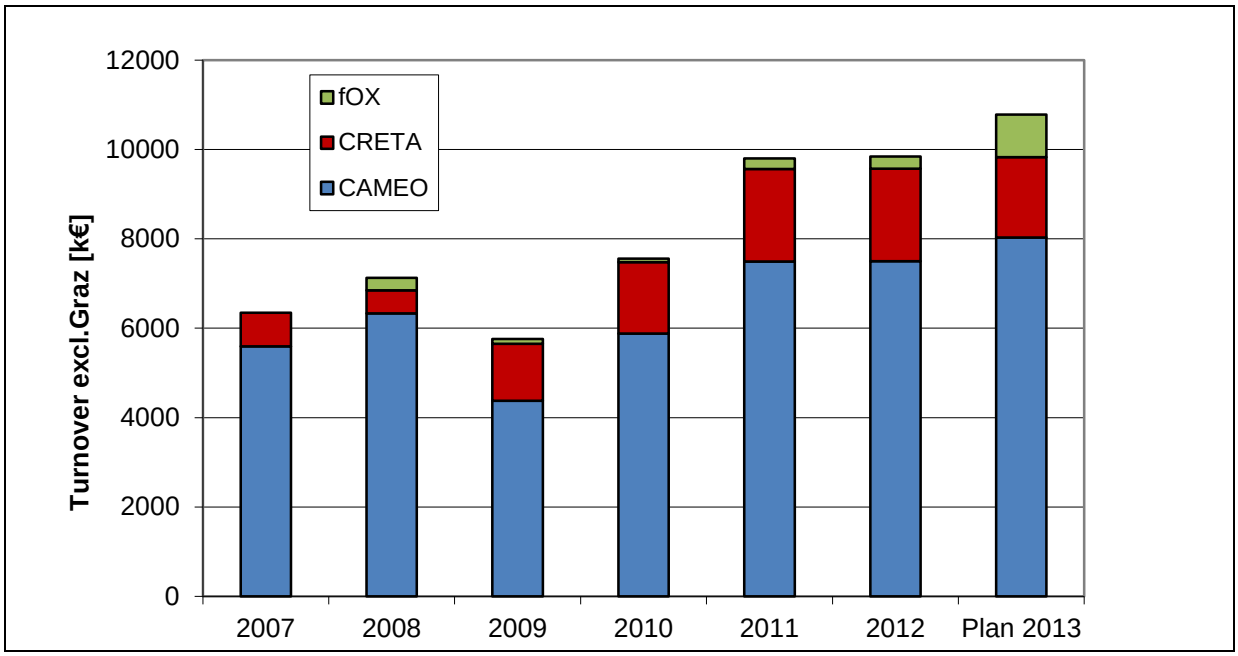


Figure 1: Turnover development of IC products exclusive Graz (Lüdigk, 2013) (Lüdigk, 2013)

1.2 Initial Situation

To give an overview of the sales and marketing situation of IC department, the following chapters will present the main challenges and potentials which have been identified. The findings are based on internal interviews, internal reports and personal experience of an internship in IC department in autumn 2012.

1.2.1 Unused market potential

Starting with information, which is often the most important for marketers, Figure 2 illustrates the actual market situation of the products of IC department.

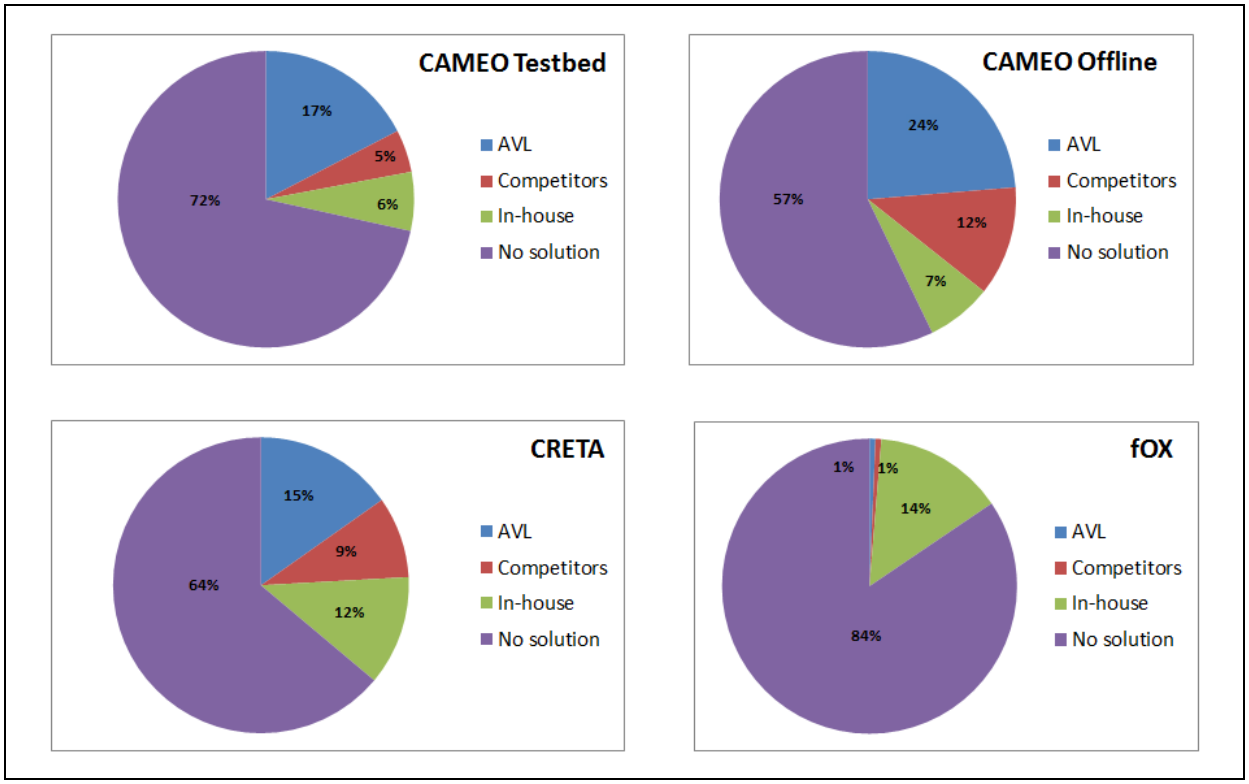


Figure 2: Actual market situation of software solutions in powertrain calibration technologies (Martini, 2012) (Martini, 2012)

As the domination of the purple colour in Figure 2 enlightens, it is noticeable that the majority of potential users do not have, or use, a professional industrial software solution for powertrain calibration tasks. Thus, the market potential in this sector is very high. Because of this, it is evident that in this area there is a good possibility of sales growth.

1.2.1 Major sales strategy

As the major business area of division ITS is the field of test bed hardware devices, IC software products are mainly sold via the hardware distribution channels. This means, customers, who use ITS hardware products represent the majority of IC customers. In general, this evolution is rated as positive because the effort and therefore the costs, to acquire customers, who are already satisfied by another AVL product, are low. But practice

shows that the customer's purchasing behaviour looks different when purchasing an IC software product compared to a test bed hardware product. Therefore an understanding of the IC customer's purchasing behaviour is a high important task. It is assumed that the understanding of the customer's buying behaviour will help IC department to create specific sales strategies, which help to grow sales in the area of powertrain calibration technology.

1.2.2 Unused licenses and rising in-house solutions

It happens in some cases, that customers, who are primary interested in AVL hardware solutions, also purchase a software licence for test purpose of AVL CAMEO^{TM}, "the leading tool for intelligent test procedures and DoE[1] methods (including modelling & optimization) in calibration" (AVL List GmbH, 2013a)(AVL List GmbH, 2013a). However, because of the missing understanding of the fields of application and the methodology of the products, the customer is not willing to switch the actual approach of calibration, although the existing processes are deficient in many respects. Furthermore, the customers are often not conscious of the open interface of IC products, which means that, for instance the calibration tool AVL CAMEO^{TM}, can be used in combination with non-AVL test bed software or hardware products. As a consequence, instead of using the calibration products of IC department, in-house tools are developed. This is paradox because licenses exist, but are simply not used. There is no doubt that this approach will not create potential long-term customers who value the software and buy more licenses in the future. If this evolution is being ignored, the future market growth potential for IC products will be compromised[2].

1.2.3 International sales structure

To get a feeling about the international sales structure, Figure 3 shows the AVL personnel who is presently involved in the sales process and sales communication. The connectors represent the existing communication channels between the different entities.
Looking at the amount of arrows in Figure 3, it is remarkable that the communication channels are not standardised. At the moment, everybody is talking to everybody and the information flow is not optimally routed.

[1] According to Kögeler (2013), the term *'Design of Experiments'* (DoE) describes a method, which is used for the development and optimisation of products and processes. The method helps in this area, where measurement results are depending on several influence factors. In respect of the task definition (e.g. a desired measurement result) DoE helps to determine the optimal values of input parameters in a clear and fast way (p. 78).
[2] These statements are the result of my personal experience at the IC customer in November 2012.

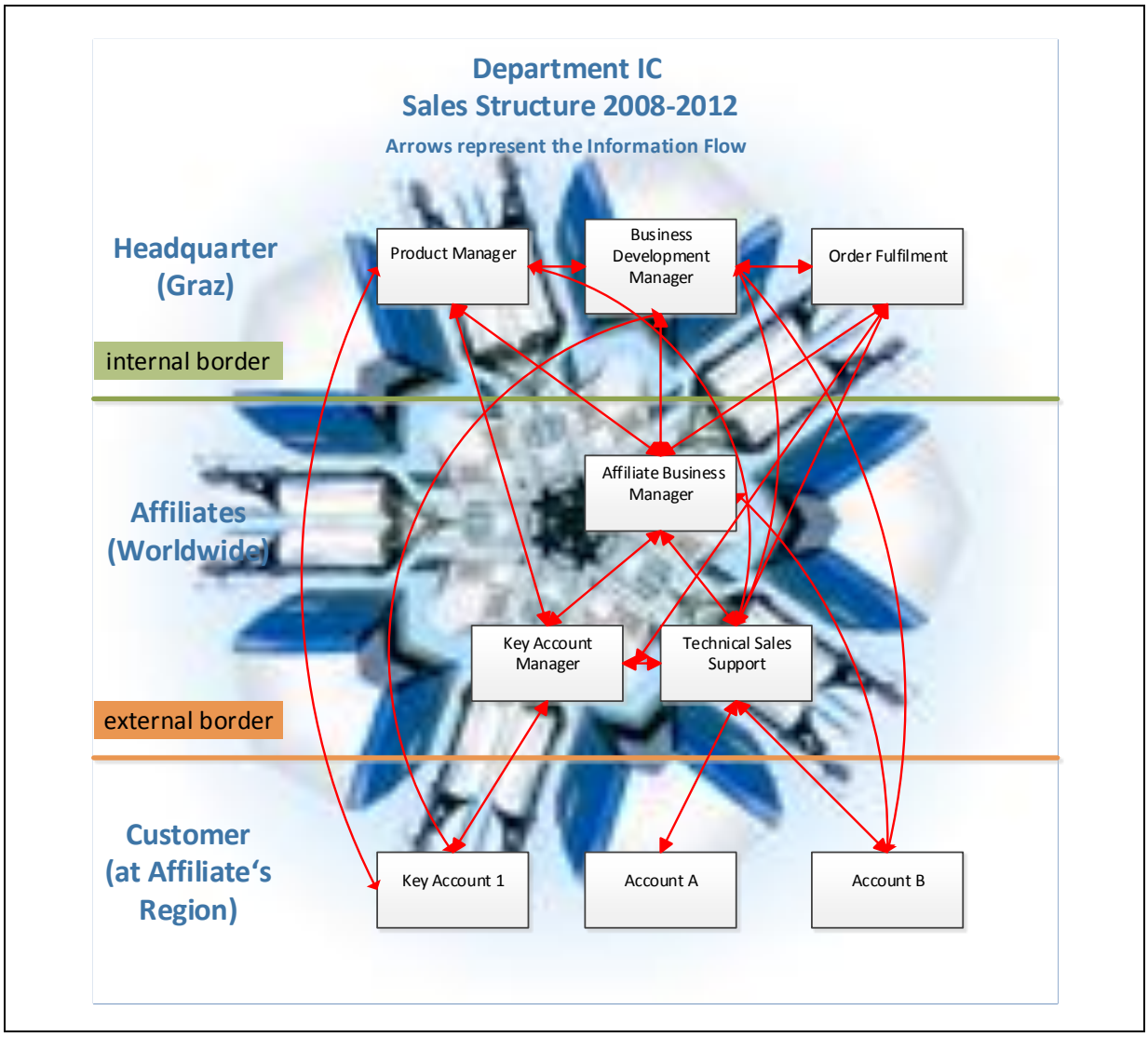


Figure 3: International sales structure (LeCossec, 2013) (LeCossec, 2013)

According to LeCossec (2013), this process is disorganised and not seen effective. It leads to parallel communication channels and reduced efficiency in the pre-sales process. Understanding also the customer's internal structure will create the possibility to optimise the sales communication and find the right communication partner for each stakeholder on customer side.

1.2.4 Sales approach

As the customers of ITS products are mainly automotive OEM's, distributed globally, the majority of the sales tasks are executed by local affiliates of AVL (see Figure 3). To enhance the communication between all the sales people around the world, since 2009 the sales process of the AVL is world-wide supported by a professional external software solution, called *'salesforce.com'* (SFDC). This web-based application incorporates the sales process proposed in the book *'Major Account Sales Strategies'* written by Neil Rackham. The theory and the software itself concentrate on the customer's decision making process. SFDC is used as an instrument for all sales people to document sales actions, save strategic

customer information, create forecasts, report opportunities and communicate with sales colleagues world-wide. The idea is that based on the stored data, sales people should be able to inform themselves about every account whenever and wherever they want and use this knowledge for upcoming sales activities. Within the division ITS, the software has a rising number of pro-active users, but as the software is still in the implementation phase, the main problem of the system is still the data quality and accuracy. It is clear that the data can only be as up-to-date as sales people feed the database with actual information. Furthermore, the data quality can only be ensured when standardised input masks are provided. As a result, the actual stored information about IC customer's purchasing situation and behaviour, are currently unstructured, incomplete and therefore difficult to use. Especially for IC department, a systematic way to report and document information about the customer's buying behaviour and the connected buying situation is seen as a potential task which may help to rise sales in volume.

1.2.5 Different stakeholders on customer side

With regard to the software products of IC department, the actual situation shows that there are always several people on customer's side, which have different priorities concerning different product attributes. On the one hand, there are engineers working with calibration, who may be interested in the quality of the results, the methodology and the user friendliness of the software. As they are the end-users of lower hierarchical level, they may not have the power to make a final purchasing decision. On the other hand, there are test facility managers, who usually have the decision-making power concerning the purchase but have only low understanding of the technical and methodical product characteristics. These people may trust their engineers concerning the technical issues of the products but have interests concerning time and money and are influenced by their long-term business strategy.
This simplified situation implies that the IC customers go through a multi-personal decision process where several stakeholders are influencing the purchasing decision in a certain degree. The more people are involved in the buying process the more complex the purchasing process will look like and the more difficult it will be, to understand how the decision finally comes along. Therefore, the search for explanation models and analysis concepts, which help to understand the customers purchasing behaviour in a systematic way, is a desired task of IC department.

1.2.6 Marketing approach

General marketing activities - "Brand positioning, branding, product launches, website, mobile apps, social media, marketing campaigns, image spots and image movies, trade shows, ads, magazines..." (SCOOP & SPOON GmbH, 2013) (SCOOP & SPOON GmbH, 2013) - are company-wide managed by an external partner, named *'Scoop and Spoon'*. This external service provider can also be booked for specific marketing campaigns or projects of a department. As explained by LeCossec (2013), continuous department internal marketing activities are mainly managed by the business development managers (BDMs) of the

department. They are supported in technical issues by the product managers but are responsible for the product specific marketing tasks. Furthermore, as mentioned by Kunzfeld (2010), at AVL Graz, the BDMs of IC department have the role of a central key position in the area of sales and marketing. These are the people who have major contact to the affiliates, supervise the affiliate's actions and strategies, support them in technical issues, develop short-term strategies, try to initiate future business opportunities and monitor customer relationships. In addition, the generation of market data and actions like benchmark studies, forecast planning, product management, etc., counts to the BDM's field of responsibility. As these minor tasks take about 80% of their daily work time, they sometimes miss time to fulfil their real missions (pp. 4-9)(pp. 4-9). Therefore, tools which help to collect and monitor market data in an efficient way, are always valued by the BDMs of IC department.

1.2.7 Missing international web-based exchange of ideas

Based on a recent internal research about the communication behaviour of calibration engineers, there is a recognition that no professional, online-based platform, where calibration experts discuss their problems or share their experiences, exists. However, first steps in this direction already started 2011 with the creation of a XING group with the name, *'AVL Powertrain Calibration Tools'*. However, as the XING statistic displays - actual 38 group members who are mainly from AVL Graz, and fifteen discussions, in the last two years – this approach can be rated as a flop. This first initiative represents what social media statistic shows: "72% of all social media initiatives are not successful" (Ramirez, 2013, p. 30)(Ramirez, 2013, p. 30). As "Social Media has the potential to positively impact the full value chain" (Ramirez, 2013, p. 33) (Ramirez, 2013, p. 33) this area is seen as high potential for the future.

All these described challenges and potentials represent the driving forces of this thesis, but due to the limited time horizon, not all aspects will be discussed. Therefore, this work will concentrate especially on the challenges in the area of sales and market research. Especially the explanation of OBB will be discussed in order to provide solutions for the described problems. The next chapter specifies the detailed objectives of this work.

1.3 Objectives

The overall target of this thesis is to propose specific actions which help to grow sales in calibration software business. In this work, the growth of sales is directly connected with the ability to understand the customers buying behaviour in order to create customised sales strategies. Therefore, the thesis follows two major targets:

> The **first** target is to develop a qualitative guideline tailored for IC department which supports the sales staff in analysing the customers *'buying centre'* (BC)[3]

[3] The term *'buying centre'* will be explained in detail in chapter 2.3.1 and 2.3.3.

step-by-step and offers templates to document the collected information in a systematic way.

The **second** target is to search for empirical methods which can be applied for analysing the BC of IC customers in a quantitative way. The selected method should be embedded in a concept for IC department and be exemplary applied for a concrete buying situation.

To accomplish these two targets, the following subtopics, which are accompanied by concrete key questions, will lead the thesis to the desired outcome:

a) Presentation of theoretical basics of organisational buying behaviour

- Which methods and concepts for explaining the OBB can be found in theory?
- What is the BC concept?
- Which methods for analysing the BC can be found?

b) Exploration and summarisation of actual behaviour patterns of IC sales staff to analyse the customer purchasing process

- Which theoretical basics do IC sales people use? How do they differ between the different people on customer's side? Are they familiar with the BC approach? Do they apply sales theory in practice? Which strategies do the sales people use, in order to identify the BC members?
- How do IC sales people create a first or "cold" customer contact? How do sales employees typically behave at customer meetings? What are typical actions?
- Do sales employees apply different sales strategies or guidelines for each stage of the process? How do sales employees manage the identified BC?
- How does the documentation behaviour of sales people look like? Which media do they use? What other supporting tools do they use during the BC analysis process? Are sales people using existing guidelines or standard questions, which are leading them through the analysis process?

c) Exploration and summarisation of typical characteristics of IC customer's buying behaviour

- Does a typical IC sales situation hit on a multi-personal decision-making process on customer side?
- Does the BC of IC software products look different from the BC of ITS hardware products?
- Is an IC BC an informal ad-hoc group or is it an organised group with standardised procedures for the buying process?
- Which interest groups are the first contact partners on customer side?
- Who, on customer side, has the most influence power on the buying decision?

d) Create a concept which embeds the selected quantitative BC analysis in the IC business environment

- Which of the methods described in literature is most appropriate for the application in IC department? How can the data of the BC be collected in a feasible way?
- Which are the main process steps of the concept?
- Which pre-conditions does the method require?
- How can the collected BC data be processed and analysed?
- How do the results look like?

e) Application of the concept for a concrete buying situation of IC department

- What buying situation and which product group fit best for the exemplary BC analysis concept of an IC customer.
- What traditional roles can be identified at a specific key customer of IC software products?
- How does the hierarchical (formal) structure between the people in the BC look like?
- Based on which criteria do the BC members compare different buying alternatives and build their individual buying decision?
- How important are the single product attributes for the single BC members?
- How does the influence power of the single BC members look like?
- How can the whole group decisions be illustrated, and what are the results for the observed BC?
- Which problems did occur during the application of the concept? What arguments can be found for further applications?

1.4 Conceptual Formulation

To give the reader an overview of the business area of IC department, a general documentation of the challenges of powertrain calibration (see chapter 2.1) as well as an explanation of the AVL calibration process (see chapter 2.2) and its three software products, will introduce the theoretical part of the work. To answer the question of subtopic *'a'* of chapter 1.3, the theoretical principals of B2B marketing and especially the area of customer analysis, where the OBB research is embedded, will be illustrated in chapter 2.3.

Coming to the first practical part, subtopic *'b'* and *'c'* will be accompanied by a world-wide survey of IC sales employees in order to collect the needed information. The survey sample will be chosen depending on different requirements in order to create high qualitative data. Furthermore, the survey development will be supported by the literature of qualitative and quantitative survey development and by an online survey tool.

With the information of the theoretical part and the first practical part, the first target, the development of a guideline for analysing the BC of calibration software business, should be feasible.

The second practical part, subtopic *'d'*, will be led by the ideas of, Backhaus, Erichson, Plinke, & Weiber (2006), Brinkmann (2006), Voeth (2004) and Büschken (1994), who deal with the operationalisation of multi-personal buying decisions and the quantitative BC analysis approaches. The concept which should be created in this step will be a junction of the different ideas described in literature with respect to the boudary condition of IC department.

Finally, the question of subtopic *'e'* will be answered by the application of the concept developed in point d. Therefore, as the concept will describe in more detail, the information will be gathered through a so-called conjoint analysis measurement on basis of internal collected expert knowledge. The results of the measurement will be illustrated in a graphical way.

1.5 Scope of Analysis

In this thesis, the border of research activities, in general is the IC department. The three software products of IC department, CRETA^{TM}, CAMEO^{TM} and fOX^{TM} will be generally described but not in a detailed manner. In addition, in this thesis the term calibration describes the creation of data sets for control units of powertrain components.
Furthermore, as AVL List GmbH follows a standardised sales approach, the thesis will mainly follow the ideas of Rackham (1989) and use the sales stages described in this book. In addition, the thesis will not compare different approaches of quantitative BC analysis, rather it will follow the proposals of Brinkmann (2006), Voeth (2004) and Büschken (1994). Therefore, the BC Analysis concept, described in this thesis, is only adjusted and applied for IC purpose and not newly developed.

2 Theoretical Principles

Beginning with an introduction about the powertrain calibration topic the reader should get a more detailed idea about the business area of IC department. Especially the challenges of nowadays powertrain calibration will be presented briefly. Furthermore, the powertrain calibration process of AVL, which aims to deal with these challenges, will be discussed roughly. Moreover, the basics of the three software products of IC department supporting the calibration process, will be enlightened.
In addition to the product principles, the area of B2B marketing, which is connected with explanation of OBB, will give the reader an overview of the area of science where the BC theory is embedded. Particularly models and methods, which help to explain multi-personal buying decisions in an organisational context, will be pointed out. Moreover, the background of AVL's sales process will show the interaction between customer analysis and sales theory. Finally, different BC analysis approaches, which can presently be found in literature, will round off the theoretical part.

2.1 Challenges of Powertrain Calibration

In automotive industry, the challenges of powertrain development are constantly rising (AVL List GmbH, 2013b, p. 170) (AVL List GmbH, 2013b, p. 170). Caused by higher constraints of fuel consumption and legislative emission limits, an increasing complexity of today's engines and whole powertrain systems can be observed (Langouët, Métivier, Sinoquet, & Tran, 2008, p. 1)(Langouët, Métivier, Sinoquet, & Tran, 2008, p. 1). For example "for gasoline engines various technologies are applied to fulfil the fuel consumption requirements – concepts with variable valve timing, direct injection, variable charge motion or compression spark ignition are in development or already in production" (Dobes, 2003, p. 7) (Dobes, 2003, p. 7). Consequently also the numbers of control parameters of the different powertrain control units, (ECU, TCU, HCU, xCU)[4] which have to be tuned and optimised in the framework of the calibration process, are getting higher and higher (Langouët, Métivier, Sinoquet, & Tran, 2008, p. 1) (Langouët, Métivier, Sinoquet, & Tran, 2008, p. 1). In nowadays control units of engines, up to thirty thousand parameters – so-called labels – have to be handled during the calibration process and up to nine variation parameters[5] have to be tuned for each operating point[6] (Kögeler, 2013, pp. 77-79)(Kögeler, 2013, pp. 77-79). For conventional calibration methods, which are solely based on dynamometer mapping and transient vehicle testing, this

[4] ECU = Engine Control Unit, TCU = Transmission Control Unit, HCU = Hybrid Control Unit; According to Neumann (1997) an engine control unit of an internal combustion engine detects several parameters of the actual engine situation, for example speed and throttle and calculates based on saved parameter maps the optimal value of e.g. spark advance or the injector on time for each cylinder (p. 1). In addition, the term xCU is used when speaking in general about any control unit of the powertrain.
[5] The *'Full-Factorial'* test design (all possible combination of variation parameters) of a system with more than 3 variation parameters is not feasible in a practical way (Kögeler, 2013, p. 79). For instance 5 variation parameters with 5 factors each would imply in a *'Full-Factorial'* test of more than 3000 points which have to be analysed for each operating point. With the assumption of 100 operating points and 5 minutes test time for each, this would results in an overall test time of 150000 minutes or around 104 days where the test bench runs 24 hours.
[6] An operating point is an combination of torque and speed of an engine (Kögeler, 2013, p. 79)

implies a calibration effort (Rask & Sellnau, 2004, p. 1)(Rask & Sellnau, 2004, p. 1) which is impractical to fulfil. Caused by these reasons and the pressure of decreasing development time, automotive industry has changed from manual tuning of control parameters to mathematically assisted calibration processes (Langouët, Métivier, Sinoquet, & Tran, 2008, p. 1) (Langouët, Métivier, Sinoquet, & Tran, 2008, p. 1). Especially the usage of statistical methods, like *'Design of Experiments'* (DoE) or *'Response Surface Modelling'* (RSM), which aim to reduce the required dynamometer tests, can be found as approaches of the recent years (Rask & Sellnau, 2004, p. 1) (Rask & Sellnau, 2004, p. 1). Nowadays DoE can be seen as state of the art for the calibration and optimisation of multi-parameter systems (Kögeler, 2013, p. 78) (Kögeler, 2013, p. 78).
Besides of that, according to AVLCALIBRATIONTEC (2012), the situation of globally distributed calibration teams calls for calibration tools which handle the world-wide generated calibration data in an efficient way and furthermore ensure data robustness and data consistency in order to provide a high level of data quality.
Driven by these challenges, AVL List GmbH supplies the automotive industry with several calibration tools supporting the holistic powertrain calibration process in order to help calibration engineers during the wide range of tasks of their daily work (AVL List GmbH, 2013b, p. 170) (AVL List GmbH, 2013b, p. 170). The following chapter will explain the calibration process and the calibration tools in more detail.

2.2 The Calibration Process of AVL

According to Martini (2013), AVL List GmbH is using a three-stage concept in order to explain the calibration process (see the vertical steps in Figure 4). The first stage deals with the data management of the calibration data. The questions, which are answered in this stage, are the following: Who, has what, when, where and why calibrated? In order to answer these questions, AVL is providing a data management system, called AVL CRETA^{TM}, which forces the calibration engineers to store the data in a systematic way and ensures a traceable documentation of the calibration data. The second stage is continuing with the experiment and analysis. Therefore the calibration engineers define the calibration and optimisation targets (e.g. minimum fuel consumption in respect of different emission limits for a gasoline engine) and design tests which aim to determine the interactions of certain input parameters (e.g. start of injection, ignition angle, etc.) and the desired output parameters (emissions, fuel consumption, exhaust temperature etc.). Next, the designed tests are executed in a test environment (e.g. an engine test cell) and the measurement results are modelled and optimised in order to find the optimal control parameters for the desired calibration target. This stage is supported by the product AVL CAMEO^{TM}, which offers engineers a standardised workflow to easily create tests, automatically execute them on a test environment, model the measured data and optimise the input parameters. Finally, the determination of the optimal control parameters for different calibration targets leads to the last stage of the calibration process, the simulation and creation of xCU functions. In this stage the calibration engineers face the task to process the raw data of the measurement and optimisation stage into values which are suitable to populate xCU labels. Therefore, the

product fOX offers different modules to support the calibration engineers in calculating engine maps and simulate the xCU functions, which finally lead to the desired behaviour of the controlled objects (e.g. the engine, transmission etc.). In the end, the calculated calibration results are stored in the data management system and the calibration process starts again in a different development environment (see the horizontal levels of Figure 4). According to Martini, depending on the calibration tasks, the above explained calibration stages can be performed in the following development environments (from left to right):

- Model in the loop: The tests are executed in the environment of a simulated engine model.
- Hardware in the loop (HiL): The tests are executed with the help of an engine model in combination with a real xCU (control unit hardware) and its connected software.
- Engine test bench: The tests are executed in the environment of a test cell where a real engine and all its connected components are installed.
- Chassis dynamometer: The tests are executed for the entire vehicle by running a driving cycle on a chassis dynamometer.
- Road: The test is executed in a real vehicle environment, driving on the road.

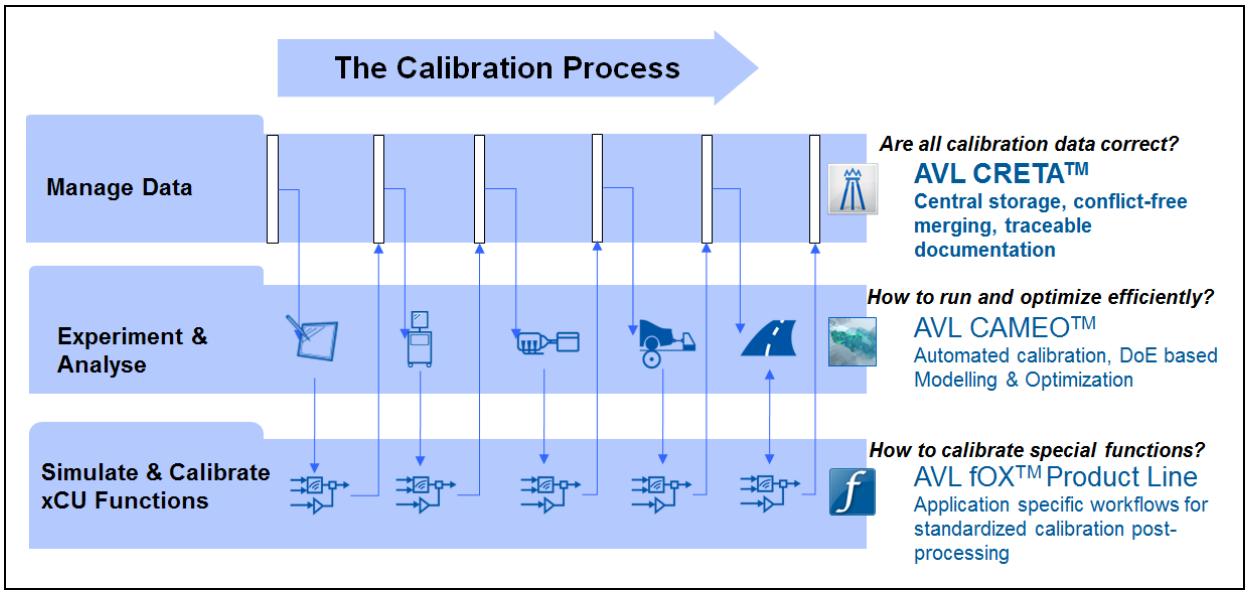


Figure 4: The calibration process of AVL List GmbH (Kögeler, 2013, p. 77) (Kögeler, 2013, p. 77)

At the end of the whole calibration project, there is a final data set stored again in AVL CRETA and also ready to be implemented to the target xCUs of serial produced powertrains. In addition, also Martini (2013) mentions that not all horizontal levels of the calibration process have to be applied in order to create a usable calibration data set ready for series production. Figure 4 simply shows the possible application environments of IC products and tries to present a standardised calibration workflow, which can be applied in practice. Experience shows that many AVL customers want to work as proposed by AVL but have no standardised process yet.

2.2.1 AVL CRETA™

AVL CRETA™ is a data management system specialised to systematically store the calibration data, which are determined during the calibration process. With the help of a central storage strategy and an integrated responsibility management system, the saved calibration data can be accessed by calibration engineers from any time zone and location in respect to their access rights. This allows the world-wide cooperation of calibration teams without any loss of calibration data and the reuse of calibration knowledge and data which is already stored in the system. Furthermore, the possibility to create and display a standardised calibration workflow ensures that all calibration engineers follow the same approach and store the data with the required quality. Moreover, every data change is logged in the history of the centralised database, which allows fast documentation, comparison and reporting actions, and ensures a fast traceability of occurring errors. In addition, the opportunity to create tailored reporting templates lowers the time spent for documentation tasks. Furthermore, an implemented project quality management system compares the actual status with the planed status of calibration projects. Consequently, the project managers can counteract project delays in order to ensure the planed start of production. As shown in Figure 4, AVL CRETA™ supports each step of the calibration process and interacts with the other systems of IC department. (AVL List GmbH, 2013c)(AVL List GmbH, 2013c)

2.2.2 AVL CAMEO™

The name AVL CAMEO™ represents a software platform of several calibration tools which can be used for powertrain calibration. According to the application area it can be distinguished between CAMEO Test Bed, CAMEO Office and CAMEO Transmission. In general, CAMEO is described as “the leading tool for intelligent test procedures and DoE methods in calibration” technologies. It aims to efficiently and automatically determine the optimal control parameters of xCU (ECU, TCU, HCU) by using design of experiments methods in combination with a model based optimisation approach (AVL List GmbH, 2013d)(AVL List GmbH, 2013d).

2.2.2.1 CAMEO Test Bed (CAMEO Online Package)

As the name already betrays, CAMEO Test Bed represents software which has been developed “to run intelligent engine calibration procedures (iprocedures[7]) in a test bed environment” (AVL List GmbH, 2009, p. 1)(AVL List GmbH, 2009, p. 1). In order to lead the calibration engineer through the calibration process, CAMEO Test Bed supports the user with a standardised workflow (see Figure 5).

[7] In CAMEO online package, the iprocedures ‘*Full-Factorial*’ and *‘DoE Variation List’* can be chosen. While a *‘Full-Factorial’* test includes all combination possibilities of the variation parameters, the *‘DoE variation list’* let the user choose between different DoE test designs: Central Composite Design, D-Optimal, Box Behnken etc. For further information about the test designs, see AVL List GmbH (2011).

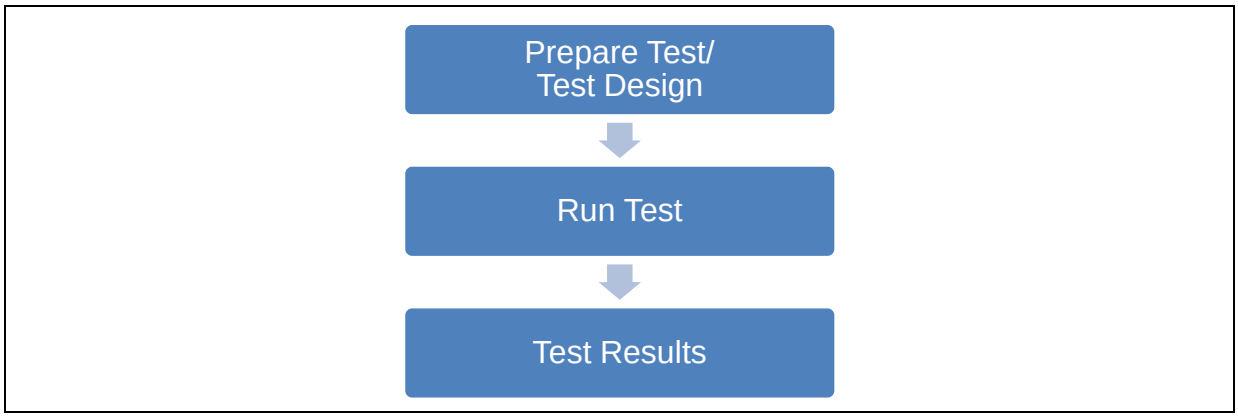


Figure 5: Workflow of CAMEO Test Bed (AVL List GmbH, 2009, p. 2)(AVL List GmbH, 2009, p. 2)

In the first workflow step, the user is guided by a wizard through the test design phase. Roughly described, the wizard helps to find the right test design for the desired application and supports the user in defining the targets, settings and boundary conditions for the tests in a standardised way. When the test design is finished, the second step of the calibration workflow automatically executes the designed test, so-called *'iprocedure'*, and informs the user about the actual calibration progress and displays the actual test data. In the background, CAMEO Test Bed interacts with the ECU application system[8] and the test bed automation system[9] full automatically, to adjust and trigger as well as receive pre-defined parameter values. Finally, the test results are displayed and can be exported or used for further investigation with CAMEO Offline.

2.2.2.2 CAMEO Offline

With CAMEO Offline, the measured test bed data can now be analysed and optimised. Again, the user is guided through a standardised workflow as shown in Figure 6.

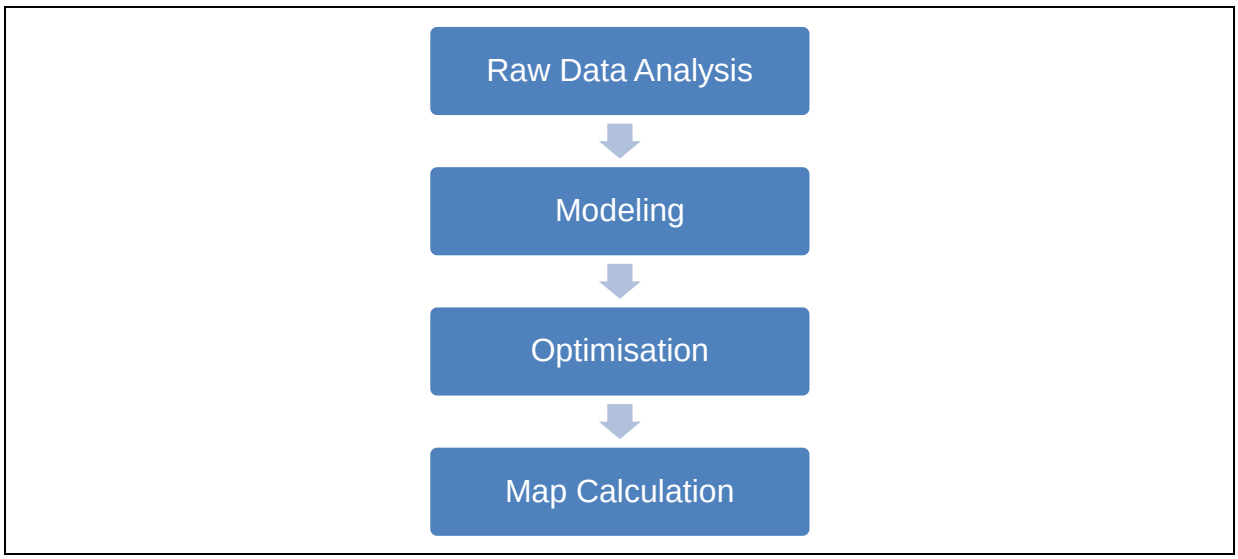


Figure 6: Workflow of CAMEO Office (AVL List GmbH, 2011) (AVL List GmbH, 2011)

[8] The ECU application system is a system which can directly change parameters and settings on the ECU (see Typical Test Cell Configuration in appendix A8).
[9] The automation system, e.g. AVL Puma, manages the dynamometer control unit and the measurement devices of the engine (see Typical Test Cell Configuration in appendix A8).

In the first step, the raw data of the test bed are imported in the office environment. Either the test data of CAMEO Test Bed are directly used or alternatively data files which, are written in '*ASCII'* text format[10], can be imported. Different visualisation possibilities help the users to identify measurement errors (deactivate outliers) and increase the quality of the raw data (AVL List GmbH, 2011, pp. 165-211)(AVL List GmbH, 2011, pp. 165-211).
Followed by the raw data analysis, the modelling phase continues. According to AVL List GmbH (2011), different modelling algorithms are therefore used to model the measured behaviour of different parameters (e.g. a model for the fuel consumption for a local operating point depending on the variation parameters is established). CAMEO offers the following modelling approach: *'Free Poly Models'*, *'Intelligent Neural Networks'* or *'Fast Neural Networks'*. Furthermore, the model accuracy is proved with different statistical methods in order to ensure the validity of the models. With adequate models of the engine response parameters (e.g. the fuel consumption), the third phase of the CAMEO workflow begins. Depending on the optimisation target, the optimum variation parameter settings can now be defined with the help of different automatic algorithms (Generic Algorithm, Sequential Quadratic Algorithm or Multi-objective Algorithm) or manually with the help of intersection graphs[11] (pp. 213-280) (pp. 213-280).

2.2.2.3 CAMEO Transmission

Finally, CAMEO also offers a solution for automated transmission calibration on chassis dynamometers. The product supports the calibration engineers by finding the optimal control parameters of a TCU of an automatic transmission depending on the defined shift quality requirements (comfort, dynamic, sportive…). Therefore, the test planning is supported by several functions: A simplified vehicle model, where all necessary transmission parameters can be defined, a transmission DoE wizard, which creates a test design in respect to the prior defined variation parameters and a sort algorithm, which automatically creates driveable test runs and optimises the number of measurements. After the test creation, AVL Transmission is controlling the driver simulator through the chassis dynamometer interface in order to execute the defined test in the test environment. Finally, CAMEO Transmission optimises the TCU parameters based on the measured results in order to meet the desired shift quality. (AVL List GmbH, 2010) (AVL List GmbH, 2010)

2.2.3 AVL fOX™

As described by AVL List GmbH (2013b), the last product of the calibration tool chain is divided into two main sub products: AVL fOX™ and AVL fOXLAB™. Basically, AVL fOX™ offers four generic workflows which support the calibration engineers in the tasks of post-

[10] Each Microsoft Excel file can be stored in ASCII test format.
[11] An intersection graph displays the impact of a variation parameter change to the desired modelled response parameter. For example, it shows the behaviour of the fuel consumption of the engine depending on the variation of the spark ignition parameter and all other selected variation parameters.

processing of the raw test and optimisation data. Different modules[12] accompany the workflows and help the calibration engineer for instance to convert the measured raw data into maps (control unit parameters), edit existing maps or simulate the behaviour of an xCU by using a predefined model. In addition to the generic workflows, AVL fOXLAB™ offers the opportunity to create customer specific workflows for the calibration post-processing. Therefore, several standard modules are available in the base library of AVL fOXLAB™ and can be used to create a customised data post-processing workflow (pp. 176-177) (pp. 176-177).

As illustrated in the prior chapters the complexity of the whole powertrain systems is rising constantly. Consequently, also the complexity of the calibration process and the requirements on the industrial software solutions, which support the process, are growing. The non-standardised calibration process of the potential customers represents challenges and barriers when entering new customers. Thus, the customer's purchasing behaviour and especially the decision criteria, which the customer uses to rate the calibration software products, have to be analysed and understood. The knowledge of the customer's purchasing behaviour will support the customer specific sales strategies of IC department. Furthermore, the detailed BC analysis will give information about the ideal product composition, which is desired by an analysed customer. Therefore, chapter 2.3 presents the theoretical basics, which aims to explain and analyse the OBB.

2.3 Business-to-Business Marketing

In the last 30 years, the theoretical and practical research activities in the area of industrial commercialisation have been enormous and as a consequence an independent sub discipline of marketing has emerged, called industrial marketing (Brinkmann, 2006, p. 1) (Brinkmann, 2006, p. 1) or B2B marketing (Matthew, Hague, & Hague, 2013) (Matthew, Hague, & Hague, 2013). In the area of marketing research and science, nowadays industrial marketing has a high importance and because of differences to consumer goods marketing, industrial marketing uses separate approaches (Backhaus, 2003) (Backhaus, 2003). Besides the multi-personal character of the buying situation, Backhaus (2003) presents additional characteristics, which show the specialities of industrial marketing. For instance, the formalised purchasing process, the international character of the buying situation, the customer concentration and the possible governmental influence are mentioned as specifics of industrial marketing (pp. 1-5) (pp. 1-5).
As the general task of marketing is to support the sales process of a company (Nabenhauer Consulting GmbH, 2012)(Nabenhauer Consulting GmbH, 2012) by systematically collecting information about the market and the customer (b-wise GmbH, 2011)(b-wise GmbH, 2011), a lot of methods have been developed in order to fulfil this target. Besides the famous strategic methods of market analysis, for instance Benchmarking, ABC Analysis, Five Forces etc.,

[12] In this context, a module represents a script which anyhow processes the calibration data set in a specific format (e.g. grouping of the data set according to torque or speed) or uses interpolation algorithms to refine the hole data set (Martini, 2013).

also methods focusing on the customer analysis are nowadays important tools of the industrial marketing (b-wise GmbH, 2011)(b-wise GmbH, 2011). As described by, especially methods which help to understand and predict the industrial buying behaviour have been the subject matter of research activities of recent decades (Johnston & Lewin, 1996).
Although there are substantial differences between industrial and consumer goods markets, Fill & Fill (2005) mention two similarities which underline the customer orientation of nowadays marketing activities:

- "Both have a customer orientation and work backwards from an understanding of the customer needs" (p. 5)(p. 5).
- "Both need the ability to gather, process and use information about customers and competition in order to achieve their objectives" (p. 5).

Therefore, it can be claimed, that the customer is the centre point of marketing research (Hoepner, 2011) (Hoepner, 2011). Based on the existing research, this work will concentrate on theoretical and practical methods of customer analysis in B2B markets, which help to explain the B2B customer's buying behaviour.

2.3.1 Organisational buying behaviour

As Johnston & Lewin (1996) explain, the conceptual foundation of OBB research was made in the late 1960s. Several researchers started to develope models explaining organisational buying behaviour with the help of a process. For example the model of *Robinson, Faris & Wind*[13] uses *'buyphases'* to expain the process of OBB as a sequence of activities. Furthermore, although the models of *Seth*[14] or *Webster & Wind*[15] use fewer stages, the nature of the activities is quite similar (pp. 1-2) (pp. 1-2). The idea to use distinctive buying stages to explain how organisations purchase products and services can also be found in younger literature. For instance the models of *Fließ*, *Kotler*[16] and *Rackham* reuse the process oriented approaches of historic research. For example Fließ (2000) mentions that OBB can be modeled by a problem solving process and all activities, which are done to solve an identified problem, can be allocated to distinct buying stages or buying phases (pp. 254-255) (pp. 254-255).
These idealised phase concepts may not always be true in practice but help to analyse the buying process in a systematically way (Kleinaltenkamp & Saab, 2009, p. 21)(Kleinaltenkamp & Saab, 2009, p. 21). In AVL List GmbH, the theory of Rackham (1989) is used as reference literature to explain the organisational buying process. Therefore, his approach will be explained in chapter 2.3.2 in more detail.
Besides of the process orientation, Johnston & Lewin (1996) summarise several constructs which include parameters affecting the OBB: (1) environmental influences (political, physical, ecomnic, suplier, etc.), (2) organisational influences (structure, rewards, goals, size, etc.), (3) individual participants characteristics (education, personality, risk reduction, preception,

[13] Robinson, P., Faris, C., & Wind, Y. (1967). *Industrial buying and creative marketing*. Boston: Allyn & Bacon.
[14] Seth, J. N. (1973, October). A Model of Industrial Buyer Behaviour. *Journal of Marketing*, 37, pp. 50-56.
[15] Webster, F. E., & Wind, Y. (1972). *Organizational buying behavior.* Prentice-Hall.
[16] Kotler, P. (1997). *Markting Management* (9th ed.). New Jersey: Prentice Hall Internation Inc.

experience, etc.), (4) purchase or product characteristics (buy task, product compelexity, product type, time pressure etc.), (5) seller characteristics (ability to meet specificaiton, delivery time, quality, price etc.), (6) group characteristics (authority, size, membership, leadershipt, etc.), (7) conflict or negotiation characteristics (persuation, problem solving, bargaining etc.) and (8) informational characteristics (type and source of information, active search behaviour of purchasers etc.) (p. 2) (p. 2).
Although all these constructs may influence the OBB, the target for this work is mainly refering to the understanding and analysis of the group chracteristics of a target customer. Therefore mainly construct (6) and construct (4) will be described in more detail while the others will be neglected.
In addition, Backhaus & Voeth (2009) point out one major speciality of B2B buying situations. In contrary to consumer goods markets, buying decisions in industrial goods markets are usually made by more than one person. In other words, multiple business representatives build a problem-oriented group, which interacts in order to achieve the buying decision. This group is named the '*buying centre'* (BC) (p. 44)(p. 44). This multi-personal character of buying behaviour was already documented by Ducan (1940), who points out that the typical buying process of organisations is based on a multi-personal problem solving process in which the responsibilities of the purchase decision is spread to various people of the organisation (as cited in Brinkmann, 2006, p. 7).
As the title of the work already betrays, the construct of the BC is the central analysis object of this work. Therefore, the BC concept and the connected constructs, which influence the BC in size and constellation, will be pointed out in chapter 2.3.3 in more detail. Finally the following lines of Johnston & Lewin (1996) should summarise the challenges of industrial commercialisation:

> In order to succeed in business-to-business markets, selling firms must possess an understanding of customer firms' buying behavior. However, such an understanding may be difficult to achieve, because organizational buying behaviour is often a multiphase, multiperson, multidepartmental, and multiobjective process. This dynamic and intricate process frequently presents sellers with a complex set of issues and situational factors that directly or indirectly influence buying firm behavior (p. 1) (p. 1).

2.3.2 Customer-oriented sales process

Before speaking about the term BC in more detail, the buying process on which AVL List GmbH bases its sales approach, has to be enlightened more precisely. Therefore, the theoretical basics of OBB described by Rackham (1989), which are used by AVL as a reference literature, will be described in the following pages.
Rackham (1989) bases his customer-oriented sales approach on the following claim: "[..] the better we understand the customer decision process and how we influence it, the better our strategy will be" (p. 16) (p. 16). Therefore, in his eyes, understanding the customer's purchasing process is the first step for creating an effective sales strategy. Furthermore, in his view, sales strategies represent actions, which have potential to highly influence the

customer purchasing decision (p. 16)(p. 16). This underlines the strong customer orientation of Rackham's sales process and correlates with the general targets of this thesis, the understanding and analysis of the customer BC.

Following the original idea of *Robinson, Faris & Wind*, Rackham (1989) uses four distinct stages in order to describe the customer decision process. "Three of these stages take place before the decision, and a fourth stage happens after the decision has been made" (Rackham, 1989, p. 18) (Rackham, 1989, p. 18). Depending on the complexity of the sales situation, not all stages have to be present in every decision process. However, even in simple personal sales decision the different steps or stages which are used to describe the organisational buying process, can be observed (pp. 18-19) (pp. 18-19). The distinct stages, which Rackham uses to explain the buying process, are shown in Figure 7 and will be explained in detail with the help of the following simple example. Thus, imagine yourself in the situation of buying a car.

As Rackham (1989) describes, the first stage of your decision process is the phase of need creation. Based on any cause, you are not satisfied anymore with your current situation and you are thinking about changing something. In our example, this dissatisfaction is represented by riding your bike or taking the bus to get from A to B. You are dissatisfied with this kind of transport medium because of different reasons. For instance, the unstable weather conditions in your city or the daily food purchases, which have to be carried home to your family each day. Thus, you think about buying a new shiny car because this solves your daily problems. Finally, your dissatisfaction reaches a critical limit that you decide to change your current situation. Rackham names this first stage '*Recognition of Needs'*. From the sales perspective, every action, which helps to discover these needs, should be part of the sales strategy for this stage. The three main objectives in this stage are uncovering dissatisfaction, develop dissatisfaction and selectively channel dissatisfaction. If this stage is done properly, the possibility to reach the other stages will be very high (p. 47) (p. 47).

Continuing with the second stage of the process of Rackham (1989), called '*Evaluation of Options'*, you have already discovered the need – in this example – to solve your current transport problem. Now you decide to act and therefore you look for all kinds of possibilities you have. Buy a new or a used car? Rent or lease? In fact, all possibilities will solve your problem but one solution will fit best to your special needs (p. 18) (p. 18). Therefore, you will create your personal decision criteria, weight them from crucial to incidental and finally judge the alternatives using the previous defined differentiators. Based on this, you will identify your preferred alternative (p. 66) (p. 66). This approach is the same for major sales, with the only difference that more people will be involved in the whole process. For sales people the main objectives in this stage are the following: Uncover customer decision criteria, influence them and finally maximise perceived fit with decision criteria (p. 65) (p. 65). It has to be noted that in real sales situations, the customer may have already entered the *'Evaluation of Options'* phase before the first face-to-face contact has been made. In such a case, Rackham points out that speaking about needs in a first customer meeting may be appropriate but it is important that sales people are aware that "the customer's psychological attention will be directed to making choices" (Rackham, 1989, p. 62) (Rackham, 1989, p. 62). But back to the example, we imagine that based on a comparison between the personal decision criteria and

the product specifications you have found the optimal solution in buying a good quality used car.

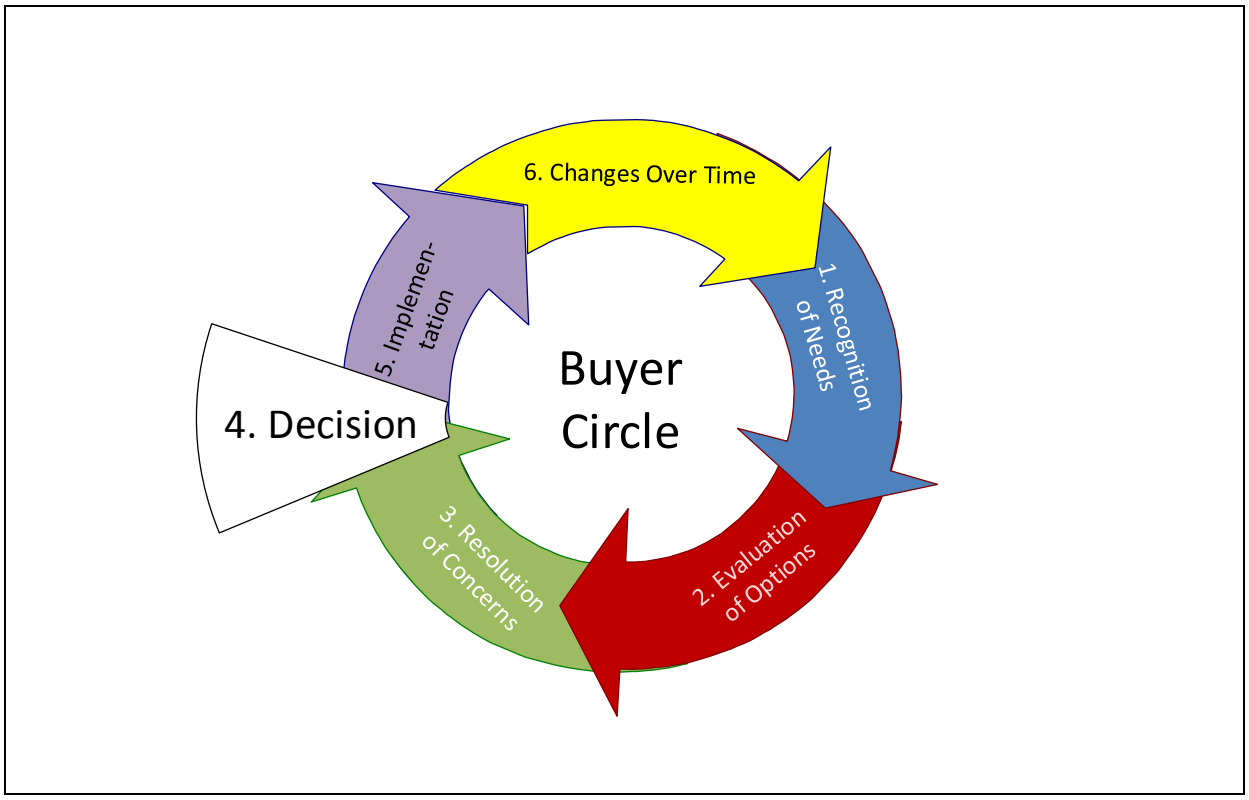


Figure 7: The buying circle of Rackham (adapted from Rackham, 1989, p. 19)

As Rackham (1989) additionally states, now you enter the last phase before you make the final purchasing decision. It is called '*Resolution of Concerns'* and Rackham notes that "it can be one of the most significant and complex stages of any decision" (Rackham, 1989, p. 18) (Rackham, 1989, p. 18). You are aware that you need a new car and you already made the specific choice which kind of car you want to buy, but different concerns in your mind rise and hinder you to do the final step. "You think about things like 'What if there is some hidden defect I have't discovered?' 'How will I tell the family that I've decided to spend all this money?' or 'Is their after-sales service really as good as they say?" (Rackham, 1989, p. 19)(Rackham, 1989, p. 19). For Rackham it is clear that at you have to overcome these fears first, in order to be able to go further in your personal decision process and finally make the decision (p. 19)(p. 19). For our example and especially in smaller sales, this will often be the last stage. Nevertheless, in major sales, the final purchasing decision will often be followed by the so-called '*Implementation'* stage. In this period the vendor will support the customer by implementing and using the product, ensuring that the customer satisfaction is created. In this stage of interacting very closely with the customer, potential future sales opportunities can be discovered by the sales people (p. 20)(p. 20).

Although these stages described by Rackham (1989) may be similar for personal and industrial buying situations one major point will always be different: In B2B sales, each sales stage is influenced by the opinion, emotions and influences of several people (see statements of chapter 2.3 and 2.3.1). Therefore, as already mentioned, when speaking about industrial buying decisions, the term BC is often used in literature. Thus, the next chapter will enlighten the ideas of the BC approach in more detail.

2.3.3 The buying centre

Put in quite general terms, the construct BC describes a group of people, which are anyhow involved in the organisational buying process (see the statements on page 18). In English literature, also the term *'decision making unit'* (DMU) is sometimes used instead (Backhaus, 2003, p. 71) (Backhaus, 2003, p. 71). This correlates with the claims of Matthew, Hague & Hague (2013), who quote that especially in B2B buying situations the existence of a decision group (DMU) instead of a single decider can often be observed (pp. 2-3)(pp. 2-3). In order to avoid confusions in the following work, only the term BC will be used when speaking about this group of people.
In addition, Backhaus (2003) quotes that the BCs often have an informal character and are not based on institutional structures and also external people, e.g. consultants, can be part of it (pp. 71-72) (pp. 71-72). Therefore, the identification of the BC members is often connected with huge problems (Fließ, 2000, p. 305)(Fließ, 2000, p. 305). These ideas are supported by Matthew, Hague, & Hague (2013) as described in the following lines:

> The target audiences for B2B communications are amorphous, made up of groups of constantly changing individuals with different interests and motivations. Buyers seek a good financial deal. Production managers want high throughput. Health and safety executives want low risk. And those are just their simple, functional needs (p. 2).

In addition, Fließ (2000) mentions one major cause for the existence of the BC. Through the integration of more than one person into the buying decision, the risks of the purchase is minimised in two main points: On the one hand, the organisational risk of making the wrong decision is minimised because of the formal division of labour – several people of different areas with different expertise assess the situation from different views. On the other hand, people who join the BC because of personal interest, minimise their personal risk which is connected with a specific buying situation, by influencing the purchasing decision. Based on these ideas, Fließ follows that the BC consists of two kinds of people. People who are related to a task of the buying process and are therefore part of the BC, and people who are motivated by personal interests. Furthermore, Fließ derives that in a BC centre, two overlapping structures can be observed. At first, the formal structure which is characterised by the task related division of labour, and second the informal structure, which is based on the relationship between the BC members as well as their personal interests and motivations (pp. 306-307)(pp. 306-307).
In addition to the general ideas of the BC approach, the following two chapters will concentrate on two main questions: Which concepts can be found in order to characterise the different members of the BC? Which factors have a high influence on the BC structure and involvement?

2.3.3.1 Players of the buying centre

Early studies have brought up different models which help to portray the different participants of the BC. For example, present a role concept, which tries to characterise the position, the task and the influence of the single BC members by allocating predefined roles (Fließ, 2000, p. 313)(Fließ, 2000, p. 313). The knowledge about the different roles of the BC members gives the selling organisation a good overview of the customer's situation and a starting point for the development of further strategies (Kleinaltenkamp & Saab, 2009, p. 23) (Kleinaltenkamp & Saab, 2009, p. 23). In the following, the different roles are described briefly (Webster & Wind, 1972, as cited in Fließ, 2000, pp. 313-316):

- User: This person is in any case connected with the use of the product. On the one hand, he/she is a specialist or applicator, who is working directly with the product. He/She is mainly interested in the user friendliness and the personal value for his/her daily work. Although he/she might be in a lower hierarchical level he/she is able to influence the purchase decision – He/She can positively promote a product or deny the use of it. On the other hand an indirect users is someone who has the responsibility of the right use of the product, and caused by the little higher hierarchical status, e.g. of a team leader, he/she may has a higher influence on the decision. Normally he/she cannot be ignored by the decision maker.
- The buyer is the person how finally carries out the purchase. He/She may be part of the purchasing department and acts on an administrative level. He/She manages the final discussion with the suppliers and writes down the results of prior negotiations in form of a purchasing contract. His/her influence power depends on his/her job description and type of procurement object.
- The decider makes the final purchasing decision. He/she is the one who has the legitimacy to delegate the purchaser to buy product X and is able to release the budget. This does not assume that he/she has to sign the contract. In several situations, it can be observed, that the decider is acting in the background and is just delegates people in order to fulfil his/her ideas. In lager sales the decider is often represented by a person of the top management or a decider committee.[17]
- Gate keeper: This person is often represented by an assistant of the management or secretary. He/She controls the information flow into and out of the BC and therefore he/she has the power to forward or block the communication flow between the vendor's organisation and other BC members, e.g. an influencer.
- Influencer: He/she has a direct influence on the purchasing decision or indirect influence on the decision maker, either because of his/her special knowledge or

[17] Also Sieck & Goldmann (2007) share the same view. In addition they point out that sales people often see too much power in the purchaser, especially in bigger sales. However, decision makers are normally not interested in technical details; they want information's about the strategic and the practical value of the product. Therefore, key indicators like Return-on-Investment (ROI) help them to decide between different alternatives (pp. 77-78).

his/her good relationship to them. Often he/she can be an external consultant[18], or a technical specialist, developing evaluation criteria and procure information which help the other roles to decide between different suppliers.

- The initiator identifies a potential in a specific investment and therefore promotes it. He tries to convince others of his idea and pushes the purchase forward.

In addition, when applying the concept of *Webster & Wind* the following aspects have to be taken into consideration:

- one role can be represented by several people
- one person can represent different roles (more than one)
- not all roles have to be present in a purchase situation

An alternative approach is mentioned by Fließ (2000), who uses the *'promoter model'* of *Witte*[19] to analyse the different roles in a BC. According to Gemünden & Hölzle (2011), originally the *'promoter model'* was developed in the area of innovation research and similar to the idea of multi-personal buying decisions (see chapter 2.3.3), it assumes that an innovation is the result of interaction process of several people (para. 1). The model assumes that each individual who is involved in the innovation process can be characterised by allocating either the role as a promoter or opponent. Promoters are individuals which drive the innovation process forward contributing in different ways. Their counterparts, the opponents are people who decelerate the process of innovation because of existing will, knowledge, hierarchy or capability barriers. *Witte* distinguishes between five different promoter roles (see Table 1), which contribute to overcome the barriers of the innovation process by using different power sources (para. 3).

[18] The paper of Dawes, Patterson & Lee (1996) underlines the importance of including also external people in a BC structure especially in high technology business markets. Therefore they develop an integrative causal model in order to determine the BC structure of an orgnisation. "Accordingly, we argue that it is necessary for researchers to include external buying center members in studies aimed at gaining a better understanding of the underlying processes which lead to the eventual purchase of a high technology product" (p. 107).

[19] Witte, E. (1973). *Organisation für Innovationsentscheidungen - Das Promotoren-Model*. Göttingen.

Innovators Role	Typical barrier in the innovation process	Power source
Technical Promoter	Capability barriers ("Barriers of the not-knowing")	Object related expert knowledge
Power Promoter	Will barriers, Hierarchy barriers ("Barrier of not-want to")	Hierarchical potentials
Process Promoter	Interdisciplinary capability and dependency barriers ("Barrier of not allowed to"	Organisational knowledge Communication skills
Relationship Promoter	Interdisciplinary Capability and dependency barriers	Social competence Network knowledge Relationship portfolio
Technological gatekeeper	Knowledge barriers	Access specialised expertise Control of information flow

Table 1: Promoter roles of Witte (adapted from Gemünden & Hölzle, 2011)

Fließ (2000) follows the idea that the purchase process of a new or innovative product can be compared with an innovation process and thus he uses the role model of *Witte* to distinguish between people involved in a B2B procurement process (p. 318)(p. 318). Furthermore, the existence of opponents is not seen as negative point, on the contrary they help to point out problems and avoid that a blind enthusiasm about the purchase object develops (Kleinaltenkamp & Saab, 2009, p. 24) (Kleinaltenkamp & Saab, 2009, p. 24).

A slightly different approach is presented by Rackham (1989). He concentrates on a systematic approach to identify and distinguish between people involved in the purchasing process. Based on the claim of Rackham, that the traditional role models "are less useful when your product is innovative or new to the customer" (p. 30) (p. 30), and therefore the customer has not established a purchasing channel yet, he limits his approach to three different, so-called *'focus areas'*, where potential sponsors[20] in an account can be found: (1) Focus of receptivity, (2) focus of dissatisfaction and (3) focus of power. Besides the differentiation between the people of the account, the strategic target of Rackham's model is to identify the decision maker(s), of a new account, or as Rackham calls it, "Getting where it counts" (p. 29) (p. 29). Therefore, he suggests a process which follows systematically from focus (1) to focus (3) (pp. 29-32)(pp. 29-32). The so-called *'account entering strategy'* of Rackham is summarised in Figure 8.

[20] According to Rackham (1989), successful sales people tend to find a sponsor, which is defined as „an individual of the account who helped them, advised them, and, if necessary, represented them in places where they couldn't gain access" (p. 32).

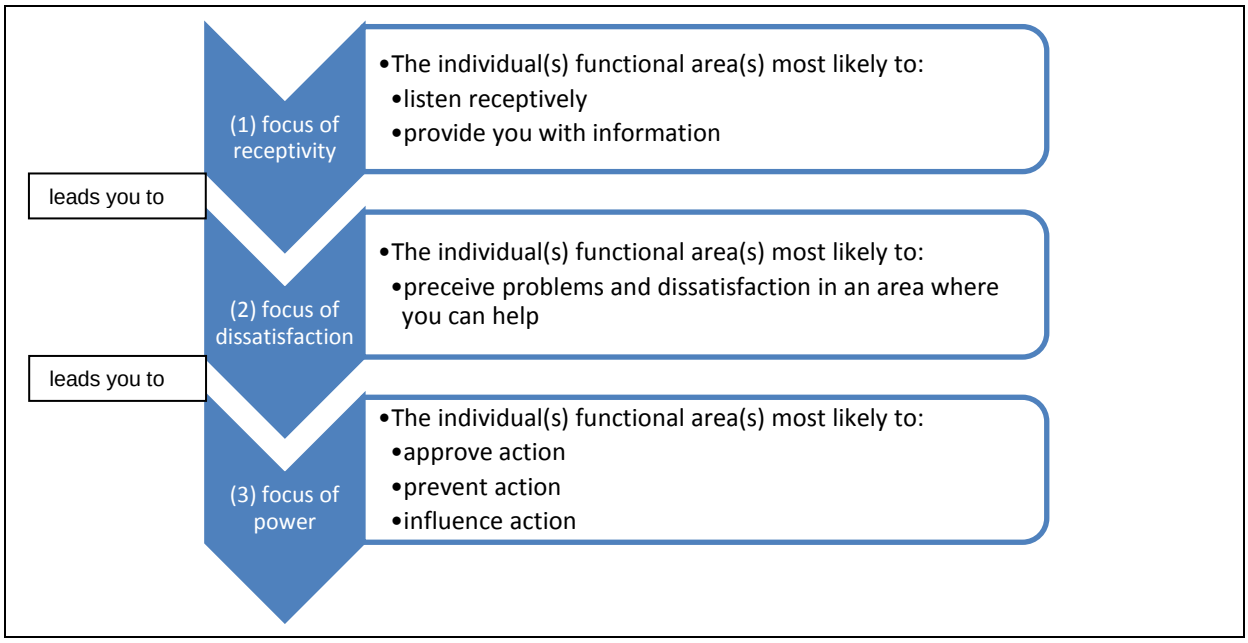


Figure 8: Focus areas of Rackham's account entering strategy (adapted from Rackham, 1989, p. 33)

- **Focus of receptivity**

According to Rackham (1989), it is most likely that you find your first sponsor when you start to penetrate an account in this area. This area describes people, who are prepared to listen and are interested in your product because of any reason. The objectives of this area are clearly defined: As the focus of receptivity does not represent people who are dissatisfied and have no decision power[21], the main target is to collect as much information about the account as possible and try to allocate the other focus areas. In this stage, one danger for sales people is that they tend to spend too much time with receptive customer employees and are distracted from actions that are more profitable. Alternatively, they start to turn the bilateral discussion in a unilateral presentation of the product because the receptive person is a good and interested listener. Nevertheless, in the end the sales people do not make a progress because the people, who are only located at the focus of receptivity, have no power to bring the sales further (pp. 33-34) (pp. 33-34).

- **Focus of dissatisfaction**

The observations of Rackham (1989) point out that the next account entering stage of successful sales people is the identification of the focus of dissatisfaction or more general, the search of people, who have problems in the area where you can offer a solution. They may have used the focus of receptivity to find these people and now start to think in a more problem solving way. The objectives for this stage are clearly defined and also rated as the most important selling skills: “Uncover dissatisfaction and develop it to a point where the customer wants to take action, and use the dissatisfaction you’ve developed to gain access

[21] Of course it is possible that the focus of receptivity is in the same time the focus of dissatisfaction or power. Rackham (1989) points out that especially in smaller sales one person may represent all focus areas. In this case the entry should be easy. “In more complex accounts, the three focus areas tend to involve different people and functions – the most receptive person may not have a problem, or the person may not have the authority to make the decision” (p. 33).

to the decision maker, either directly or by using your sponsor to sell on your behalf" (p. 38) (p. 38).
In addition, the importance of this stage is underlined by Rackham with the following ideas. If there is no one who is dissatisfied on customer side, no basis for sales exists. In fact the customer does not need your help or the product you are offering (pp. 36-38) (pp. 36-38).

- **Focus of power**

Finally, moving from dissatisfaction to the focus of power, which is the next step in the *'account entering strategy'* of Rackham (1989). He describes the people, who are dissatisfied as the "strongest allies in finding who can – and who cannot make the decision to acquire your products and services" (p. 40) (p. 40). If the focus of power is finally located, according to Rackham the sales strategies depend on the sales stages, in which the focus of power is located at that moment. Therefore, the sales stages, which are described in chapter 2.3.2, have to be considered.
Furthermore, Rackham (1989) gives one major advice. If the decision maker is identified the sales people should do their homework and do not waste the access to them. For instance asking routine questions to the decision maker would be a wrong behaviour. In addition, he clarifies that it is important to understand that in modern sales decision the focus of power is not only represented by one decision maker; rather by several decision makers and influencers. Caused by the actual management climate, in most organisation it is nowadays the rule, that several people are located at the focus of power and even the people representing the roles *'decision maker'*, which have the authority on paper to decide, tend to consulate other areas of the account before they sign the contract (pp. 41-42)(pp. 41-42).
This brings us again to the topic of the BC and especially to the idea of the informal structure of the BC. Kleinaltenkamp & Saab (2009) take the view that these role concepts can only be used to describe the task related or formal behaviour of the BC members (p. 23)(p. 23). However, as the personal relationship between the single BC members also plays an important role in the buying decision process, also the understanding of the informal structure represents an important task of the BC analysis. They quote that the relationship between the BC members determines in which degree the poeple will contribute to the pruchase decision and therefore influence the whole buying process (p. 25)(p. 25). Therefore chapter 2.3.4 will present models which also include the idea of the influence power of the single BC members.

2.3.3.2 Influences on the buying centre

Moving to the question, which factors influence the BC constellation, the literature provides many studies dealing with this topic. As Lewin & Donthu (2005) point out, the problem is that these studies show conflicting results and therefore you do not know which results should be trusted[22]. For that reason, they performed a meta-analysis of existing buying behaviour research with the target to evaluate the "strength, significance and generality of relationships between the nature of purchase situation, (a) the buying centre structure and (b) the buying

[22] A detailed discussion about the inconsistencies which can be observed in literature can be found in the paper of Lewin & Donthu (2005) on page 1384.

centre involvement" (p. 1381) (p. 1381). Their research domain is shown in Figure 9. Before presenting the outcome and the study, the factors which have been used to describe the terms buying situation, will be discussed briefly.

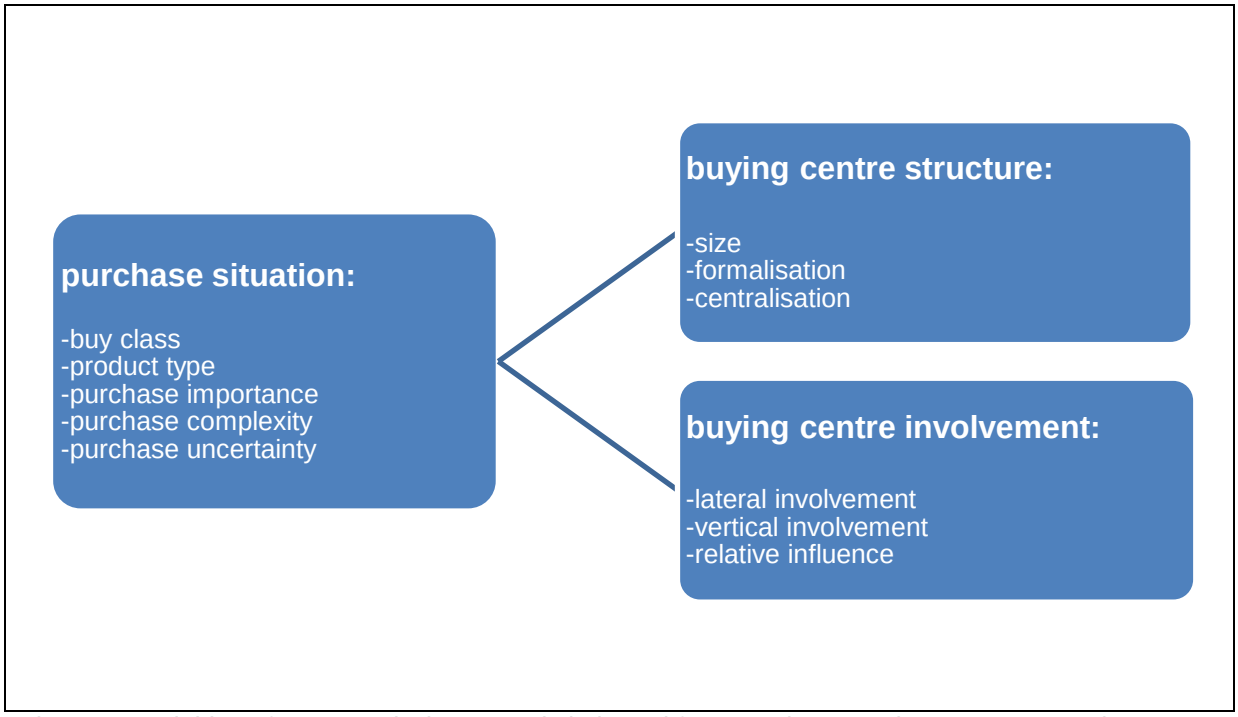


Figure 9: Variables of meta-analysis research (adapted from Lewin & Donthu, 2005, p. 1382)

Starting with the purchase situation, Lewin & Donthu (2005) observed five factors which have been repeatedly used in literature to describe this construct:

- **Buy class**

First, Robinson et al. (1976) point out that each buying situation can be characterised by three attributes: First, the newness of the problem, second, the information requirement and third, the consideration of new alternatives. By combining these attributes, Robinson et al. derives three different buying classes (see Table 2). Furthermore they claim, that the allocation of a buying situation into a buy class allows the prediction of the effort the company has to put into the information procurement of data they need for making the right buying decision (as cited in Kleinaltenkamp & Saab, 2009, p. 22).

Buy class	**Novelty grade of the problem**	**Information needs**	**Consideration of new alternatives**
New task	High	Maximum	Important
Modified rebuy	Average	Average	Limited
Straight rebuy	Low	Minimum	None

Table 2: Characteristics of different buying classes (adapted from Robinson et al., 1976, as cited in Kleinaltenkamp & Saab, 2009)

- **Product type**

Second, Lewin & Donthu (2005) talk about the product type schema, which uses seven different categories, ranging from major capital equipment to business services. In addition, this construct has been used to explain differences in the BC structure and involvement (p. 1382) (p. 1382). As this thesis will concentrate on specific products of the automotive calibration business, the explanation of the different product types will be skipped at this point. But, the factor product type will not be ignored in the further study. As mentioned in the introduction, it is assumed that the BC looks different depending on weather talking about software products or hardware products of calibration technologies. Therefore, the distinction between these two product types will be used.

- **Purchase importance**

Third, according to Stump & Heide (1996) the construct purchase importance can be described as the relative importance of a selected purchase compared to others, or as the direct impact on business success of the purchasing organisation (p. 434)(p. 434).

- **Purchase complexity**

Fourth, the purchase complexity is described in literature as a variable, which defines the product complexity or the complexity of the purchase decision (Lewin & Donthu, 2005, p. 1383)(Lewin & Donthu, 2005, p. 1383).

- **Purchase uncertainty**

Fifth, the last factor, which is often used to describe variances in the BC constellation is the purchase uncertainty. Lewin & Donthu (2005) summarise that this factor is used to describe the accessibility and availably of information in order to make the right or best purchase decision. The more information is available, the lower the uncertainty of the purchase decision (p. 1383) (p. 1383).

As these five factors are often discussed in relation to one another, Lewin & Donthu (2005) combined the factors to one construct and analysed the combined effect on the outcome variables, which are shown on the right side of Figure 9. Therefore they used data found in thirty-three empirical studies of OBB and proved the predicted relationship between the variables of the construct purchasing decision and the outcome variables of buying centre involvement and structure, with a statistical procedure. The significance of the pairwise relationship – "[…] the relationship among the predictor variables and the outcome variables […]" – has been evaluated by "[…] the zero-order Pearson product-moment correlation coefficient […]" (Lewin & Donthu, 2005, p. 1386) (Lewin & Donthu, 2005, p. 1386), abbreviated with the letter r[23].
Finally, the study of Lewin & Donthu (2005) prove a significant dependency between the construct of purchase situation and the outcome variables BC size, lateral involvement,

[23] Besides of the observed correlation, abbreviated with the letter r, Lewin & Donthu (2005) calculate the "observed correlation corrected for measurement error r‘ ", as well as "the 95% confidence intervals for the observed and corrected correlations" (p. 1386). Furthermore, they consider every relationship which does not show a zero in their confidence interval as significant, with a significance level of p≤.05 (p. 1388).

vertical involvement[24] and relative influence[25]. With other words, it can be expected that an increase of the input variables (e.g. importance, and uncertainty) is directly related with “lager buying centres […], increased level of lateral involvement, vertical involvement and relative influence of purchase participants" (Lewin & Donthu, p. 1387) (Lewin & Donthu, p. 1387). No significance was confirmed for the outcome variables formalisation and centralisation[26] (pp. 1386-1387) (pp. 1386-1387).

All in all, the findings of the study will be picked up again in chapter 3.2 and support the development of the practical guideline for analysing the BC of IC department. As a significant correlation between the buying situation and different variables of the BC constellation can be observed, it is rated as an elementary task to document the associated purchasing situation, when analysing a BC.

2.3.4 Theoretical principles of multi-personal or group decision processes

In the previous chapters, general ideas of OBB were described, an example of a customer-oriented sales process was presented and general ideas of the term BC were pointed out. But until now, the explanation of how a group of people comes to a purchasing decision is missing. Therefore, this and the following sections will present methods which aim to explain multi-personal decision making processes as well as the measurement of it.
Starting with Büschken (1994), who summarises several ideas concerning the operationalisation of multi-personal buying decisions and sets them into the organisational context, the following lines will present the major statements concerning this topic. At first Büschken, abstracts the multi-personal buying decision of a BC to a general group decision and presents theoretical group decision models to explain their process. In general, he distinguishes between two different views: The result-oriented and process-oriented model (see Figure 10). While the process-oriented model tries to explain the interactions in the group before the decision is made – in this case conflict solving models[27] like the compromise model, the adaption model, the avoidance model, the problem solving model and the power struggle model are used – the result-oriented model concentrates on the outcome of the decision finding process. In other words, only the decision itself is the key variable of the result-oriented model and not the process that leads to the decision. Thus, assuming that each individual of a group has his/her personal preference imagination

[24] According to Lewin & Donthu (2005), „Lateral involvement refers to the number of departments or other work related groups that are represented in the BC or are involved in some way in the purchase decision. […] Vertical involvement refers to the levels of mangement that will be involved in and/or influence a particular purchase decision” (p. 1383).
[25] The variable relative influence tries to differ between purchase situations where the purchase department takes the lead role and situations where other groups, e.g. the users, specialists or management, act as major deciders. (Lewin & Donthu, 2005, p. 1384)
[26] According to Lewin & Donthu (2005), “Buying center formalization refers to the emphasis placed on the use of formal rules and procedures by buying center participants during the purchase process. […] Buying center centralization refers to buying centers where, regardless of the number of people involved, only a few participants hold meaningful influence over the purchase decision process” (p. 1383).
[27] For a detailed description of the different conflict-solving models see Büschken (1994).

concerning different alternatives, the result-oriented model describes the process how the individual preferences of the group members can be combined in order to derive a representative group preference. Put another way, the result-oriented model describes the direct relation between individual and group preferences. The interaction processes which may influence the individual preferences are not considered in this model (pp. 19-30)(pp. 19-30).

Following the result-oriented model, weather on the idea if the group decision is directly derived by simply aggregating the individual preferences (choice of one alternative which the most people of the group members prefer) or by prior building a group preference (a group preference order[28] is derived from the individual preference orders with the help of a selected aggregation model in advance and used as the basis for the decision), it can be distinguished between decision-oriented or preference-oriented models (Brinkmann, 2006, p. 12)(Brinkmann, 2006, p. 12).

Bossert & Stehling (1990) see a clear benefit in the preference-oriented model because the intermediate step of developing a group preference gives the applicator an additional information about the importance of other alternatives, which have not been chosen as highest preferred alternatives (as cited in Brinkmann, 2006, p. 12). Furthermore, also Fließ (2000) proposes to follow the result-oriented approach for the analysis of group decisions. He claims that only the understanding of the interaction of the people in a process can provide information which help to prognosticate the buying behaviour of a BC (p. 350) (p. 350).

Based on these statements, the literature proposes to follow the result-oriented model and preference-oriented models, as illustrated with the green lines in Figure 10.

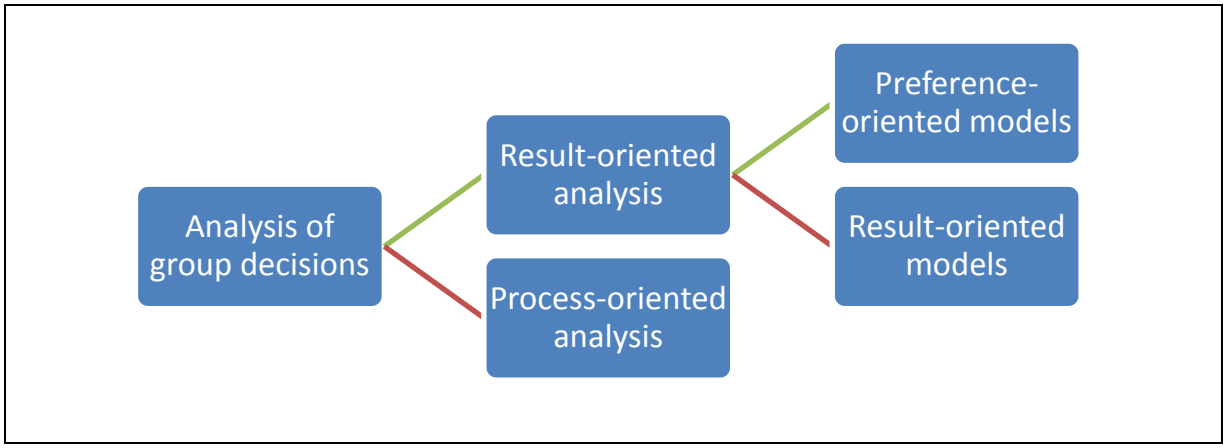


Figure 10: Structure of conflict solving models (adapted from Brinkmann, 2006, p. 11)

According to Brinkmann (2006), the usage of the preference-oriented model offers three different ways to aggregate the individual preferences to an overall group preference[29]. First, assuming that each individual can put forward their preference with the same efficiency, the *'proportionality approach'* follows the idea that all individual preferences have the same weight when building the aggregated group preference. Second, if it cannot be assumed that all group members can promote their personal preferences with the same efficiency, a

[28] A preference order is the result of an individual ranking process of different alternatives.

[29] For a detailed description of the different preference aggregation models see also Büschken (1994), pp. 40-46.

weighting factor (between 0-1) helps to describe the real influence of an individual to the group preference, the so-called weighted proportionality approach. Third, the extreme case where the group preference is similar to the individual preference of the most powerful member of the BC[30] can also be used to generate the group preferences. All in all the preference-oriented models correlates best with the general target of multi-personal buying behaviour research, which aims on connecting the individual preferences of the group members in such a way that a group decision can be derived (p. 13)(p. 13).

Based on this structural classification of the existing explanation models of group decision, the following chapter will present specific explanatory models which describe collective procurement behaviour.

2.3.4.1 Explanatory models of collective procurement behaviour

As summarised by Büschken (1994), the models of *Choffray & Lilien* or *Corfman & Lehmann* can be mentioned as early approaches which have been developed in order to model multi-personal purchasing decisions. While the model of *Choffray & Lilien* was developed to explain organisational procurement decisions, the model of *Corfman & Lehmann* was developed against the background of multi-personal buying behaviour in families (pp. 48-52)(pp. 48-52).

According to Choffray & Lilien (1978), the model aims to determine the purchase likelihood of different alternatives, a customer can choose between in an organisational buying situation. As shown in Figure 11, the model assumes that the BC builds in a first step a so-called *'evoked set of alternatives'* and derives further on – with regard to the economical and organisational limitations – a so-called *'feasible set of alternatives'*. In a next step the model explains that the single BC members, build their personal preferences list, ranging from the most to the least preferred of the possible alternatives. Further on, the model shows that, under the consideration of the interaction structure in the BC, a group preference is build, on which finally the group buying decision is based. Finally, the choice of the BC is based on the construct of the organisational preference order according to the given set of buying alternatives (pp. 21-23) (pp. 21-23).

[30] See for more details the *'dictator model'* of Büschken (1994), where the dictator has the weightig factor one and all others have zero (p. 31).

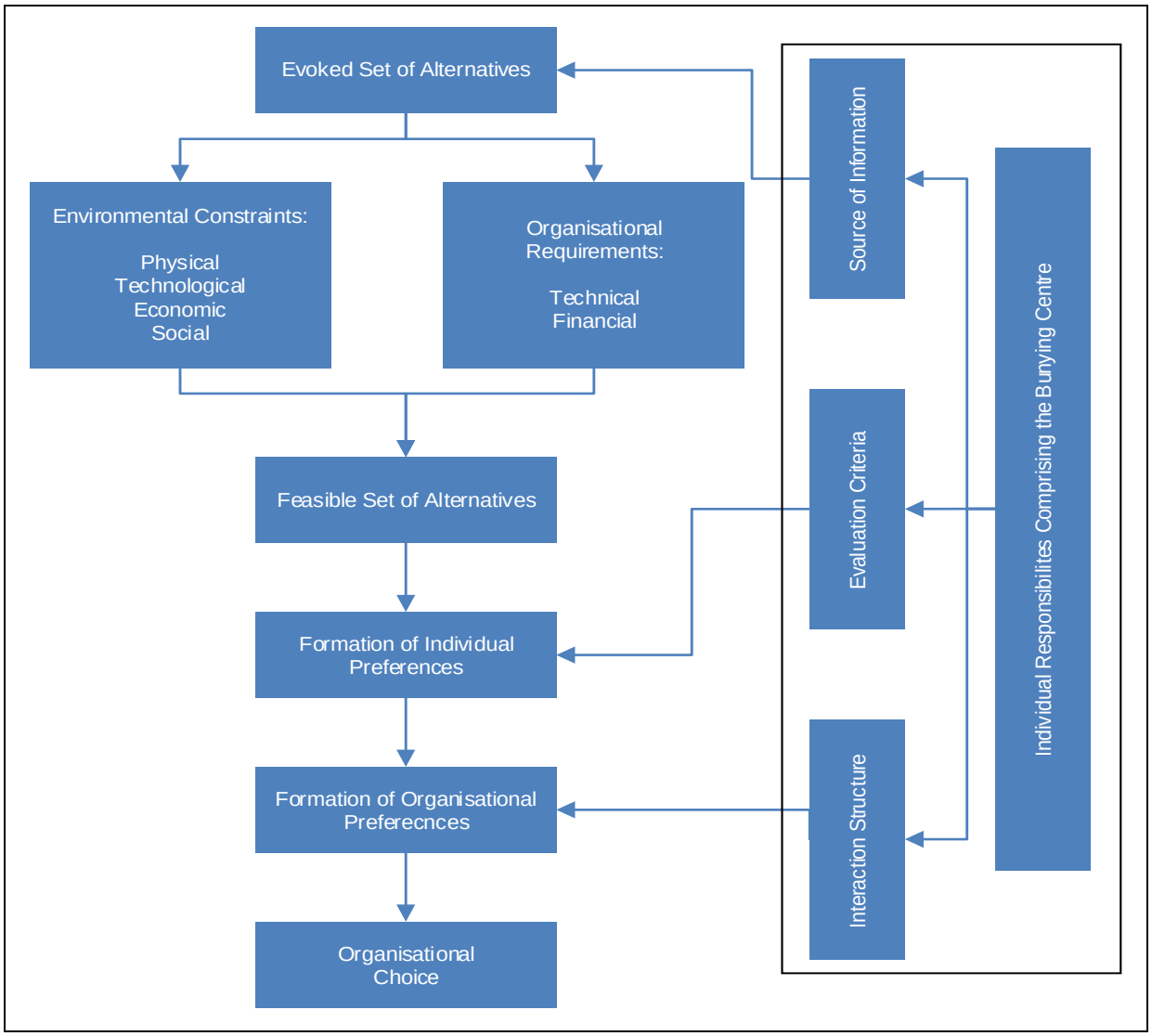


Figure 11: Model of organisation buying behaviour (adapted from Choffray & Lilien, 1978, p. 22)

While the model of *Choffray & Lilien* explicitly differs between the individual and organisational buying preferences, the model of *Corfman & Lehman* directly derives the group decision from the individual preferences without building the intermediate group preference (see Figure 11 and Figure 12). However, as Brinkmann (2006) describes, *Corfman & Lehman* expand the model of *Choffray & Lilien* by adding influence values of the decision members as a central determinate of the group decision. Hence, with the explanation of the interaction between personal preferences and personal influence[31], they succeed in explaining how the group decision develops. The model insists that the conflict situation, which necessarily exists in the BC – caused by deviating preference ideas – can be resolved by the exertion of influence[32]. In this case, the authors connect the term influence directly with the power construct, which in turn describes the capability to change the behaviour or attitude of others (pp. 17-18) (pp. 17-18).

[31] The model of Choffray & Lilien (1987) describes the group decision as a weighted linear function of the individual preferences. “The weights are defined by the relative influence of the members – each individual’s influence over the other” (p. 2).

[32] For detailed information about the theory of influence exertion and effectiveness, see Corfman & Lehmann (1987), pp. 2-4.

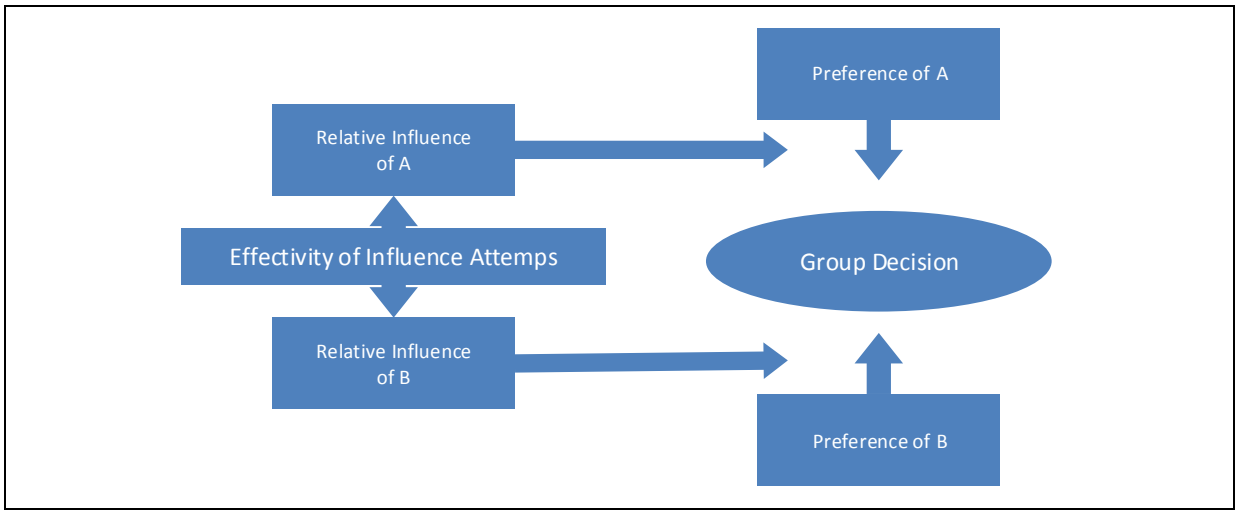


Figure 12: Explanatory model of group decision (adapted from Corfman & Lehmann, 1987, as cited in Büschken, 1994, p. 51)

In addition, Brinkmann (2006) recognises that both models have important similarities. For example, both assume a multi-level decision process where in the first step, the people which are involved in the decision process, built their individual preferences in a seperate way. In the next step, a *'group preference'* (see 'formation of organisational preference' in Figure 11) or a *'group decision'* (see Figure 12) is derived from the individual preferences of the decision unit. Both models adopt the idea that not all members of the decision unit influence the group construct in the same way (pp. 18-19) (pp. 18-19).
Finally although, both models follow a result-oriented approach (see Figure 10) only the model of *Corfman & Lehmann* contribute to the explanation of group decisions. The model of *Choffray & Lilian* lacks in these respects and thus can only be seen as a structural, not as an explanatory model (Büschken, 1994, pp. 49-53) (Büschken, 1994, pp. 49-53).

2.3.4.2 Determinants of multi-personal buying decisions

Based on the general and buying process specific approaches to explain multi-personal buying decisions which have been describe in chapter 2.3.4 & 2.3.4.1, Büschken (2004) summarises three major determinants which are needed to describe multi-personal buying decisions (see Figure 13). At First, the determinante *'preference'* is defined as the result of an individual evaluation process. This assumes that a set of alternatives exists, that the alternatives can be brought in an rank order and that a decision rule[33], on which the individual can rate the buying alternatives, is present. The result of the rating process is an

[33] Büschken (2004) distinguishes between four decision rules (p.57):
First the *'dominating criterion'* can be used as an easy rule when one alternative dominates all other alternatives according to one product attribute, and the values of the remaining attributes is not weaker than of all others.
Second, the usage of a *'minimum level for each attribute'* eliminates all alternatives with consist of attributes level which do not reach a specific minimum level.
Third, using the *'lexicographic rule'*, the product attributes are sorted according to their importance for an individual, and stepwise the alternatives are compared according to the ranked attributes. If alternatives have the same attribute-level of the most important attribute, the second important attributes is used to find the preferred alternative.
Fourth, the *'evaluation of the utility of an alternative'* is often used as a decision rule. In this case, the attributes of the alternatives are rated with part-worth utilities and moreover, the overall utility value is derived by adding up all part-worthies. The alternative with the highest overall utility value is seen as the preferred one.

individual rank order, ranging from highest prefered to lowest prefered alternative (pp. 56-57) (pp. 56-57).

Second, the ability of an individual of the BC to influence other members, is seen by Brinkmann (2006) as determinate which is important for the operationalisation of the organisational buying decision process. The influence potential of an individual is often explained with the help of the power construct. Therefore, the term power stands for the capability[34] to affect the preferences and as a consequence also the behaviour of others (in the direction of the ideas of the person who imposes power). This means for the BC, that members may change their attitute and opinions about alternatives during the interaction process in the group because of the exercise of power of others. That implies that power or influence is not an attribute of a person; rather it can be seen as the result of relationship between people. Thus the deteminate *'influence structure'* is used to consider the internal influence relationships (pp. 22-24) (pp. 22-24).

Third, Büschken (2004) points out that the structure of the BC in general depends on the situation. This refers to the personal structure as well as interactional structure[35] (p. 55) (p. 55). These statements are remarkably similar to the findings of Lewin & Donthu (2005), which confirms the dependecy of BC structure or involvement with the purchase situation in their empirical study (see chapter 2.3.3.2 or Lewin & Donthu, 2005, p. 1382). Moreover, this implies that two determinants, *'preference'* and *'influence structure'* are only valid for the underlying buying situation (Brinkmann, 2006, p. 19)(Brinkmann, 2006, p. 19).

Finally, on basis of the determinants pictured in Figure 13, Brinkmann (2006) concludes the functional context between the construct *'group preference'* and *'individual preference'*. With the assumption of a given situation, he uses the information about the *'influence structure'* to derive weighting factors for the *'individual preferences'*. With other words, an *'individual preference'* of members with low influence will not be reflected in the *'group preference'* as strong as the *'individual preference'* of members with high influence. In addition, this assumes that a conflict situation exists; otherwise the individual preferences would be anyway the same and no model to explain inhomogeneous influence distribution would be needed (pp. 28-29) (pp. 28-29). Brinkmann (2006) formulates the functional correlation as documented in Equation 1:

[34] According to Fließ (2000), the exertion of power is based on different power sources, which allow people to influence others (p. 331). For further information about the power sources see Patchen (1974) who distinguishes between the following seven power sources: (1) reward power, (2) coercive power, (3) legitimate power, (4) referent power, (5) expert power, (6) information power and (7) department power (p. 197). In addition, research results point out that while the expert and the information power are the most often-used power sources in the industrial buying context, the legitimation power, which is connected with the hierarchical position of a person, is seldom used in this context (Brinkmann, 2006, p. 27).

[35] As Büschken (1994) describes, the personal structure refers to the size, and the constellation of the BC and interactional structure refers to influence structure and the decision behaviour of BC members (p. 55).

$U_{cg} = f(u_{ci}, u_{cj}, e_{ci}, e_{cj})$ with $\sum_{i=1}^{j} e_{ci} = 1$ for all $e_{ci} \geq 0$

With U_{cg} = Utility or preference of group g for alternative c

u_{ci} = Utility or preference of individual i for alternative c

u_{cj} = Utility or preference of individual j for alternative c

e_{ci} = Influence of individual i on the decision about alternative c

e_{cj} = Influence of individual j on the decision about alternative c

Equation 1: Functional correlation between individual and group preference (adapted from Brinkmann, 2006, p. 28)

As this general formulation gives no information about how the influences and preferences can be measured, the next section presents methods which are used to operationalise these two determinants.

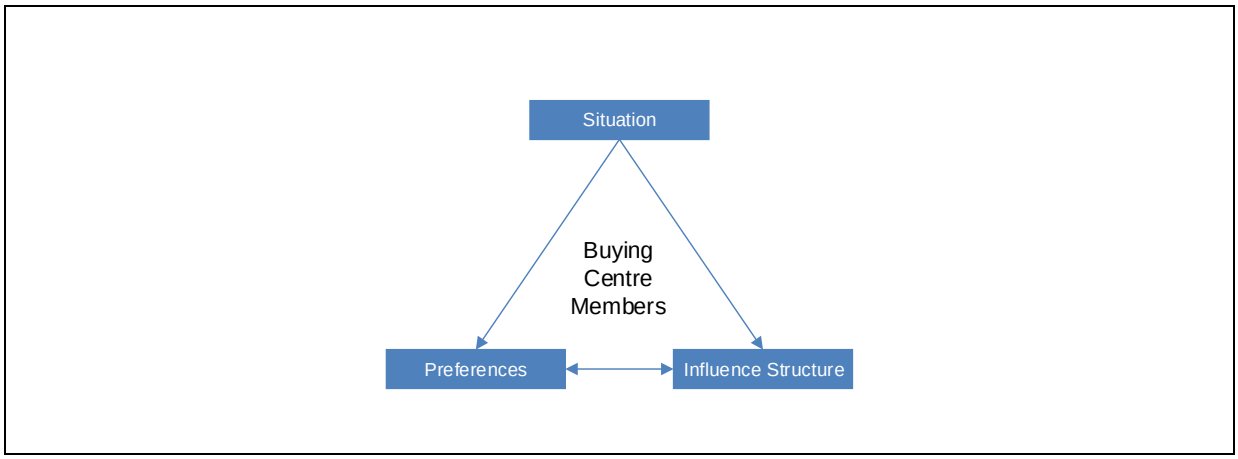


Figure 13: Determinants of multi-personal buying decisions (adapted from Büschken, 1994, p. 55)

2.3.4.3 Methods for measuring the group preference of a BC

The findings of chapter 2.3.4.2 have pointed out that the modelling of a BC decision can be done with the help of three determinants. Furthermore, in consideration of a specific buying situation, the two determinants *'preferences'* and *'influence structure'* should make it feasible to simulate the decision of a group, in our case the BC. Therefore, the following sections will present different methods, which aim to analyse these two constructs.

Brinkmann (2006) uses one method that was presented by Voeth (2004), the multi-step limit conjoint analysis (MeLimCA). In this approach, *Voeth* is exploring the two-stage decision process (see chapter 2.3.4.1) with the help of an interlinked two-stage limit conjoint-measurement (Brinkmann, 2006, p. 51)(Brinkmann, 2006, p. 51).

As the limit conjoint analysis (LCA) is an advancement of the traditional conjoint analysis (TCA) both approaches will be explained in the following paragraphs. In addition, based on these methods, the concept of the MeLimCA will be presented.

2.3.4.3.1 Traditional conjoint analysis

The traditional conjoint analysis was developed originally in the area of mathematical psychology by *Luce & Tukey*[36] in 1964 and was introduced the first time by *Green & Rao*[37] in 1971 in the area of marketing (Baier & Brusch, 2009, p. 5) (Baier & Brusch, 2009, p. 5). Following Brinkmann (2006), the conjoint analysis is one of the most important methods of decompositional utility measurement, which are described in literature since 1970s. Initial point of the method is that the holistic utility of a multi-attributive object[38] can be derived by adding up by the part-worth utilities of the single attribute-levels[39] by using a so-called *'preference structure model'* [40]. In contrast to the compositional methods, which try to compose the overall utility of an object by summarisation of direct measured part-worth utilities for the attribute-levels, the TCA discovers the overall utility of a multi-attributive object in a holistic way and derives the part-worth utilities of the attribute-levels with the help of statistical estimation procedures[41]. The underlying idea is to create different buying objects or so-called *'stimuli'* [42] in order to simulate a set of alternatives, the purchasing people can choose of. Therefore in a first step, attributes and the associated attribute-levels, which are used to describe specific objects of a selected object group, are defined and combined in a systematic way in order to create several, maybe fictive, products (experimental design). Then, this set of alternatives is presented to the test people who rate the items according to their individual feeling of preferences[43] by bringing them in a preference order[44] (p. 35)(p. 35). With other words, the underlying idea of the TCA is the choice between alternative

[36] Luce, R., & Tukey, J. (1964). Simultaneous conjoint measurement – A new type of fundamental measurement. *Journal of Mathematical Psychology*, 1*(1), pp.1-27.*

[37] Green, P., & Rao, V. (1971, August). Conjoint Measurement for Quantifying Judgmental Data. *Journal of Marketing Research*, 8, pp. 355-363.

[38] In respect to our research, a concrete software product of IC department represents the multi-attributive object. Multi-attributive means that a purchasing product can be characterised by the composition of different product attributes in respect to an underlying rule.

[39] An attribute-level represents a specific value or manifestation of an attribute. For instance, the attribute price may have the following three attribute-levels: 5€, 10€ and 15€. Consequently, a multi-attributive object can be characterised by composing concrete attribute-levels of all its attributes.

[40] The *'preference structure model'* of the TCA can be formulated by combining the part-worth model (or attribute specific with an additive logic operation function: $y_{k=} \sum_{j=1}^{J} \sum_{m=1}^{M_j} \beta_{jm} x_{jm}$. ($y_k$: estimated overall utility value for stimulus k; β_{jm}: part-worth utility for attribute-level m of attribute j; M: amount of possible manifestations of attributes (number of possible attribute-levels); x_{jm} =1 if the characteristic j is present for the regarded stimulus k; x_{jm} =0 if the characteristic j is not present for the regarded stimulus k (Hillig, 2006, p. 45).

[41] Depending on the data type of the empirical collected preference information – ordinal scaled or metric scaled data – different solution algorithm can be used. For this study, which assumes metric scaled data, the ordinary leas square (OLS) regression or the variance analyse (ANOVA) are suitable estimation algorithms (Hillig, 2006, pp. 48-50).

[42] The term *'stimuli'* is used to describe a concrete purchase object, which is composed, by a specific combination of attribute-levels.

[43] In the framework of the conjoint analysis, the term *'preference'* is described as the result of an individual utility comparison concerning different multi-attributive objects (Howard & Sheth, 1969, pp. 26-27). For instance, regarding two possible purchasing objects A and B, the preference of object A is connected with a higher perception of benefit, than for product B.

[44] Hillig (2006) mentions two different scaling logics which can be used to create a preference order: First the *'ranking method'*, where the single stimuli are brought in an specific order; from most to least prefered stimulus. Second, the *'rating method'* allocates in addition to the ranking also a concrete point rating to each stimuli (p. 47). Following this approach, different utility distances in the ranking order between the single stimuli can be considered (p. 61).

objects based on individual preferences concerning the special composition of different attributes – in this respect the buyers go through a weighting up decisions of pro and contra for each object (Trade Off) (Hillig, 2006, p. 37)(Hillig, 2006, p. 37). Finally, the result of the subjective created preference list of alternatives serves as dataset from which the part-worth utilities of the single attribute-levels as well as the relative importance of the different attributes can be derived from (Brinkmann, 2006, p. 35)(Brinkmann, 2006, p. 35). At the end, as described by Backhaus, Erichson, & Weiber (2011), the single part-worth utilities for a concrete product can be summed up and an overall utility value[45] can be defined. Based on that, several products can be compared by their *'overall utility value'*, and a prediction about which product has the highest possibility to be bought by the BC, can be derived. Furthermore, the relative importance of the single attributes for the overall utility sensation of the test subjects, can be calculated (p. 318)(p. 318).

Although the TCA method finds a lot of application in the area utility measurement, the theory describes two major points of criticism. Thus, the development of different variants of the TCA is caused by the following two driving forces (Brinkmann, 2006, p. 36)(Brinkmann, 2006, p. 36).

First, according to Weiber & Rosendahl (1997) the number of stimuli, which can be rated by a test subject, is limited to a number of twenty. Reaching a value higher than twenty, the test subject is no longer able to rate the stimuli without a distortion of the reality. This is caused by a simple information overload (p. 112) (p. 112). Second, as described by Brinkmann (2006) the single usage of positive utility values entails that even a stimuli rated least preferred, has a positive utility value and expresses the theoretical disposition to buy. With the theoretical assumption that a stimulus can be rated as *'no consumer acceptance'* by the test subjects (the consumer would not buy this stimuli), the need of an alternative ranking scale is indispensable. Thus, the LCA method extends the TCA with the clear distinction between stimuli, which cause a positive or negative buying intension (p. 36)(p. 36).

2.3.4.3.2 Limit conjoint analysis

Under the name of LCA, *Voeth & Hahn* extended the traditional TCA in 1998 by a second stage, in which the existence of a non-buying interest has been taken into consideration (Voeth, 2004, p. 723)(Voeth, 2004, p. 723). As Hillig (2006) describes, besides of the existence of a general disinterest about a product group, it can be assumed that the theoretical existence of a general buying intention of a product group must not correlate with a concrete buying interest of a specific alternative; rather the concrete buying interest depends on the composition of the alternative. Thus, the theoretical willingness to buy is only allocated to stimuli which exceed a specific utility threshold. This means that there are also stimuli rated as worth buying (p. 61).

Therefore, after bringing the presented stimuli in a preference order, the test subject has to distinguish clearly between objects he/she would buy and objects he/she would not buy – this idea is operationalised by setting the *'limit card'* into the existing ranking of a set of

[45] The term overall utility value is further on used to describe the total utility of a product.

stimuli[46] (Voeth & Hahn, 1998) (Voeth & Hahn, 1998). The position of the *'limit card'* can be interpreted as the individual neutral point of utility (Stadie, 1998, p. 67)(Stadie, 1998, p. 67). The application of this procedure causes that after the calculation of the overall utility value of an object, a theoretical buying intention is characterised by a positive overall utility value and an object with a non-buying intention with a negative overall utility value (Voeth & Hahn, 1998, p. 123) (Voeth & Hahn, 1998, p. 123).

The statements of the previous section show that the execution of a LCA (or TCA) asks for a controlled way of proceeding. Therefore, the next chapter will describe the design scope and the single steps, which have to be considered in order to perform a CA.

2.3.4.3.3 Design scope of limit conjoint analysis

According to Voeth (2004), in order to deliver valid data, the execution of a CA requires a certain preparation. Therefore, the literature offers different, mostly process-oriented, frameworks (p. 38)(p. 38). For example, Backhaus, Erichson, Plinke, & Weiber (2006) present a framework for the design of a TCA. As the LCA follows the same way of proceeding like the TCA, the steps proposed by Backhaus et al. (2006) are used as structural framework for the design of the LCA (pp. 562-618) (pp. 562-618). Figure 14 summarises the main process steps and the following sections will explain them in detail.

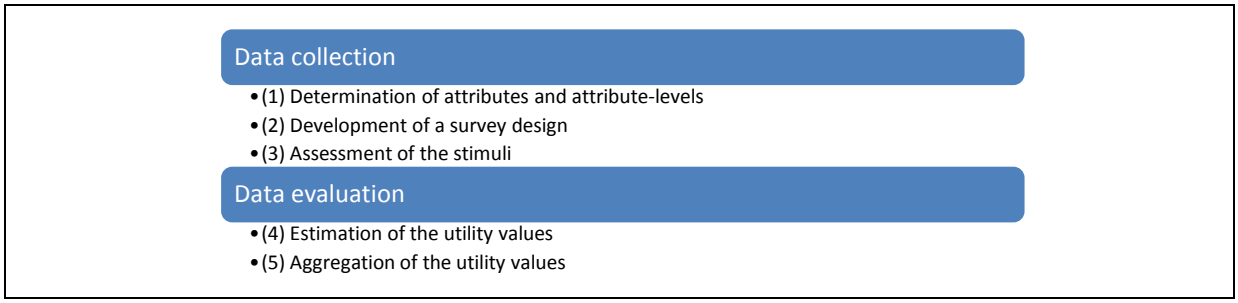


Figure 14: Process of conjoint analysis (adapted from Backhaus, Erichson, Plinke, & Weiber, 2006, p. 561)

(1) Determination of the attributes and attribute-levels

At the beginning of the preparation of the LCA there is the choice of attributes and attribute-levels[47] for the study object. The part-worth utilities resulting of the LCA, refer to the attribute-levels. Müller (2005) and Hillig (2006) see the development of the attributes and attribute-levels as the most important design step, which highly influences the quality of the collected data. Therefore as Backhaus et al. (2006) propose, the following requirements should be considered (pp. 562-563)(pp. 562-563):

- The attributes must be **relevant** – Only attributes, which contribute to the overall utility of the object and influence the buying decision, should be chosen.

[46] Also here, the allocation of a concrete point value to the limit card is demanded if the equidistance between the stimuli cannot be assumed (Hillig, 2006, p. 61).

[47] In literature different terms for *'attribute'* and *'attribute-levels'* can be found. While Backhaus et al. (2006) speak about „Merkmale und Merkmalausprägungen" (p. 562), Louviere (1988) uses the terms „attributes" and „levels" (p. 17). In order to avoid confusion about the terms, we stick to the terms '*attributes'* and '*attribute-levels'* in the remaining work.

- The attributes must be **influenceable** and **feasible** – This means that the chosen attributes must be parameters of the product design and also technical producible by the fabricator.
- The attributes should be **independent** – In order to not violate the additive model of the conjoint analysis, the change of an attribute-level must not affect the utility feeling of an attribute-level of another attribute.
- The attributes have to be in a **compensatory relationship** – The compensatory character of the LCA assumes that the overall result is composed by adding-up part results, which have a substitutional character. Referring to the level of the overall utility value of the product, e.g. a smaller price can compensates the lower quality of a product.
- The attributes and attribute-levels must not represent a **criterion for exclusion** – This means that attributes which assume a minimal manifestation of an attribute-level in order to be relevant for the test subjects, should not be included in the set of attributes.
- The amount of attributes and attribute-level must be **limited**[48] - E.g. the existence of four attributes with three attribute-levels each result in $3^4 = 81$ combination possibilities.

The result of this phase is a list of defined attributes and their attribute-levels. This leads to the next step of the preparation of the TCA.

(2) Development of a survey design

In the second step the survey design has to be defined. Therefore decisions about the method of stimuli creation, the construction of the set of stimuli, the type of presentation as well as the attribute-specific evaluation function have to be made :

- **Methods of stimuli creation** (Hillig, 2006, p. 45) (Hillig, 2006, p. 45)

In general, it can be distinguished between two methods. If each stimuli is characterised by the combination of one attribute-level of each attribute we speak about the *'profile method'*. If stimuli exist which are described by less than all attributes of the prior defined attribute set, we speak about the *'sub-profile method'*.

- **Construction of the stimuli set** (Backhaus et al., 2006, p. 564)

Often the usage of the *'profile method'* results in a too high amount of stimuli, which are not rateable in a realistic way by the test subjects (see page 36). Thus, a systematic reduction of the complete design (all combination possibilities of the attribute-levels) by using a so-called reduced design is proposed. The reduced set can be developed by several methods[49]. The aim of the reduced design is to find a subset of stimuli, which represent the complete design

[48] As already mentioned, the maximum number of stimuli which a test subjects can evaluate is rated by Weiber & Rosendahl (1997) by a number of about twenty (see chapter 2.3.4.3.1).

[49] See also Backhaus et al. (2006), which describe different methods for the development of a reduced design (pp. 566-570).

in the best way. In this study, the reduced design will be developed with the procedure ORTHOPLAN[50], which is included in SPSS 21.

- **Type of presentation** (Hillig, 2006, p. 46) (Hillig, 2006, p. 46)

The presentation of stimuli should give the test subjects a clear imagination about the product concept. In general, the stimuli can be presented in visual, verbal, model-based or real ways. But as the preparation of the stimuli in visual, model based or real way is connected with a huge effort, often the verbal presentation type is preferred. With the help of cards or digital media, the verbal defined stimuli are presented to the test subjects. In this case the so-called position effect[51] has to be considered when preparing the stimuli.

- **Attribute-specific evaluation function** (Klein, 2002, pp. 15-18)(Klein, 2002, pp. 15-18)

To determine the relationship between the part-worth utilities and the attribute-levels, a so-called attribute-specific evaluation function has to be chosen. It can be distinguished between three models: (1) The *'linear model'* assumes that the part-worth, utilities are in linear correlation with the attribute-levels. E.g. the higher the price of the product, the lower the attractiveness and thus the part-worth utility of the attribute-level. (2) The *'ideal point model'* assumes that the highest part-worth utility is connected with a specific (ideal) parameter value. The higher the distance to this ideal point, the lower the test subject sees the part-worth utility of the attribute-level. (3) The *'model of separate part-worth utilities'* assumes that each parameter value of the attribute has a specific part-worth utility which is not related with the part-worth utility of other attribute-levels.
According to Klein, model (1) and (2) require quantitative attributes, e.g. a price or a number. Model (3) can be used for any kind of attributes, also for attributes with qualitative attribute-levels (e.g. the attribute colour with the attribute-levels green and red). Furthermore, the choice of the evaluation function influences the result of the part-worth utility estimation. While the result for an attribute, which is described with model (1) will be one coefficient, the result of the utility estimation for an attribute which is described with model (3) will be three separate part-worth utilities. As model (1) assumes a linear relationship, the estimated value represents a kind of standardised regression coefficient. The single part-worth utilities can be calculated by multiplying the value of the attribute-level with this coefficient.

(3) Assessment of the stimuli (Hillig, 2006, p. 47)(Hillig, 2006, p. 47)

[50] The procedure ORTHOPLAN produces a reduced design by using the so-called Addelman-plan (Backhaus et al., 2006, p. 584). Addelmann (1962) explains the idea of the orthogonal main effect plans with the following lines: "[…] the interactions of the s^n factorial arrangement can be considered as factors to construct orthogonal main-effect plans for the symmetrical factorial experiment involving up to $(s^n - 1)/(s - 1)$ factors, each at s levels, with s^n treatment combinations, where $s = p^m$ and p is a prime number. Hence, for example, an orthogonal main-effect plan for 4 factors A, B, C and D, each having three levels, can be constructed with 9 treatment combinations by corresponding factors A and B with the two factors X1 and X2 of a 3^2 factorial experiment and factors C and D with the generalized interactions of X1 and X2, namely X1X2 and X1,X2²" (p. 48).

[51] According to Hillig (2006), the position effect describes the significant correlation between the importance of an attribute and position of the attribute on the presentation media. This means that attributes which are presented on first, second or last position of the list, are noticed as more important by the test subjects. This distortion of the reality can be avoided by varying the position of the attributes (p. 46).

After presenting the reduced set of stimuli, which was prepared in respect to the restrictions mentioned in point (1) and (2), the test subjects have to evaluate the stimuli according to their personal utility feeling. The most popular techniques applied in TCA are the *'rating'* and the *'ranking'* method. The ranking method demand the test subjects to arrange the presented stimuli from most to least preferred. The rating method additionally asks for a concrete point evaluation. While the ranking method only gives information about the preference order - and therefore creates ordinal-scaled data - the rating method also considers different distances between the stimuli – and produces interval-scaled (metric) data.
At the end of the rating and/or ranking process the test subject has to set the *'limit card'* as described in chapter 2.3.4.3.2. While the position of the *'limit card'*, in connection with the ranking method, is simply done with the determination of a rank, the positioning of the *'limit card'* in connection with the rating procedure asks for an additional allocation of a rating value for the *'limit card'* (Hillig, 2006, p. 60) (Hillig, 2006, p. 60).

(4) Estimation of the part-worth utility values and relative importance of the attributes

Moving on from data collection to data evaluation, the choice of a suitable estimation procedure is the next step. Depending on the scale of the produced data, different methods can be used. For metric data, the most famous methods are the ordinary leas square (OLS) regression or the classical variance analysis (ANOVA). With the help of these methods, part-worth utilities for each attribute-level can be derived (Hillig, 2006, pp. 48-49) (Hillig, 2006, pp. 48-49). With this information it is possible to calculate the overall utility value of a purchase stimuli with any combination of attribute-levels (all kind of stimuli which are imaginable by combining the attribute-levels which have been defined in step 1) and in addition, also the relative importance of single attributes can be derived (Backhaus, et al., 2006, p. 571). The relative importance[52] of an attribute can be interpreted as power of the attribute to change the overall preference imagination of a test subject concerning a multi-attributive object (Klein, 2002, p. 28)(Klein, 2002, p. 28).
In addition, according to Hillig (2006), the scale transformation of the utility scale, caused by the setting of the *'limit card'*, has to be considered. As the *'limit card'* shifts the individual neutral point of utility (utility value 0) a linear transformation of the utility value is necessary. Caused by the linearity of the transformation, this can be done before or after the calculation of part-worth values. Depending on the assessment methods, which have been described in Point 3, two different transformation equations (see Equation 2 and Equation 3) are used (p. 63) (p. 63).

$$U_{kn}^{L} = U_{kn} + LR_n - K - 0{,}5 \quad (2)$$

With:

U_{kn}^{L} = Overall utility value of stimulus k for test subject n for LCA

U_{kn} = Overall utility value of stimulus k for test subject n for TCA

LR_n = Rank, after which test subject n has placed the *'limit card'*

K = Amount of stimuli of reduced design.

[52] The calculation of the relative importance is described in detail in appendix A9.

Equation 2: Transformation rule for ranking method

$$U_{kn}^{L} = U_{kn} + LP_n \quad (3)$$

With:

U_{kn}^{L} = Overall utility value of stimulus k for test subject n for LCA

LP_n = Point value of the *'limit card'*

Equation 3: Transformation rule for rating method

(5) Aggregation of the utility values

Step (1) to (4) describe the procedure to derive the individual part-worth utilities for the single attribute-levels of the attributes of a study object. In a further step the TCA suggests the aggregation of the part-worth utilities of all test subjects. Therefore, a standardisation of the utility values has to be done in advance (Backhaus et al., 2006). As the MeLimCA uses a little different procedure to aggregate the individual *'overall utility value'* to the group-related utility value, this process step will be skipped at this point[53]. The next chapter will explain the MeLimCA in more detail.

2.3.4.3.4 Multi-step limit conjoint analysis (MeLimCA)

The approach presented by Voeth (2004) uses two separate LCA measurements in order to illustrate the two-stage decision process and develop a so-called group preference or group-related utility value (see chapter 2.3.4.1). Therefore, the results of the first LCA (used to measure the preferences or utilities on individual basis) and the second LCA (used to measure the relative influence of the group members on the BC decision), are connected with a relationship model to simulate the group decision process (see Figure 15). While stage one follows the traditional process of LCA (see chapter 2.3.4.3.3) to derive the part-worth utilities for the attribute-levels, the LCA of stage two uses a modified approach. Instead of different buying objects, the test subjects have to rate simulated decision making situations according to the likelihood of a successful purchase decision of the BC. An example of such a simulated decision situation (also called conflict situation) is illustrated in Figure 15. This means that the BC members themself are used as attributes and their decision about a purchase – three different decision possibilities are defined in advance[54] - represent the attribute-levels of the attribute. Here again, the systematic combination with a reduced design[55] defines a set of stimuli which is presented to the BC members. In an analogue way to stage one, the people assess the stimuli with the ranking or rating method and under the usage of linear additive estimation algorithm, the influence values for the single BC members are derived (in this case the influence values are represented as the relative importance of the attributes). Further on, the collected information about personal influences and preferences are linked with the help of an integration model in order to simulate the group

[53] Backhaus et al. (2006) describe the aggregation of the *'overall utility values'* of different test subjects in TCA and LCA in more detail (pp. 580-582).

[54] Voeth (2004) distinguishes between three decision possibilities, which are represented by the following votes of the BC members: First, *'pro purchase of product X'*, second *'contra purchase of product X'* and third *'can imagine the purchase of product X (but prefers product Y)'* (pp. 725-726).

[55] For instance the function ORTHOPLAN of SPSS 21.

decision process. Taking into consideration that the benefit of the LCA – the possibility to illustrate the theoretical *'non-buying-intention'* of a stimulus – should not be lost, the models of *'upward integration'* and *'downward integration'* can be used. Furthermore, an empirical study of Voeth proves that the model of 'downward integration' provides better prognostic results. For this reason, the explanation of the *'upward integration'* is set aside at this point. The model of *'downward integration'* weights the object-related *'overall utility value'* of the BC members according to their relative influence of the BC members (pp. 725-729)(pp. 725-729). According to Voeth (2004), the 'group-related overall utility value' is formulated as shown in Equation 4.

$$u_c = \sum_{i=1}^{I} u_{ic} \cdot w_i \quad (4)$$

With:

u_c = estimated overall utility value for product (stimuli) c on group level

u_{ic} = estimated overall utility value for product (stimuli) c of individual i

w_i = relative influence of individual i

I = amount of group members

Equation 4: Integration model to calculate the *'group-related utility value'*

As described by Voeth (2004), the result of the MeLimCA procedure is a *'group-related utility value'* for a concrete purchasing product. The repetition of this procedure for all competition products allows the simulation of group decision. Following the First-Choice-Rule, the object with the highest not *'group-related utility value'* will be chosen by the group (p. 53) (p. 53).
Following the methods of *Voeth* and the ideas of *Brinkmann*, a concept could be found which allows to analyse the BC decision in a quantitative way. This concept will be applied for a concrete purchasing situation of a selected BC of IC department. Therefore, the following chapter will summarise the BC analysis concept of *Brinkmann* as well as other concepts which can be found in literature.

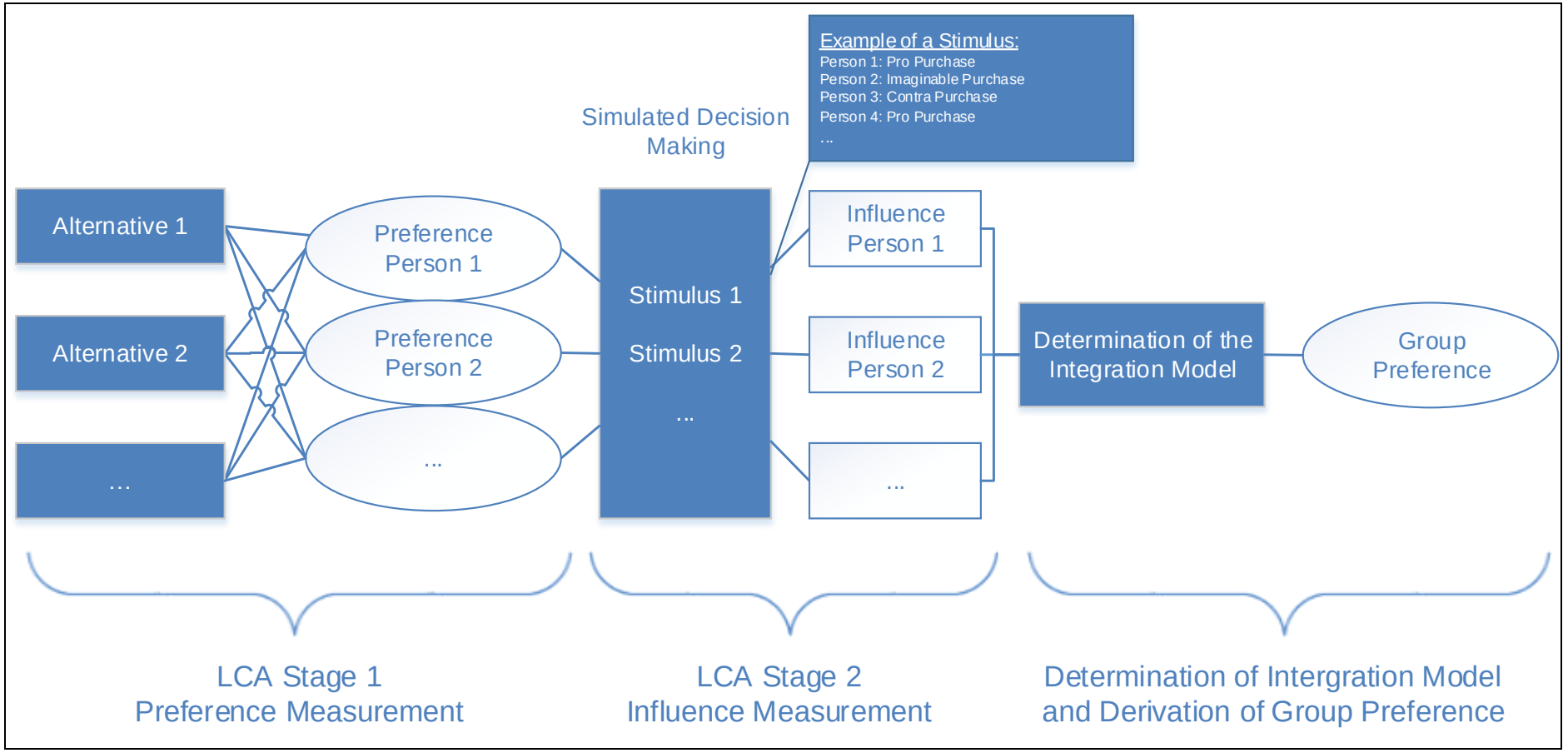


Figure 15: Sketch of group preference measurement according to MeLimCA (adapted from Brinkmann, 2006, p. 52)

2.3.5 Buying centre analysis

According to Brinkmann (2006), in the discipline of industrial buying behaviour research, the BC represents the central analysis object. Based on the aim to explain the present (or historical) and prognosticated the future behaviour of organisational buyers (p. 2) (p. 2), the literature provides different explanation and measurement models (see the statements of chapter 2.3.4.1 and 2.3.4.3.). Besides of the empirical-quantitative market research approaches of *Brinkmann* and *Voeth*[56], also qualitative practice-oriented approaches can be found. E.g. *Sieck & Goldmann* or *May*[57] provide a practice-oriented BC analysis which is documented in a kind of workbook and provides guidelines for analysing the BC. The approach of *Sieck & Goldmann* focuses on the development of a so-called *'power map',* which illustrates the BC constellation, aiming to understand the customers purchasing behaviour in a systematic way.
However, regardless of the type of the BC analyse, the question about how, and from whom, the needed information is collected represents a central point. While Sieck & Goldmann (2007) point out three major information sources which can be used – (1) The company itself, (2) the world-wide web or other publications and finally (3) the customer itself (p. 16) (p. 16) – Weiber & Jacob (1999) distinguish more general between two types of information acquisition: *'information collection'* and the *'information procurement'*. While in the framework of *'information collection'* the needed data is generated by primary analytic surveys or observations, the term *'information procurement'* refers to the evaluation of secondary data (p. 531)(p. 531). As the way of data collection directly influences the prognostic quality of the analysis (Brinkmann, 2006, p. 198)(Brinkmann, 2006, p. 198), the topic of data generation has to be enlightened in more detail.

2.3.5.1 Data generation

Respectively to our case, information about the individual preferences of the BC members and the influence distribution between them are needed in order to predict the buying decision of a customer (see chapter 2.3.4.2.). According to Brinkmann (2006) this implies especially in the industrial goods markets a huge challenge. Because of the multi-personal buying character the information is distributed over several people and thus the classical market research approaches, which have been developed for the consumer goods markets, where mono-personal buying decisions are in the centre of consideration, can only be applied under restrictions (pp. 1-2) (pp. 1-2). While mono-personal buying analysis in consumer goods markets concentrate on the questioning of single, independent persons, the analysis in the organisational context aims to collect the preference information of an interacting group of people.

[56] The approaches of Brinkmann and Voeth are based on the conjoint analysis, a quantitative market research tool. The conjoint analysis is seen as state of the art of empirical market research methods (Klein, 2002, p. 7).
[57] May, J. (2006). *Buying Centre B2B.* Haus Mosenstein und Vannerdat.

As a group preference can only be derived if all people of the BC can be identified and encouraged to participate in a survey, the data generation hits the first problem[58] (pp. 60-61)(pp. 60-61). Furthermore, it is assumed that the test subjects behave differently, depending if they have to answer questions in a personal context (as private end-user) or in an organisational context. In addition, the difficulty to encourage a person to participate in a survey in an organisational environment and the danger that people answer questions in a strategic way, are mentioned as further data generation problems (pp. 63-64) (pp. 63-64).

In addition to these general problems of data generation, which are independent of the type of the collected information, Brinkmann (2006) states that the elevation of the influence information of the single BC members hits on further problems. While the preference information concerning a set of stimuli always represents data, which are depending on only one person, the influence information represents a value, which is only rateable in the context of the whole group (see also the statements of chapter 2.3.4.2). With other words, the influence construct is a measure, which can only be operationalised in relation to other persons of the group. Thus, the determination of the influence structure is a trade-off decision, where the power fundamentals of single BC members are weighted against each other. For the data acquisition, this means that you need to think about from whom the trade-off decision should be made in order to get objective, valid and reliable data. While the questioning of only one representative on customer side is rated with low data quality[59], the questioning of all BC members hits on the problematic of how the single trade off decision can be summarised to a valid group statement (pp. 65-66)(pp. 65-66).

The existence of these data generation problems drove Brinkmann (2006) to rethink the classical information acquisition methods, which have been described by *Weiber & Jacob* in 1999. In his view, the decision between the methods cannot overcome the data generation problem. Neither the primary analytic observation of the influence structure nor the evaluation of secondary data on their own are suitable for the collection of reliable and valid influence information of an interacting group. Thus, he presents a hybrid approach, which uses the observation of an expert in combination with the interview of the observers in order to overcome the described data generation problems. Figure 16 displays this approach in comparison to the classical way of data generation, in the context of an industrial buying situation (pp. 69-71)(pp. 69-71).

[58] The likelihood that all BC members participate in a survey can be formulated with the following equation: $P(G) = \prod_{i=1}^{N} a_i$ with 0<a<1; N = amount of group members; a_i=likelihood a, that person i participates in a survey. As a consequence of the multiplication rates for independent events, the likelihood that a group survey is successful is always smaller than the likelihood on individual level (Schira, 2003, as cited in, Brinkmann, 2006, pp. 61-62)

[59] The research of Arora & Allenby (1999) show that group members often tend to make misjudgements concerning their own or others influence power in the BC (as cited in Brinkmann, 2006, p. 65).

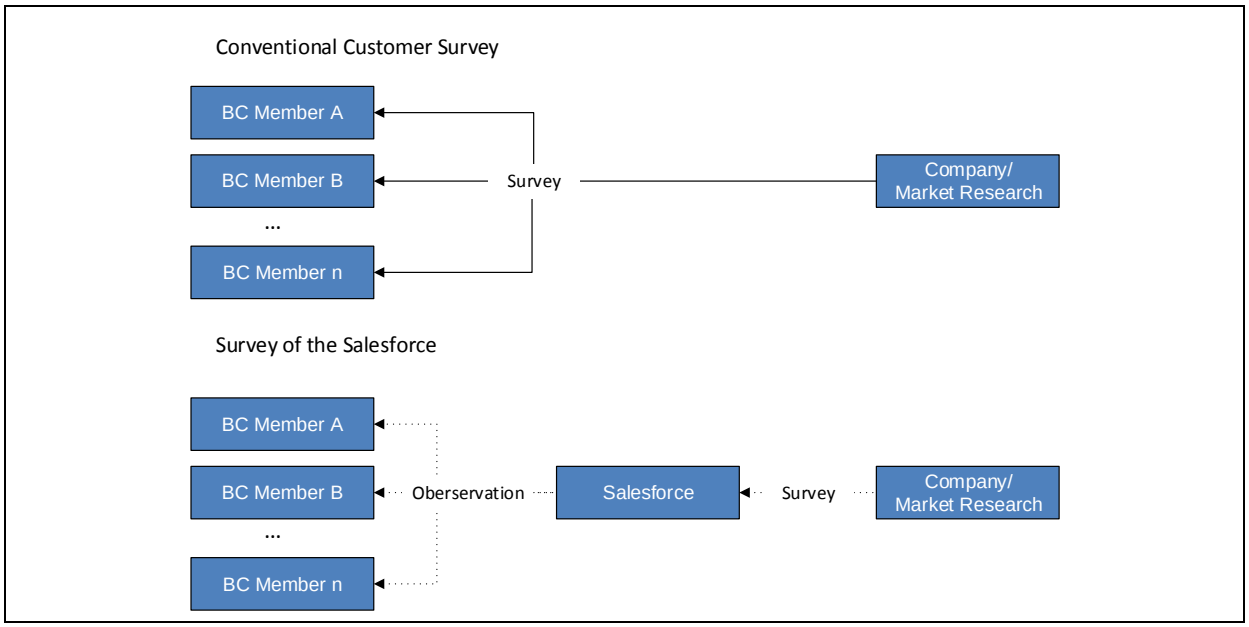


Figure 16: Conventional survey and survey of the sales force as data generation approach (adapted from Brinkmann, 2006, p.71)

Based on this idea, Brinkmann (2006) searched for a group of people representing the observer of the model. For him the best suited people can be found in the own organisation, especially in the area of the own sales force. Because of the job task, the sales employees are in regular and direct contact with the customer, know the people on customer side very well, are integrated in the customer decision process, maintain the relationship to their customers and in general the nature of the tasks is anyhow connected with the observation of the customer. Usually they have the information about the preferences and influences of the BC members already in mind, and do not have to be ordered to observe it. In addition, it can be assumed that sales employees represent a neutral position and are able to evaluate the influence information in an objective way (pp. 71-73) (pp. 71-73). In addition, Brinkmann supports his general idea to use the internal sales employees for the analysis of the buying decision with the proposal of Webster, who proclaimed, that the task of sales men is also to provide information about the market (p. 74) (p. 74). Furthermore, also Backhaus (2003) points out that the sales personnel is best capable to provide information about the constellation and the structure of the BC. Following these suggestion it may be possible to overcome the data generation problems and produce data which can be used for analysing the BC of IC department. Therefore the next chapter will present further arguments supporting the usage of Brinkmann's data generation approach and to describes his concept of BC analysis through the sales force in more detail.

2.3.5.2 An analysis of buying centre decisions through the sales force

Based on the ideas described in chapter 2.3.5.1, Brinkmann (2006) conducted an empirical study which should prove, if his approach counteracts the data generation problem and if the sales force is able to provide information with sufficient prognostic quality (p. 77) (p. 77). Thus, he designed and empirical test with the aim to evaluate the prognostic quality of the collected information based on the comparison between customer and sales view. With other words, Brinkmann matches the results of a direct customer survey with the internal sales

employee survey[60] on individual level and derives the prognostic value of the collected data (the answers of the customer survey are used as scale for the prognostic quality of the information collected on internal base) from this comparison (p. 135) (p. 135).

The results of Brinkmann's (2006) study show that the information gathered on internal basis lead to the same or even better prognostic quality as the information gathered directly at the customer[61]. In combination with the efficiency benefits[62], the data acquisition on basis of internal expert interviews is proposed as the best way to collect information for the prediction of buying decisions (pp. 199-200)(pp. 199-200). Thus, the change from the classical market research to the questioning of internal sales expert can overcome the data generation problem (p. 197).

But it has to be noted that Brinkmann (2006) proposes to proves the validity of the collected data, especially when strategic company decisions should be based on the collected information. This can be done by performing a plausibility check, where the results of the analysis are presented to and rated by people of the customer (p. 201)(p. 201).

In addition to the general evaluation of the applicability of the internal data collection for analysing the BC of a customer, Brinkmann (2006) developed and checked different hypotheses, which are connected with the design and the type of data collection. First, he examined the type of the used market research method (direct or indirect) for the collection of preference and influence information about their prognostic quality. The results prove that the prognostic quality of the preference information collected in indirect way (in this case with the LCA or MeLimCA (Stage 1)) lead to better results than the direct approach (error probability[63] p=0,007**). Not significantly better results could be proved for the application of the indirect approach of the influence information. Second, the type of information (preference or influence) was proved by its prognostic quality. The test shows that the prognostic quality of influence information gathered through internal sources is significantly higher (direct approach p=0,001** and indirect approach is p=0,049*) than preference information. Third, hypotheses about characteristic of the conducted sales employee have been examined. The claims about, the longer the customer relationship the better the prognostic quality of the data or the higher the experience of the sales employee the better the internal collected data, could not be proved by the test. Only the idea that the prognostic

[60] The overall sample size of the empirical study was 120 queries which means the questioning of 60 customers and 60 sales people connected with these customers.

[61] Although the findings of Brinkmann (2006) do not pass the Mc-Nemar significance test, the data of the study shows that the indirect questioning of internal sales employees, with the two stage MeLimCA, leads to nearly 15% better prognostic quality (while the survey of a customer representative leads in 48,33% of the cases to the right prognoses, the indirect data collection on internal basis leads in 63,33% of the cases to a right prognoses) (p. 190)

[62] Brinkmann (2006) summarises the following benefits: (1) The survey of the own sales force is connected with only slightly additional costs. (2) The customer rates the sales employee as problem solver and therefore he is open minded concerning sharing his preference ideas about a product group. (3) it can be assumed that the sales employee tries to care about his customers relationships and therefore has an insight in the customers preferences. (4) The questioning of the internal sales force can be done with only slightly additional expenditure because generally the sales employee has the information already in his mind. (5) The short procurement time of the needed information in comparison to the classical market research (pp. 74-75).

[63] Brinkmann (2006) uses the McNemar significance test with the following notation: *** highest significant (p<=0,001); ** very significant (p<=0,01), * significant (p<=0,05), [ns] not significant (p>0,05) (p. 174).

quality is positively connected with the success of the consulted sales employee, could be proved (p=0,021* for the direct-direct; p=0,049* for indirect-indirect) (p. 187)(p. 187).
With these proposals of Brinkmann, the design of a concept for analysing the BC of IC department through the sales force should be possible. Therefore, his ideas will be reused in the practical part of the thesis.

2.3.5.3 The buying centre analysis – A practical approach

Besides of the scientific supported proposals of chapter 2.3.5.2 for analysing the BC, two marketing and sales consultants named Sieck & Goldmann (2007) published a practical-oriented workbook which should guide sales people in understanding and analysing their customers. They are not going as far as the prediction of the customer behaviour but also propose ideas about how the BC structure and the behaviour can be understood and analysed. One chapter of their workbook deals with the analysis of the BC. According to Sieck & Goldmann's experiences as consultants, their impression is that a lot of sales people still tend to contact only one person, who is, in their mind, the most involved person in the sales process, and ignore the existence of the BC and a multi-personal buying decision. Often the result is that the competitor closes the final sales because he understood better the "who is who" at customer side (p. 71) (p. 71). Thus, the next paragraph will summarise the proposal from Sieck & Goldmann about how to analyse and understand the BC.
Sieck & Goldmann (2007) base their approach on five questions (see Table 3) which guide the sales people through the BC analysis and support them in creating a so-called *'power map'* of the customers. The term *'power map'* refers to a graphical visualisation of the BC with further information about the persons, their roles and their influence power. In the end, the power map should build the base for further sales strategy development (p. 72) (p. 72). In the following sections, the five points which should lead to the *'power map'* will be explained in more detail.

Five Questions to the power map
(1) Which role can be allocated to whom on customer side? Are all roles distributed?
(2) How do these people see us, who is our friend and who is our enemy?
(3) How well do we know the involved persons and to whom do we have a lack of contact?
(4) Who has which influence power on the decision and who can influence the opinion of other BC members?
(5) Who of our organisation should start a long-term relationship with whom of the BC?

Table 3: Five questions to the power map (adapted from Sieck & Goldmann, 2007, p. 72)

(1) Roles in the purchasing process (Sieck & Goldmann, 2007, pp. 73-80) (Sieck & Goldmann, 2007, pp. 73-80)

The first question in this stage is to allocate everybody involved in the purchasing process, and therefore represents a BC member. As Sieck & Goldmann claim, it can be distinguished between two major types of members. On the one hand there are people who are obviously part of it, e.g. the purchaser or a technical specialist of a specific department, and follow their

formal and functional task. Usually these people can be found in the organisation chart, so they are part of the formal structure of the organisation and are not that difficult to allocate. But on the other hand, what is even more important, hidden influencers, which may not be explicitly part of the customer organisation, can also be part of the BC. For instance, these could be external technical consultants with an important influence on the buying decision. For this case, Sieck & Goldmann propose to talk to different people on client's side and ask them about who could be interested in a presentation of the product. Reading between the lines of the dialogue may help to get a feeling about the hidden influencers, which are not part of the formal organisational structure. Furthermore, collecting as much soft facts can be the key to get an inside of customer's informal structure (see also the statements of chapter 2.3.3 and 2.3.3.1).

Second, to distinguish between the people who are involved in the purchasing process, Sieck & Goldmann present seven different *'*BC *roles'* in their workbook (see Figure 17). The majority of the roles pair with the classical roles of *Webster & Wind* (see chapter 2.3.3.1). While Sieck & Goldmann do not use the role of the initiator they describe two other role types - the *'ratifier'* and the *'specifier'*. The *'specifier'* is responsible for the requirements of products and thus develops the requirements catalogue for the product. The *'ratifier'* is a person who has to sign the final contract because of organisational regulation. Although he/she is not involved in the decision making process, he/she has to set his/her signature on the contract. With the imagination that a major buying contract may have to be signed by more than ten people, it is clear that *'ratifiers'* can delay the closing of a sales project and therefore also the cash flow.

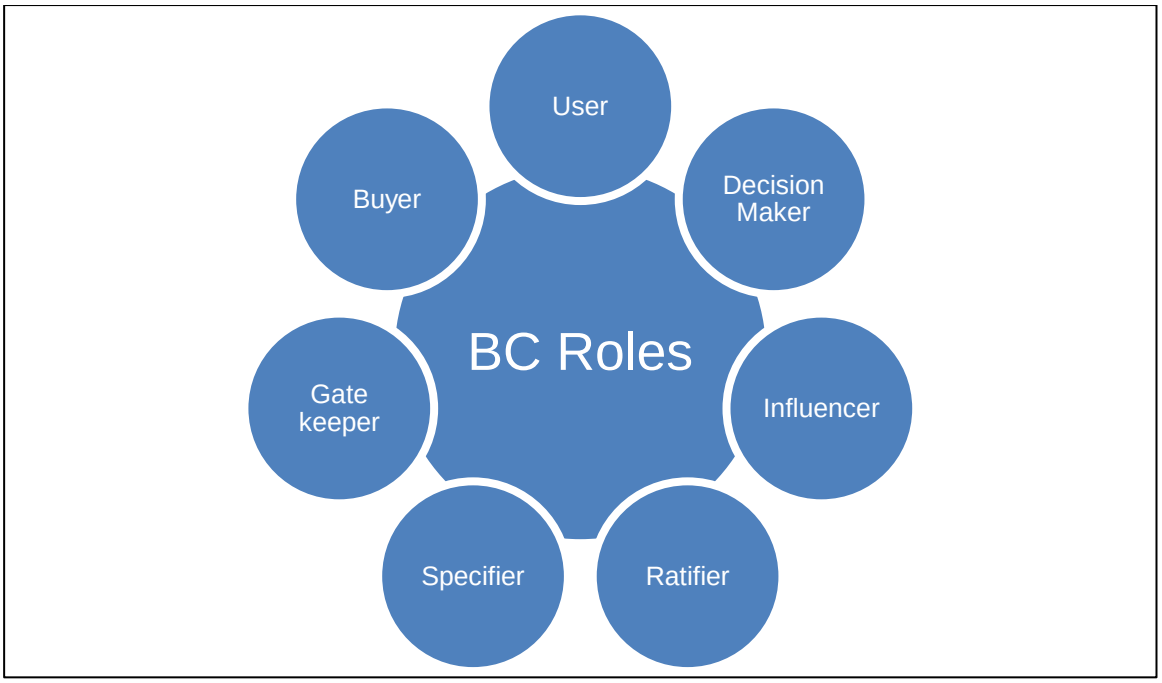


Figure 17: Buying centre roles (adapted from Sieck & Goldmann, 2007, pp. 77-79)

Sieck & Goldmann use these seven BC roles in order to distinguish on a functional level between the BC members. It has to be noted that especially in small companies it can be the case that one person represents more than one role at the same time. After identifying the

people involved, Sieck & Goldmann propose to visualise the results through a kind of organisational chart (this organisational chart is the starting point for the development of a power map). As shown in Figure 18, each BC members is represented by a separate field in the structural diagram. Furthermore, the characteristic information of the single BC members, the name, the job description and the BC role(s) are documented in the first three lines of the boxes.

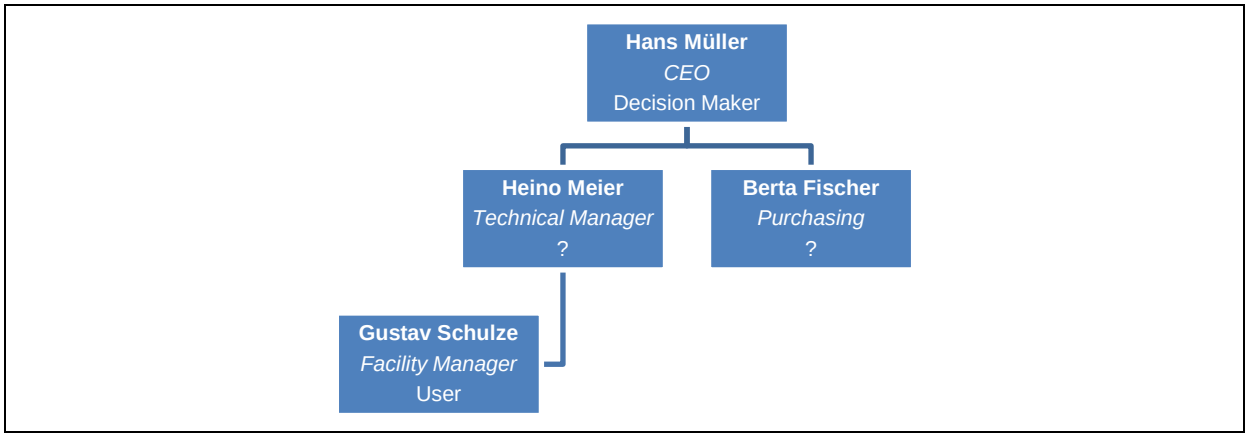


Figure 18: Example to display a BC structure (adapted from Sieck & Goldmann, 2007, p. 80)

(2) Customer‘s attitude to us (the seller) (Sieck & Goldmann, 2007, pp. 81-83)(Sieck & Goldmann, 2007, pp. 81-83)

Moving to the second stage of Sieck & Goldmann’s concept, each person who was identified in the first step, is now additionally characterised by an attribute, which informs about the attitude of the BC member to the selling organisation (us). The first attitude type which can be used is the so-called *‘coach’.* As he/she likes the sales person and/or the organisation and/or the product, the *‘coach’* helps strongly to persuade the decision maker or generally pushes the purchase process forward. According to Sieck & Goldmann, the strategy should be to be honest with the coach, tell him/her clearly if you cannot stick to a bargain and use him/her as a driving force in the purchase process. He/she trusts the statements of the sales employees and therefore he/she can lose his/her face if they lie to him/her. As a consequence, he/she turns into an *‘enemy’*. This brings us to the other extreme, the *‘enemy’*. He/she is someone who likes your competitor and wants to see them winning. The strategy should be to neutralise his/her negative attitude to your products or if this is not possible try to positively influence many others of the BC and overrule the ‘*enemy’*. Beside the two extremes, the attributes ‘*positive’*, ‘*neutral’* and ‘*negative’* can be used. ‘*Neutral’* means that the person is totally objective and has no preference concerning the alternative suppliers. *‘Positive’/’Negative’* can be assigned to people how like/dislike your product but are not proactive, which means that they only judge if they are asked. As shown in Figure 19, Sieck & Goldmann propose to implement the attributes in the power map in the line of the role description, at the second place.

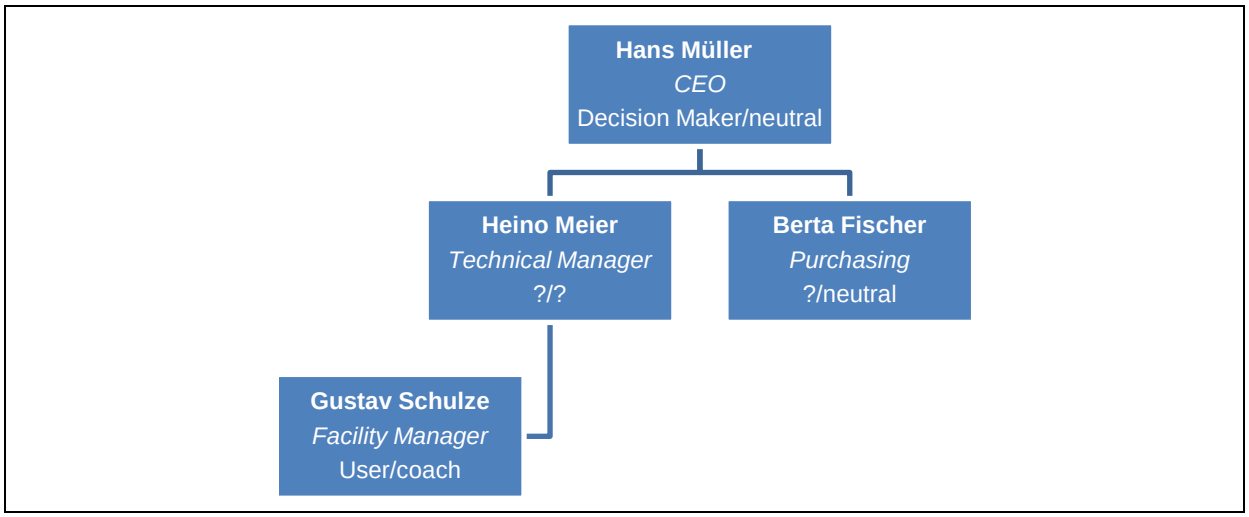


Figure 19: Attitude of BC members to the seller company (adapted from Sieck & Goldmann, 2007, p. 83)

(3) Relationship intensity (Sieck & Goldmann, 2007, pp. 84-86) (Sieck & Goldmann, 2007, pp. 84-86)

In the third step, Sieck & Goldmann propose to evaluate the relationship intensity between the selling company and each BC members. In practice, the three levels of '*no contact'*, '*regular contact'* and '*intensive contact'* have shown a good applicability to this approach. For this task, Sieck & Goldmann point out that it is really important to be honest to yourself. Otherwise, the power map looks good and the feeling that the customer is under control will rise, although in reality you should act to intensify some BC relationships. Finally, the relationship statements are also implemented in the line of the roles description in the power map, on the third place (see Figure 20).

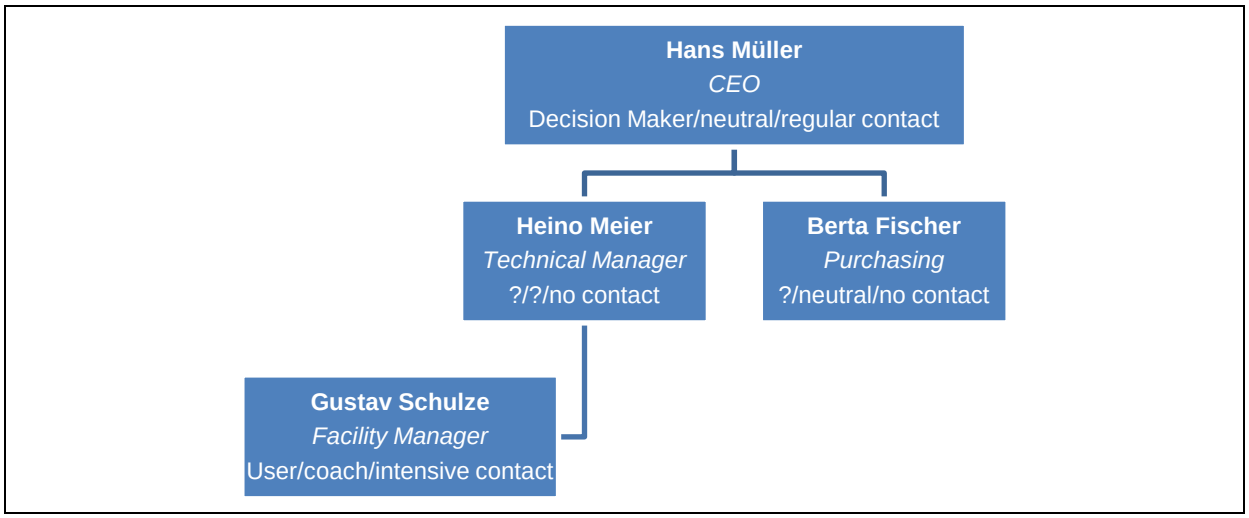


Figure 20: Contact intensity (adapted from Sieck & Goldmann, 2007, p. 86)

(4) Influence on the decision (Sieck & Goldmann, 2007, pp. 86-88)(Sieck & Goldmann, 2007, pp. 86-88)

The fourth step of the BC analysis is the characterisation of the power deviation in the BC. On the one hand, the ability of people to influence the decision and on the other hand the ability to influence other members of the BC should be discovered. Concerning the influence on the buying decision, Sieck & Goldmann propose to use the information about the

hierarchical level of the BC members as well as the role descriptions in order to estimate the manifestation of the influence. Concerning the influence on other BC members, the authors propose to use the following lead questions:
Who knows whom for how long? Between which people can friendships be detected or are there animosities which can be observed? Do some contacts also have a private relationship, for instance hobbies they share? Who has an influence on whom?
Answers to these questions should give the sales people an idea of the real situation. In practice the differentiation between three different influence levels have proved their worth: '*low*' influence, '*moderate*' influence and '*high*' influence. Finally, the influence attribute concerning the buying decision is added in the line of the role description on the fourth position. The influence power between the BC members can be illustrated with the help of arrows between the entities in the power map. With different stroke width of the arrows, the strength of the influence can be visualised. An example is shown in Figure 21.

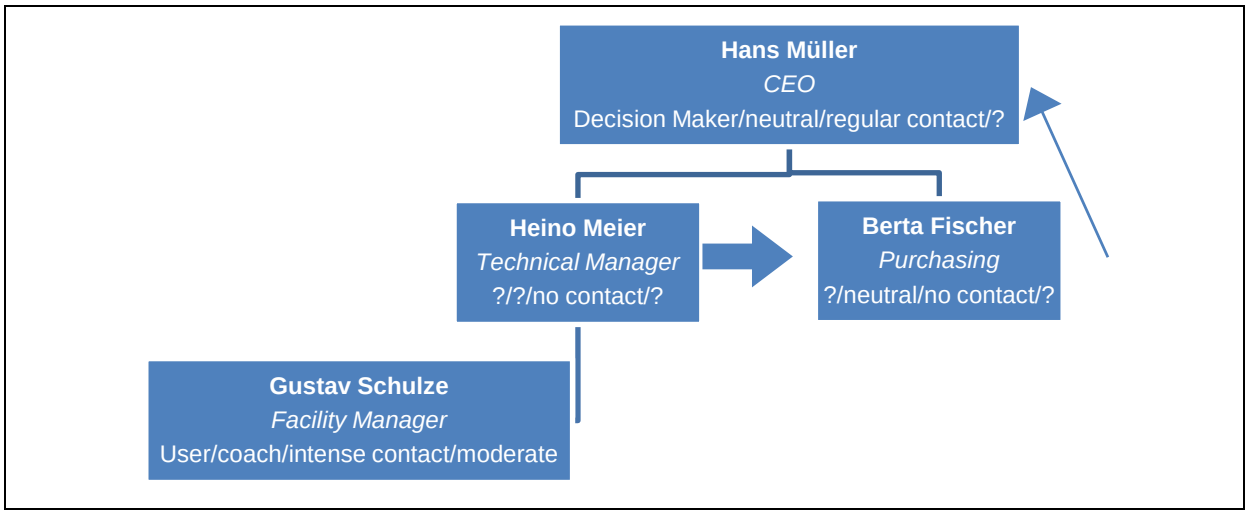


Figure 21: Influence of BC members on the decision and on other members (adapted from Sieck & Goldmann, 2007, p. 88)

(5) Selling centre management (Sieck & Goldmann, 2007, pp. 89-92)(Sieck & Goldmann, 2007, pp. 89-92)

The tasks of point one to four aim to detail the analysis of the customers BC and to build the so-called power map. To finalise the power map the last task is to think about who of the selling organisation should build a relationship to whom of the BC of the customers organisation? Therefore it is assumed that more than one person of the selling organisation is in contact with the customer. In this case, the group of people is called "Account Team" or "Selling Centre". Although some account managers may claim that they are the only interface to the customer, Sieck & Goldmann indicate that the praxis shows that usually more people of the seller side are in intense contact with the customer. They quote the following areas from which people may be in contact with the customer:

- Employees of the aftersales and service area
- Employees of the internal sales team
- Sales employees of other affiliates or sales regions of the organisation
- Employees of the quality management area

- Sales managers or business unit managers

To finish the development of the *'power map'*, Sieck & Goldmann propose to add a fourth line for each identified BC member, the best suitable contact partner of the selling company is added (see Figure 22).

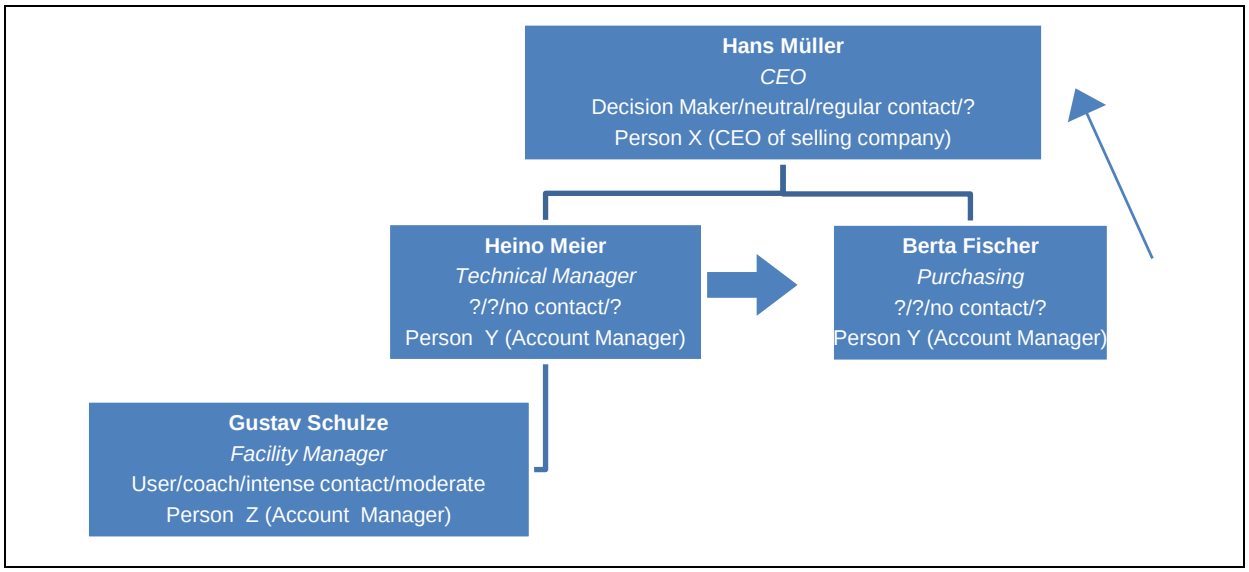


Figure 22: Selling centre integration (adapted from Sieck & Goldmann, 2007, p. 92)

Finally the finished *'power map'* can be used by sales people to develop specific strategies for penetrating an existing BC of an account and pushing the sales forward. *For* Sieck & Goldmann, the development of the *'power map'* is therefore rated as basic task of any customer analysis in the B2B sales situation. In consideration of the given example of the *'power map'* in Figure 22, they exemplarily extract the following strategic actions from the *'power map'*:
Heino Meier and Berta Fischer are not known at all. It has to be identified which role in the buying process they actually play. Evaluate if Miss Fischer prefers a product of a competitor and consequently if her strong influence on the decision maker endangers the sales success. Interview the *'coach'* about the two identified BC members, who represent a dead spot in the map (pp. 93-94) (pp. 93-94).

All in all, with the presentation of the theoretical ideas of the discipline of B2B marketing of the chapter 2.3, the questions of chapter 1.3.a have now been answered. Furthermore the finding will serve as a foundation for the practical part of the thesis which will follow in the next chapter.

3 Practical Part

Driven by the first target of the thesis (see chapter 1.3) as well as by the objectives of the subtopic “b)” (see chapter 1.3.b), data about the actual sales situation in IC department had to be generated. Thus, to give an overview of the actual behaviour and proceedings of IC sales people when entering and analysing new IC customers, chapter 3.1 will summarise the explorative sales survey, which was developed and executed in a first step of the practical part of the thesis. The survey was addressed to AVL sales employees world-wide who have experience in selling IC products. Especially the strategies and methods which are used by sales people to analyse the customer buying behaviour, are paramount of the survey. Furthermore, in respect to the objectives of sub-topic c) of chapter 1.3, the survey aimed to the explore the specialities of the BC of IC customers.
In a second step, based on the theoretical ideas of chapter 2.3 and the information gathered in practical chapter 3.1, an IC specific guideline for analysing the BC will be presented in chapter 3.2. With other words, the proposals of the market research theory and the empirical findings of the global sales survey have been brought together in order to derive an adjusted guideline in respect to IC departments purposes.
Furthermore, chapter 3.3 will present a concept for analysing a BC of IC department in an empirical-quantitative way, on the basis of internal sales force data. Therefore, the ideas of chapter 2.3.4 and 2.3.5 will be used as a framework and will support the development.
In a last step, the concept of chapter 3.3 will be applied for a concrete situation in IC department. Finally, the results of the analysis concept will be presented and illustrated in a graphical way.

3.1 Explorative Survey of the Sales Staff

The consultation of the sales personnel on an international level called for a special survey framework. Beginning with an estimation of the amount of potential interview partners, followed by the survey and question design as well as the survey execution and evaluation, the following sections will present the single parts of survey framework in detail. Finally, the results of the survey will be presented and discussed in chapter 3.1.6 and summarised in chapter 3.1.7.

3.1.1 Estimated sample size

In the first step of the survey development, the size of the target group had to be estimated. Therefore, especially people with experience in selling IC products had to be found. In the framework of an AVL internal international sales meeting, which took place in January 2013 in Graz, several conversations concerning this issue could be performed with sales employees of different AVL affiliates. The result was a list of thirty six (see appendix A1) potential interview partners (exclusive Graz), which could be allocated. Furthermore, with the assumption, that people of the sales personnel have in general a full appointment diary and are therefore not easy to encourage in participating in a voluntary survey, a response rate of

50% was estimated. This lead to the assumption of around eighteen usable survey responses. With this estimation, a survey design could be chosen.

3.1.2 Survey design

Caused by the international characteristics of the target group, only an online survey came into question. In addition, it could not be assumed that the interview partners have the same level of experience and knowledge about the sales theory and BC analysis. Therefore an additional requirement of the survey tool was an integrated filter system, which enabled to hide or show additional questions or information based on prior given answers of the test subjects. In respect of these requirements, the tool '*EFS Survey'* from the developer Questback[64] was chosen to design, execute and evaluate the international survey. Accompanied by the theoretical basics of qualitative[65] and quantitative[66] social research techniques, the design of the sales survey was developed. The full survey within all questions, as it was sent to the target audience, is presented in appendix A6.

3.1.3 Question design

As Bortz & Döring (2006) propose, in a first step, the topics BC analysis and OBB was illuminated with the help of a classical brainstorming session (p. 254) (p. 254). Supported by the theory of OBB, six main survey topics which should cover the whole research topic could be identified (see appendix A6). Furthermore, the questions have been formulated mainly in form of statements, as this is proposed for exploring the opinions, attitudes and behaviours of the test subjects (Bortz & Döring, p. 254). In combination with the statements, mainly pentatonic rating scales with verbal presented characteristics have been used[67,68]. In addition to the closed statement design, also the item category "others" was implemented for questions where the completeness of answers possibilities could not be ensured (see for instance questions 1 of chapter 3 in appendix A6). Furthermore, open questions have been formulated at the end of each chapter in order to collect additional information about behaviour patterns of the test subjects which have not been covered in the given statements (see appendix A6). In a last step, the questions have been revised under consideration of the checklist presented by Bortz & Döring (p. 255) (p. 255).

[64] See www.unipark.de

[65] See chapter 4.1 in Mayring (2002).

[66] See chapter 4 and 5 in Bortz & Döring (2006)

[67] Bortz & Döring (2006) distinguish between four different types of pentagonic rating scales with formulations of chracteristics which are mostly seen by the test subjects as equidistant. The four types are: Frequency, Intensity, Liklihood and Assessment. In the framework of the international sales survey, the type frequency with the following characteristics were used: *'never-seldom-sometimes-often-always'* (p. 177).

[68] In addition to the frequency scale, the pentatonic scale for the level of agreement was use for some statements. According to Vagias (2006) the characteristics were formulated in the following way: Strongly disagree – Disagree - Neither agree nor disagree - Agree - Strongly agree (p. 1). Instead of neither agree or disagree the term uncertain was used in this survey.

3.1.4 Survey execution

After the development of the survey and the implementation into the survey tool, a pre-test[69] was executed. Therefore, the implemented pre-test function of the *'EFS Survey'* was used. The pre-test was send to five selected test subjects, which have been pleased in advance to give feedback to the questions. The pre-test was online in week fourteen, and based on the responses of the pre-test test subjects, some questions could be eliminated, changed and extended. Three out of five feedbacks have been considered in this step.
In the next step, the final survey could be send out in calendar week sixteen to all identified interview partners. The survey was online for one month and with the help of three reminder mails, a response rate of sixteen people could be achieved. The fact, that some test subjects have cancelled the survey after reading the introduction and instruction, implies that not all test subjects had rated themselves as appropriate interview partners. On the fifth of May, the online survey had been closed and the evaluation of the collected data could start.

3.1.5 Survey evaluation

The survey evaluation was done with the help of the implemented reporting function of *'EFS Survey'*. As the survey concentrated on exploring trends of the behaviour of sales people, only methods of descriptive statistics have been used. Thus, the collected information was evaluated concerning trends and used in a further step to derive experience values (EV) for IC department. As only descriptive statistics are used it has to be noted that the explored trends are only valid for the observed sample.
Furthermore, when speaking about trends or majorities in the following sections, the determination of some notations has to be done. Thus, Table 4 shows the different wordings in connection with a percentage range, which are used to describe the uniqueness of the trends or majorities. In addition, the connected label, which will be used to mark the EV at the end of each chapter, can be seen in the table.

Formulation	**Connected percentage of supporting answers**	**Label**
No trend or majority	0%-59%	(^{nt})
Slight trend or majority	60%-69%	(*)
Clear trend or majority	70%-79%	(**)
Dominating trend or majority	80%-100%	(***)

Table 4: Definition of trend attributes

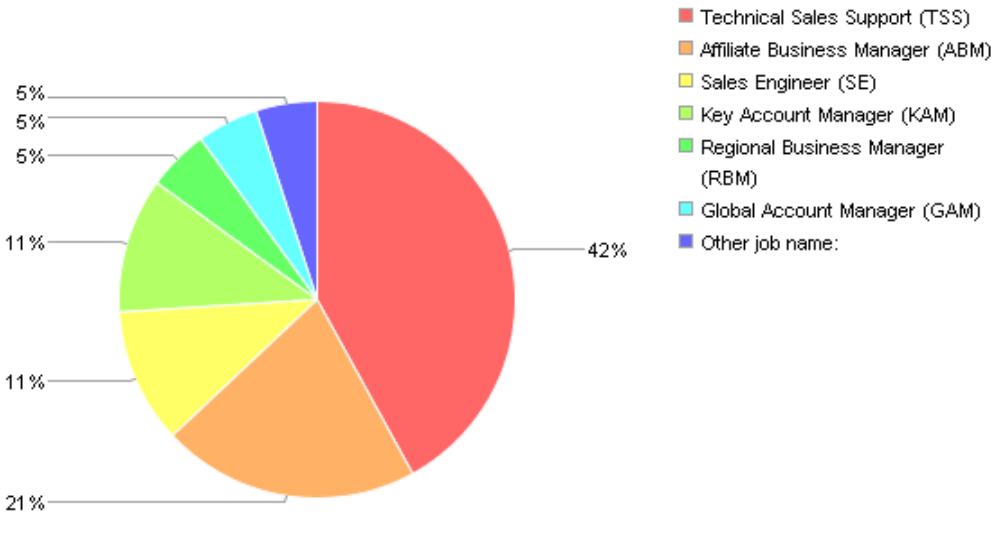
[69] Bortz & Döring (2006) propose to proof the comprehensibility of the whole survey with the help of a test survey with people of the target group (p. 256).

3.1.6 Results and experience values

The following paragraphs will present the results of the online survey step-by-step. Each chapter will be accompanied by a short summary of the most important results and a discussion, where a possible comparison between practical experience and theory will take place. Rounding off, each chapter is closed by EVs, which are derived out of the results and represent the major findings of the chapters. As the data set is huge, not all questions will be considered in this chapter. For detailed information about the whole survey, the untouched data set can be found in appendix A7.

3.1.6.1 Information about the sample

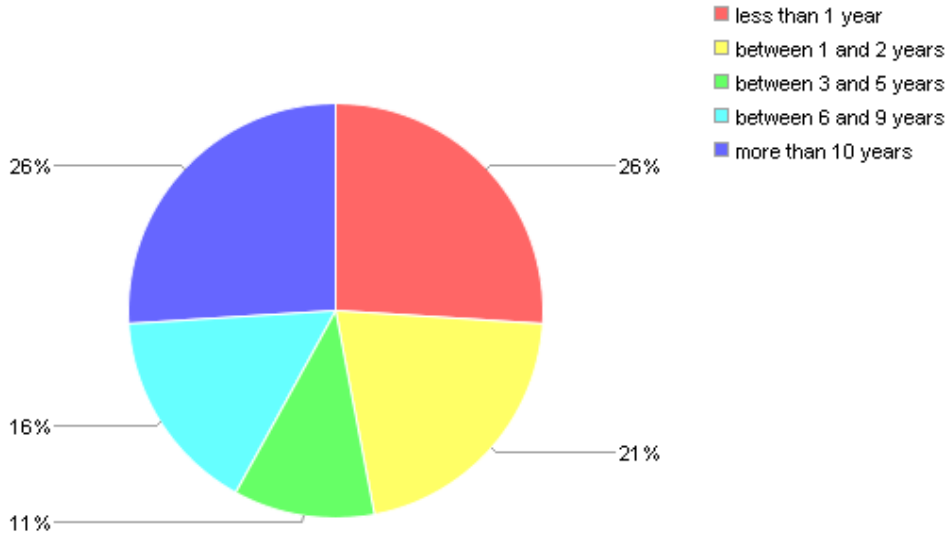
To give an overview about the composition of the sample, the first chapter was designed to gather information about the general sales and product experience of the interviewed test subjects. Also the job position of the employees and the region, where the test subjects gained their sales experience, were explored. Based on this information, some questions have been examined about the different trends in different sub groups. For example, it could be distinguished if the answers of KAM's and TSS's follow different trends or if certain behaviour correlates with the level of sales experience. Figure 23 and Figure 24 show the composition of the sample according to the job specification and sales experience of the test subjects.



Base: n=19

Figure 23: Job specification of the test subjects

Nearly three quarters of the responses came from TSS, ABM or SE. It is remarkable that the responses rate of the hierarchical higher position, for instance KAM, RBM and GAM, was clearly lower. While from eleven contacted people of a hierarchical higher position only four gave an answer (response rate of 36,6%) the response rate of hierarchical lower positions was 60% (15 out of 25 surveyed). This correlates with the assumption that hierarchical higher positions are in general busier and not easy to encourage to participate in a survey.



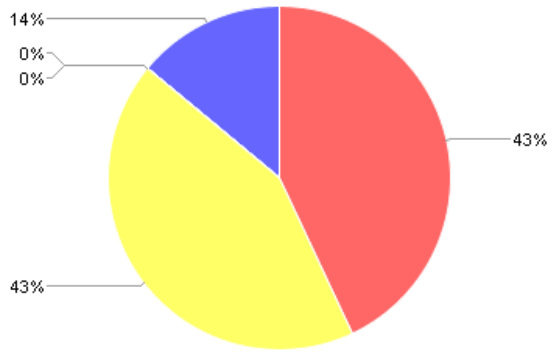
Base: n=19

Figure 24: General sales experience of the test subjects

Moreover, the data shows that the sample is very homogenous concerning the experience of the test subjects. Half of the sample size can be rated as professional sales people with a high level of experience (42% have six and more years of experience in the area of sales), and nearly the other half can be rated as beginners (26%) or newcomers (21%) in the area of sales. The remaining 11% are advance sales men.

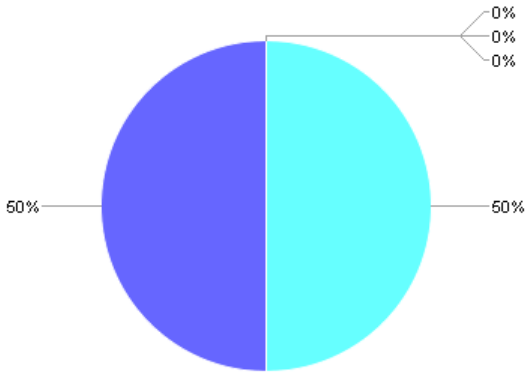
In addition, Figure 25 shows the connection between sales experience and job position. It is remarkable that TSS represents the majority of lower (1 to 2 years) experienced employees and BMs and AMs represent the majority of the higher experienced (6 to 10 years) people.

For legend see Figure 24



Base: n=7

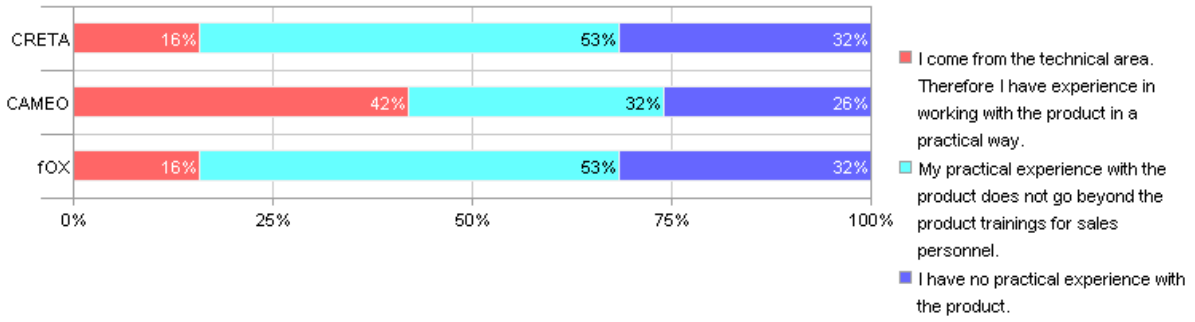
For legend see Figure 24



Base: n=8

Figure 25: Sales experience of technical sales support (left) and account mangers & business mangers (right)

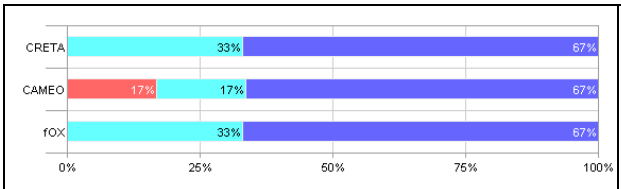
Finally, Figure 26 shows the practical product experience of the test subjects. Although 69% of the surveyed people stated that they have at least product training experience for the products CRETA and fOX (75% for CAMEO), nearly one third points out that they have no experience in working with the product they are selling (26% for CAMEO).



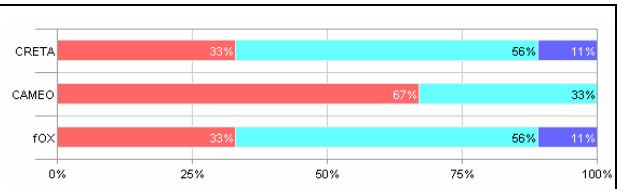
Base: n=19

Figure 26: Practical product experience of the test subjects

In addition, a filtered view of the product experience shows that the TSSs and SEs have a higher practical experience than AMs and BMs (see Figure 27).



Base: n=8



Base: n=9

Figure 27: Practical product experience of account and business managers (left) vs. technical sales support and sales engineers (right)

Discussion:

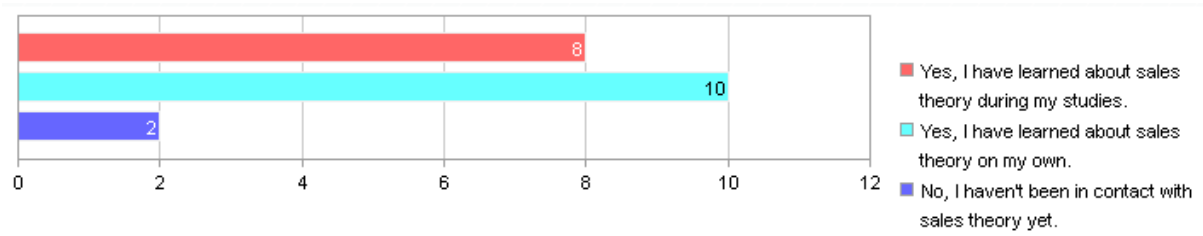
The general response rate of 44.4% is in the area of the expected 50%. This correlates with the claims of Brinkmann (2006), who states that the sales people are in general very busy and that the participation in a survey disturbs their personal time management (p. 63) (p. 63). In addition, the results correlate with the outcome of studies, which prove that sales employees in general do not show an interest to share their sales experience and tend to not share their knowledge with others (p. 105) (p. 105). Furthermore, the results of the question about the practical product experience rise the question, if AMs or BMs should have a practical knowledge about the products or not. Especially when sales people meet end-users or technical specialist of the customer in the early sales process, a minimal practical knowledge of all sales employees may help to develop a good communication level and therefore a solid base for a long-term relationship which the customer. Finally, it can be stated that the job position of TSS and ABM is often represented by people with lower sales experience than KAM, GAM and RAM.

Derived EVs for IC department:

- Hierarchical lower sales employees of IC department are easier to encourage for participating in a sales survey than hierarchical higher positions (*).
- While TSSs and SEs have a lower sales experience than AMs or BMs (***), an opposite behaviour can be assumed for the practical product experience (*).

3.1.6.2 Consciousness and knowledge about the theory of general sales approaches and the buying centre

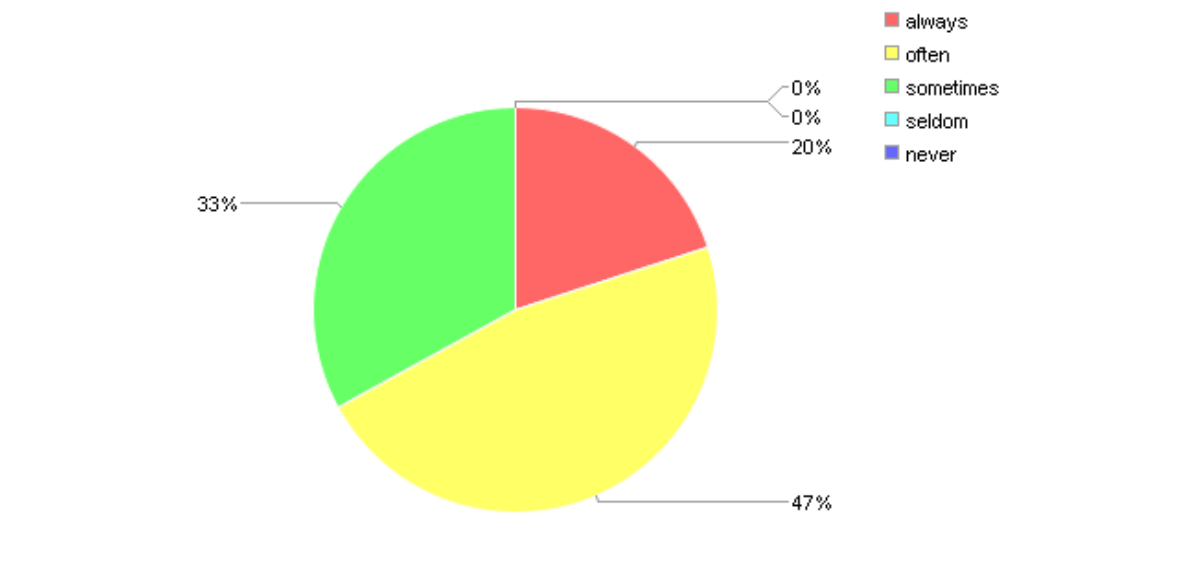
The second chapter of the survey deals with the theory of customer-oriented sales approach in general and especially with the theory of the BC. The target was to illustrate how well the interviewed sales personnel knows the BC approach or if they use other expressions (see chapter 2.3.3). In addition, the general knowledge (see Figure 28) and the frequency of application of sales theory (see Figure 29) have been explored.



Base: n=17

Figure 28: General consciousness and source of sales knowledge

The data shows that 2 out of 17 contact persons have not been in contact with sales theory yet. The other 15 test subjects, who state that they have learned about sales theory, mentioned the following two sources of knowledge with nearly the same frequency. 10 out of 15 quote that they have learned about sales theory on their own and 8 out of 15 indicate that they have learned about this topic during their studies (Multiple answers were possible, only the *'no'* answer was exclusive).

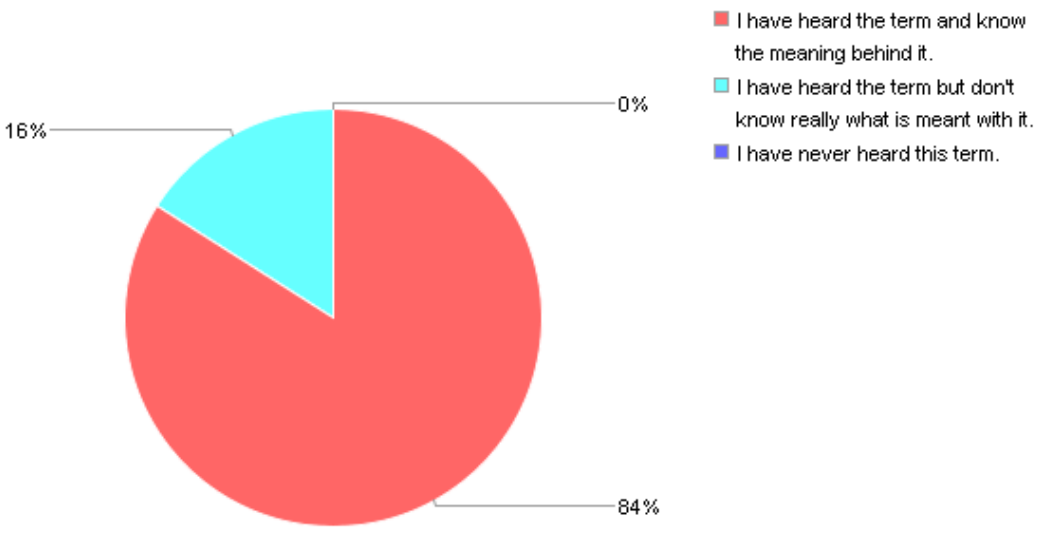


Base: n=15

Figure 29: Frequency of practical application of sales theory

Concerning the application of sales theory in practice, everybody (who has knowledge of sales theory) quotes that they use sales theory at least sometimes in their daily work. Even 20% say that they use it always and 47% use it often. Thus, a clear pro sales theory

behaviour of the AVL sales staff is implicated. It implies that 67% of the sales people would often miss something during their daily work when sales theory would not exist.

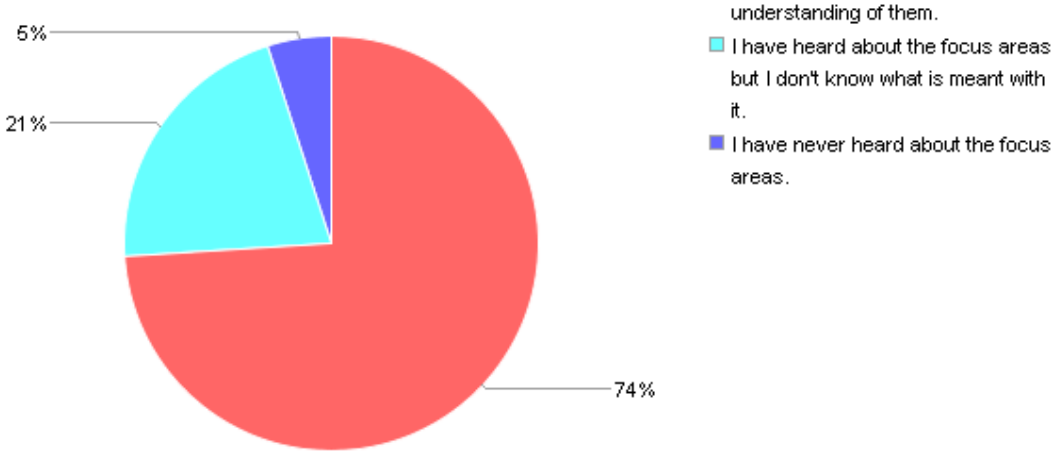


Base: n=19

Figure 30: Knowledge and understanding of the term buying centre

Furthermore, Figure 30 shows that the BC approach in general is well known by the sales people. Only 16% quote that they have heard the term but do not know exactly what is meant with it. In addition it can be clarified that the term BC is the only term which AVL sales people of the region Europe and Asia (see question 3 of chapter 1 in appendix A2) use, when they speak about people who are involved in the buying process on customer side. 100% of the test subjects state, that they do not have an alternative expression (see question 7 & 8 of chapter 2 in appendix A7). Based on this, the term DMU is awarded with a low importance for the regions Europe and Asia.

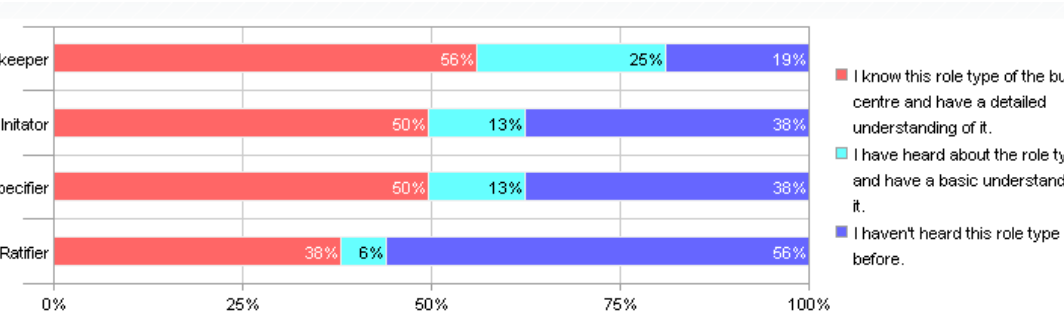
Concerning sales theory in general, the theory of *Rackham* enjoys a high attention by the sales people. While 11 out of 18 people mention *Rackham* as an important author of sales theory (see question 4 of chapter 2 in appendix A2) even 74% of the test subjects point out that they have a detailed understanding of the three focus areas (see Figure 31).



Base: n=19

Figure 31: Level of recognition of the three focus areas[70]

Moving to the classical role approach of the BC, the following can be stated. While the BC roles *'User'*, *'Decision Maker'*, *'Buyer'* and *'Influencer'* are known by all test subjects and understood in detail by at least 80% (see question 9 of chapter 2 in appendix A7), the existence of the roles, shown in Figure 32, is not clear for everybody. Especially the *'Ratifier'*, who is a person signing the contract in addition to the decision maker (see chapter 2.3.5.3), is not known by the majority of the test subjects. Furthermore, it is remarkable that only 56% of the test subjects noted that they have a detailed understanding of the role *'Gatekeeper'*. As the *'Gatekeeper'* can be a key person especially when entering a new account, this role type should be promoted in the sales area.



Base: n=16

Figure 32: Less known buying centre roles

Discussion:

It can be summarised that in general the clear majority of IC sales people have learned about sales theory and also often try to apply it in their practical work. The clear majority states that

[70] See chapter 2.3.3.1

he/she was in contact with sales theory and in addition has an understanding of the BC approach. No other expression is used in the European and Asian area to describe the group of people, which are involved in the buying decision. Especially the theory of *Rackham* (see chapter 2.3.2) is known quite well, and in particular the focus areas, which represent an alternative to the classical role model approach (see chapter 2.3.3.1), are understood in detail. The fact that especially the *'account entering strategy'* of *Rackham* is well known by IC sales people can be explained with the rising usage of SFDC. The program is based on *Rackham's 'Buyer Circle'* (see Figure 7) and has implemented the focus areas in its strategic documentation mask. In addition, the traditional BC roles of *Webster & Wind* (see chapter 2.3.3.1) are very common for the dominating majority of the employees.

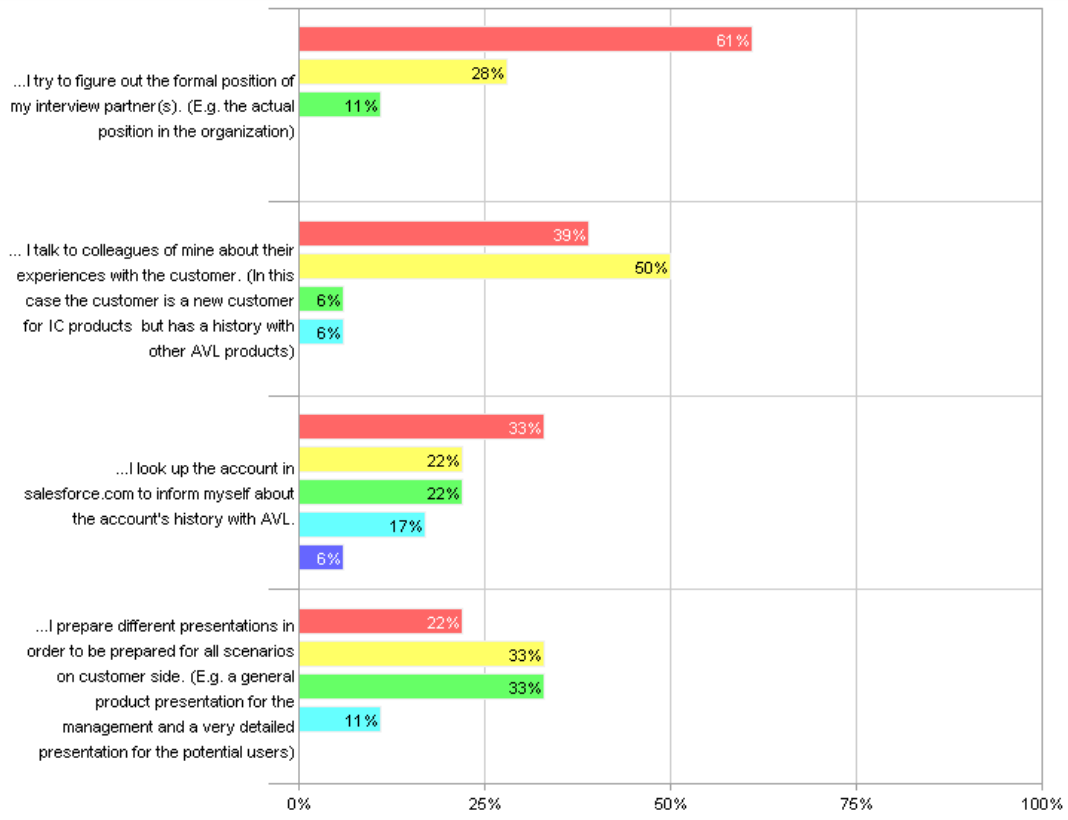
Derived EVs for IC department:

- The sales theory of Rackham as well as the BC approach is known and therefore used, by the majority of IC sales people (**).
- No other term instead of BC is used (***).
- At least sometimes, the practical application of sales theory can be observed (***).
- The BC roles, *'User'*, *'Decision Maker'*, *'Influencer','Buyer'* and *'Gatekeeter'* are known and understood by the clear majority of the test subjects and are therefore the most important BC roles for IC sales situations (**).

3.1.6.3 Behaviour in first customer contacts

The third chapter of the survey focused on the exploration of the behaviour of IC sales people when analysing a new account. Therefore, the statements mainly concentrated on the preparation, the subject matters and the target group of the first customer meetings. In addition, the test subjects where asked in an open question to specify their steps, when entering and analysing a new account. The idea was to find out if a standard procedure can be observed.

Concerning the preparation for the first customer meeting, the following can be stated: All interview partners inform themselves at least often about the contact person and think about what information could be relevant for the different stakeholders on customer side. Nearly all (89%) state that they at least often try to figure out the formal position of the contact person and also talk to sales colleagues about their experience with the selected customer in advance. The usage of SFDC as well as the preparation of different presentations was only rated by 55% as an action they often do. Figure 33 shows the rated statements in detail.



Base: n=18

Figure 33: Activities for the preparation of the first customer contact

In addition to the given statements, the sales people quote additionally the following actions, for a first customer meeting. The answers of the open questions have been summarised to the following propositions (see Table 5).

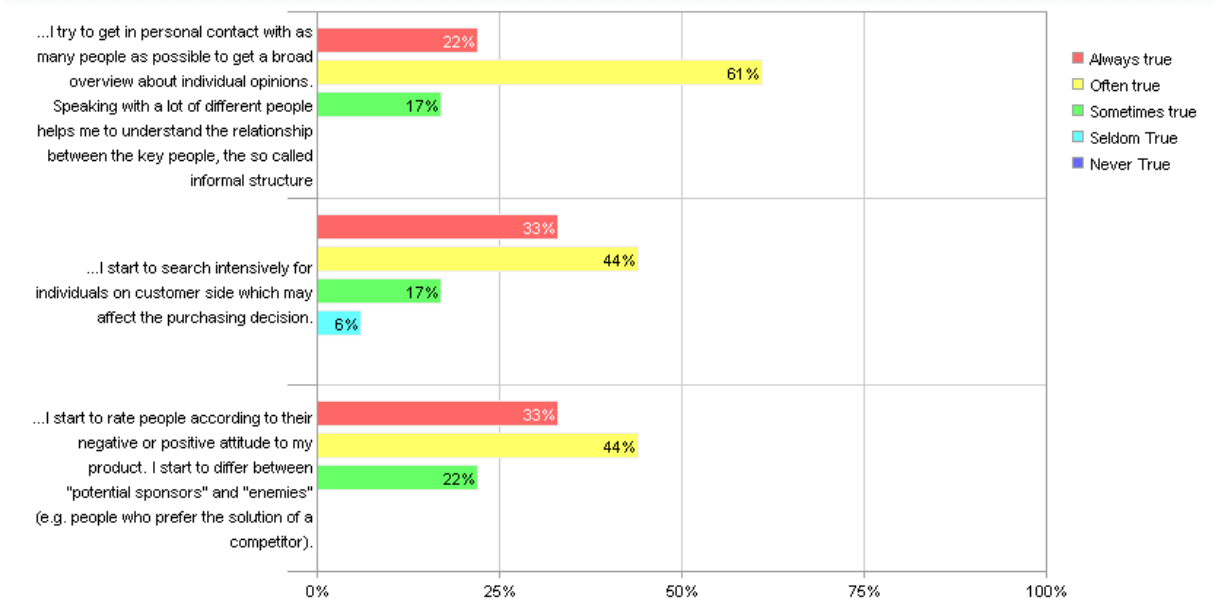
Summarised responses of question 1 of chapter 3 (see appendix A2)	**Amount of answers**
Understand customer needs or problems concerning calibration topic	4
Search for competitors	1
Get information from the internet	1
Get information about the customer's product portfolio, service situation, or project status	3

Table 5: Additional actions at the first customer meetings[71]

The next statements (see Figure 34) examined strategies of IC sales people, which they follow in the first face-to-face customer meeting. It can be noted that the clear majority of the sales people start in 75% of sales cases, to search intensively for all BC members and also start to rate them as *'potential sponsor'* or *'enemies'*. Besides of this, 83% quote that they often want to get in personal communication with as many people of the customer's

[71] The original answers of the test subjects can be seen in question 1 of chapter 3 in appendix A7.

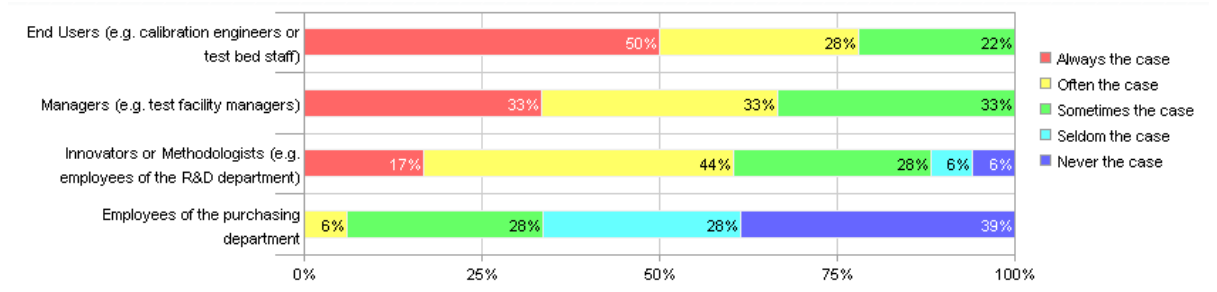
organisation as possible, to get a feeling about the informal structure (see statements of Fließ in chapter 2.3.3) of the BC.



Base: n=18

Figure 34: Intentions of IC sales people in a first face-to-face customer meeting

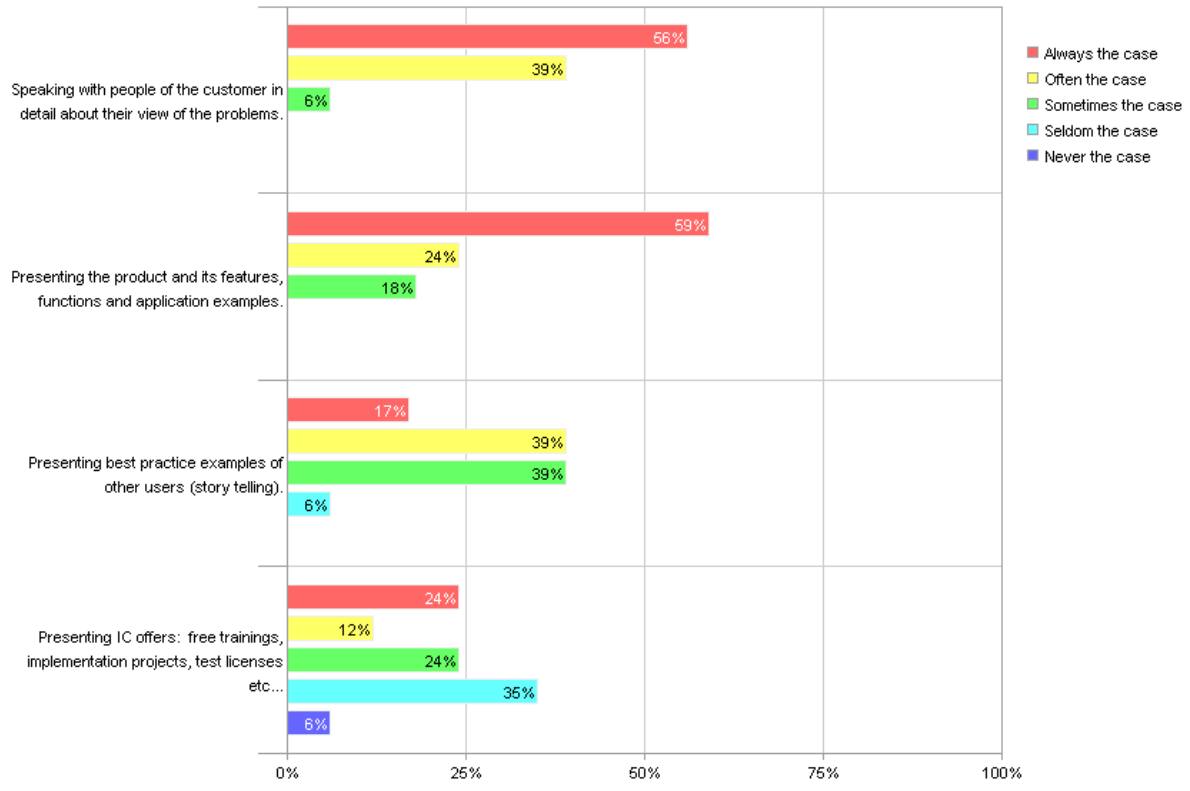
Moving on to one key question, who are the target people in the first customer contact (see questions of chapter see 1.3.c), the understanding of the first customer interactions was underpinned. The results of Figure 35 show one clear picture. In comparison to the ‘user’, ‘manager’ and ‘methodologist’ group, the members of the ‘purchasing department’ are noticeably lower frequency participants of the first customer meetings. The interview test subjects rate with a slightly different percentage (79%-61%) the ‘users’, ‘managers’ and ‘methodologists’ as people who are often participants of the first customer meeting. In addition to the predefined target people (see Figure 35), an ‘IT responsible’ was mentioned by an interview partner as a potential participant of the first customer meeting. As the products of IC department are only software products, and depending on the programming language or architecture, the product may live or die for some customers, it is obvious that also specialists of the IT sector may take part in the first customer meeting.



Base: n=18

Figure 35: Target people at the first customer contact

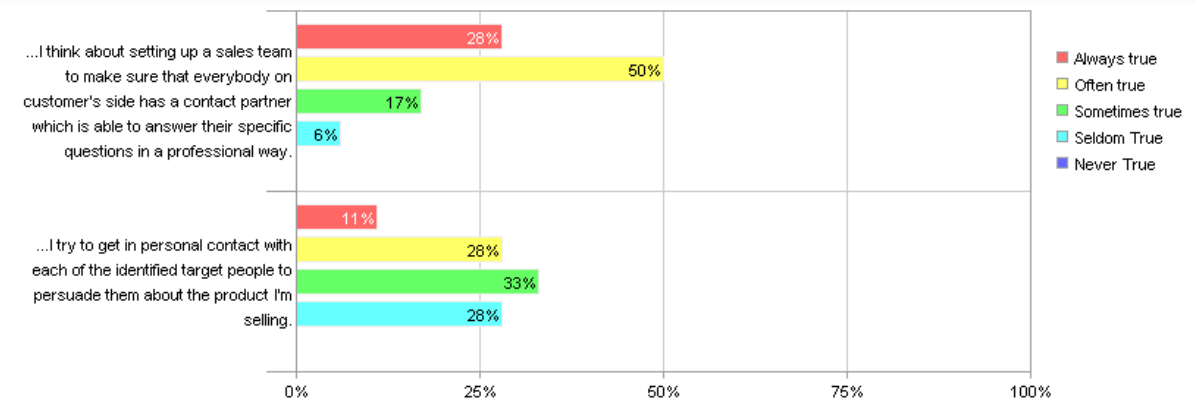
In addition to these intentions, Figure 36 shows the typical subject matters of the first customer meeting. While a dominating trend can be observed in statement one and two the frequency of application of statement three and four is noticeably lower. Beginning with the most frequent action – talking with the people of the customer in detail about their view of the calibration challenges – 94% of the test subjects quote that they do this often. Next, the presentation of product features, functions and application examples, which is also rated by 83% of the test subjects as an often applied action, can also be seen as a key behaviour of the sales people. Furthermore, the presentation of best practice examples is rated by only 56% of the test subjects as an often applied subject matter. Finally, the presentation of IC offers, is rated by the slight majority as a sometimes (24%), seldom (35%) or never (6%) happening action of the first customer meeting.



Base: n=18

Figure 36: Subject matters of first customer meeting

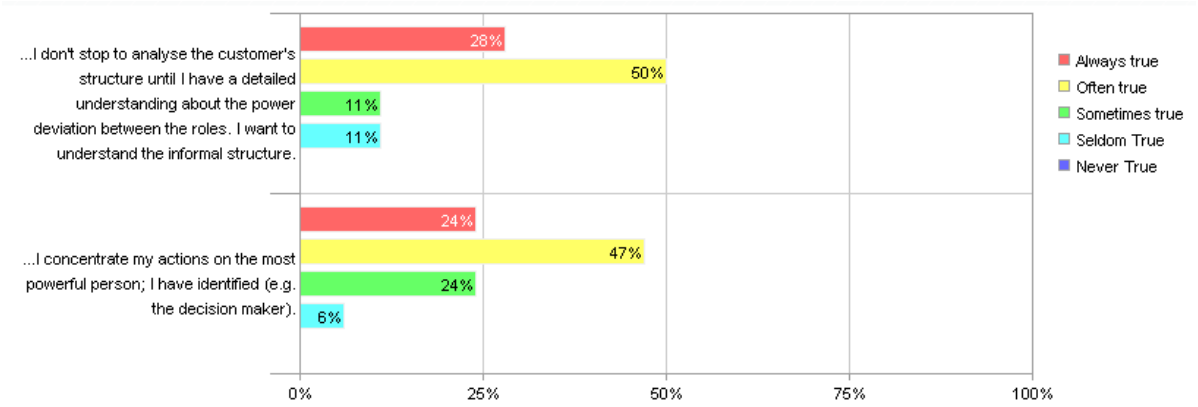
Following up the question about the typical subject matters of first meetings, the aim of the next statements was to clarify if the sales people of IC department tend to set up a *'selling centre'* or manage the relationship to each stakeholder of the customer solely. Figure 37 shows, that while 78% of the test subjects often set up a sales team, only 39% also often try to get in personal dialogue with all identified stakeholders.



Base: n=18

Figure 37: Selling centre vs. solely sales communication

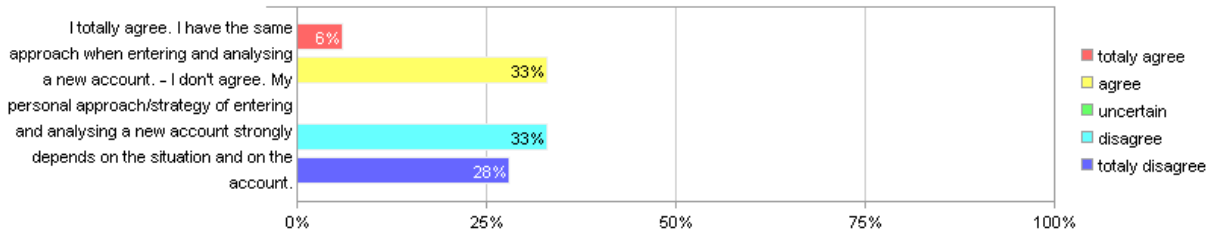
In addition to this, the analysis of the informal structure of the BC is quoted by 78% of the test subjects as an often followed target in the whole BC analysis. In connection with the understanding of the power deviation, 71% of the test subjects quote that they often concentrate their actions and persuading efforts on the most powerful person they have identified (see Figure 38).



Base: n=18

Figure 38: Analysing the informal structure and promoting the most powerful BC member

The final questions of chapter three, aimed to explore the standard behaviour of IC sales people when entering and analysing a new account. Therefore the test subjects were pleased to rate their personal behaviour according to two given extremes with the help of a five point ranking scale (see question 7 of chapter 3 in appendix A6). The results of Figure 39 show a slight trend, that the sales people disagree with the idea of the standard approach. Furthermore, the filtering of the question by different sub groups – for instance new versus experienced sales members – presented the nearly similar distribution of the answers. Thus, only a slight trend against the existence of a standard approach could be observed.



Base: n=18

Figure 39: Standard vs. situation-related account entering and analysing approaches

To close chapter three, the test subjects have been asked to write down their standard steps (if they quoted that they follow a standard approach) or their main actions they perform, when entering and analysing a new account, in form of an open question. They idea was to give the test subjects the possibility to write down their personal behaviour in an own structure and own words. In Table 6, a summarisation of the quoted standard steps and main actions can be seen.

People who quoted that they follow a standard approach (according to Figure 39)	
Summarised responses of question 8 of chapter 3 (see appendix A2)	**Amount of answers**
Step 1: Collecting information about the customer (online and internal): **Step 2:** Analysis of the actual calibration situation: Used products; performed calibration tasks; requirements of the customer; search for problems/dissatisfaction **Step 3:** Presenting general overview about IC solutions **Step 4:** Define personal strategy	3
People who quoted that their approach strongly depends on the customer and the situation (according to Figure 39)	
Summarised responses of question 9 of chapter 3 (see appendix A2)	**Amount of answers**
Understand customers product portfolio and search for existing AVL products	2
Identify need and dissatisfaction	4
Search the right contact person and identify BC structure	4

Table 6: Steps of IC sales employees when entering and analysing a new account

Discussion:

IC Sales people perform many different actions to prepare themselves for the first customer meeting. Often applied actions are for example the pre-info about the first contact partners and their formal position. For this, they use mainly internal information sources, for instance the experience of colleagues but also digital documented information as it is stored in SFDC or available at the customer homepage. However, the expectation that SFDC is often used in this phase, could only be confirmed by approximately the half of the survey test subjects.

Moreover, beginning with the first face-to-face contact, the sales people tend to identify all relevant people on customer side and also try to find out their general attitude to IC products, as it is proposed by *Sieck & Goldmann* (see chapter 2.3.5.3). In addition, they want to understand the relationship between the identified BC members which correlates with the idea of *Fließ*, who describes the existence of the informal structure of the BC (see chapter 2.3.3). In contrast to the experience of *Sieck & Goldmann*, who claim that sales people still tend to concentrate on only one person on customer side (see chapter 2.3.5.3), the results show that the dominating majority of IC sales people try to get in contact with as many people as possible to get a broad overview of the individual opinions. Furthermore, they start at the first customer meeting intensively to search for individuals, which may anyhow affect the purchasing decision. Besides this, the clear majority tend to concentrate their action on people with high influence power, representing the focus of power. Thus the understanding of the power deviation is rated by the clear majority as an often desired target. They reach these goals by communicating with a lot of different people on customer side about their view of challenges and needs in the calibration process. Concerning the participants of the first customer meeting on customer side, the *'users'*, followed by *'managers'*, followed by *'innovators or methodologist'*, describe in decreasing number of frequency, the group of people, which are often participating in early customer meetings. In addition, people of the IT department have been mentioned as participants of the first customer meeting. Finally the clear trend, that sales people often tend to set up a *'selling centre'* (see also the ideas of *Sieck & Goldmann* in point 5 in chapter 2.3.5.3) adjusted to the customers BC, instead of managing each relationship on their own, could be identified. In the end, the idea about the standard procedure of entering and analysing the customer BC shows a slightly aversion by the test subjects. The majority claims that their personal strategy depends on the situation and on the account. Despite of this, some congruities in the open question about the standard approach could be identified.

Derived EVs for IC department:

- IC sales employees often perform the following actions before they go to the first customer meeting with an potential customer:
    - Identify the formal position of the interview partners (***) and prepare suitable product information for each of them (^{nt}).
    - Interview AVL internal sales colleagues about their experiences with the customer to get an overview of the customer situation (***).
- An often-followed strategy for the first customer meeting is to get in personal communication with as many people (of the customer) as possible in order to identify everybody who takes part in the sales decision (***). The dialogue with many people on customer side helps the sales people to get an idea of the informal structure (**) of the BC as well as who is a potential sponsor or an enemy (**). In addition, they try to seek out what the needs or problems in the customer's calibration process are.
- An on-going strategy of IC sales people is to analyse the informal structure of the BC in order to get a feeling about the power deviation in the BC (**). After the identification and classification of the BC members, sales people often tend to set up

a *'selling centre'* (**) and they concentrate their main actions on the person with the most power (**).

- Often the subject matter of the first customer meeting is a standard presentation about the product as well as a detailed discussion about the customer's view of needs and problems in the calibration process (***).
- The sales people do not follow a standard approach when entering and analysing a new account (*).
- At the first customer meeting the following audience can be expected (statements ranked with decreasing likelihood):
  'End-users' > 'Test facility managers' > 'R&D employees' > 'IT administratives'

3.1.6.4 Specialties of the BC of IC customers

The fourth chapter of the survey aimed to the explore the special circumstances, which can be observed in IC BCs. Furthermore, also the specific strategies of IC sales people have been subject matter of the questions. In addition, also different methods of customer acquisition and the frequency of their application have been explored.
First, the interview partners were asked about their impression concerning the difference between the BC of IC software and ITS hardware products. The results show that for the products CRETA and fOX a slight majority (minimum 69%) has the experience that the BC of IC products differs from the typical BC of ITS hardware products. For the product CAMEO the trend for the whole sample is not that obvious but still twice as much (10) people at least agree with this idea than disagree (5). Thus, also here a slight trend can be assumed. Figure 40 shows the detailed result of this question.

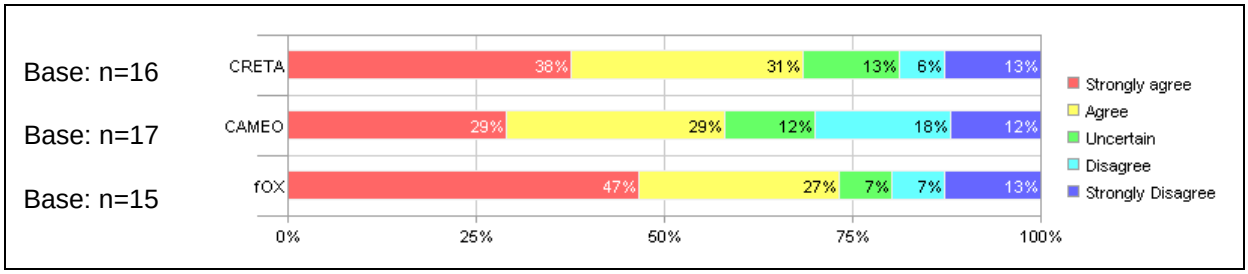
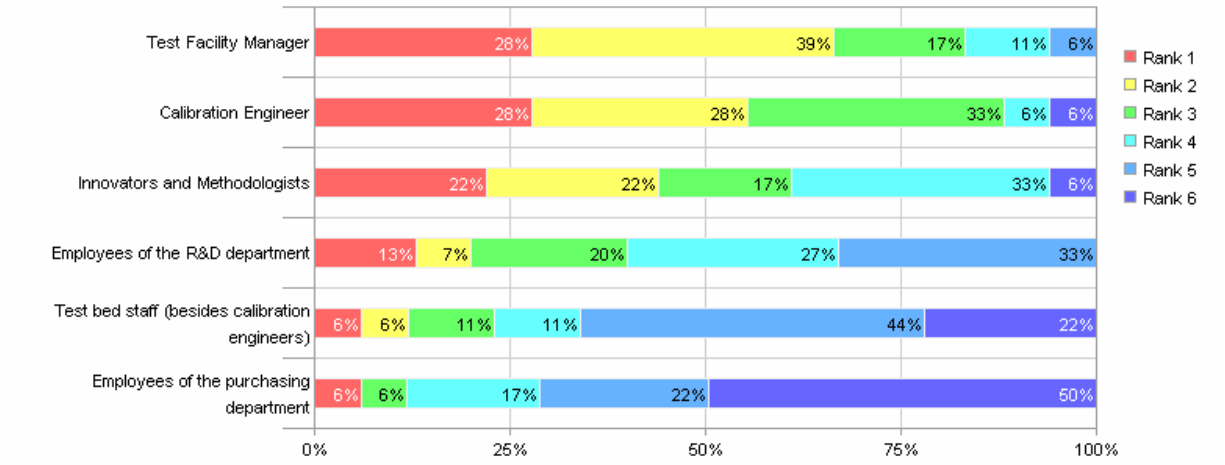


Figure 40: Difference of the buying centre for IC software products and ITS hardware products

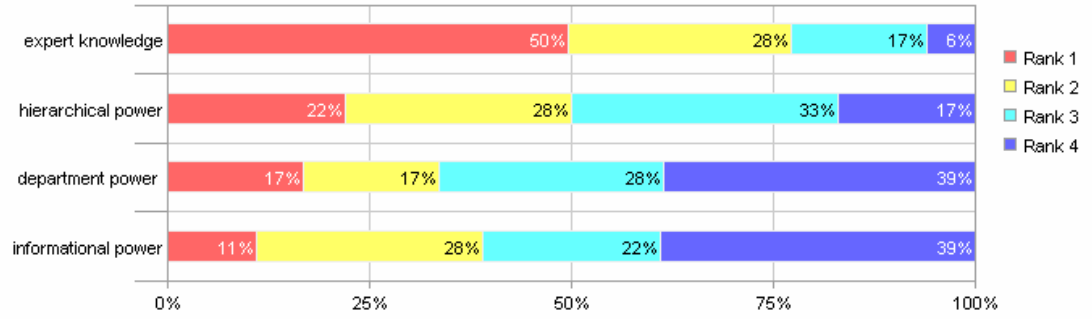
Moving to the next question, the ranking of the BC members according to their influence power on the buying decision as well as the ranking of the underlying power source, was a further task for the interview partners. 67% of the test subjects ranked the *'Test Facility Managers'* on the first and second rank (out of 6 possible ranks and rank 1 represents the highest influence power). This is followed by the *'Calibration Engineers'* which reach a level of 56% for rank one and two. Rank five and six are clearly allocated to the *'Employees of the Purchasing Department'* (72%) and the other to *'Test Bed Staff'* (66%). The detailed distribution of the ranking can be seen in Figure 41.



Base: n=18

Figure 41: Ranking of influence power on the purchase decision of customer's BC members

Subject matter of the next question was the source of the power. Therefore, the four most important power sources (see statements of chapter 2.3.4.2) had to be ranked, from the most to the least important. The outcome of the ranking shows that for 78% of the people, the *'expert knowledge'* is rated on rank one or two and thus the most important power source. This is followed by 61% who would rank the *'hierarchical power'* as the second or third important power source. The *'departmental power'* and the *'informational power',* are rated by 39% as the least important power source (see Figure 42).



Base: n=18

Figure 42: Ranking of power sources of the buying centre members

Moreover, the test subjects had to answer in which sales stage (see statements of chapter 2.3.2), from their experience, the sales process for each product normally starts and also how their personal sales strategy for each of this stages looks like. As Figure 43 illustrates, 76% (77%) of the test subjects quote that sales process for the products CRETA (fOX) normally starts in the first stage of *Rackham's 'Buyer Circle'* (see chapter 2.3.2). Furthermore, it is remarkable that by 41% of the test subjects, the starting point of sales process of the most complex product CAMEO, is not seen in the first stage.

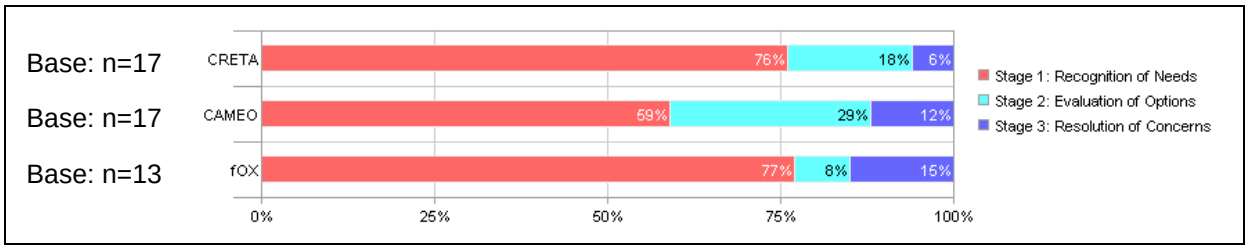


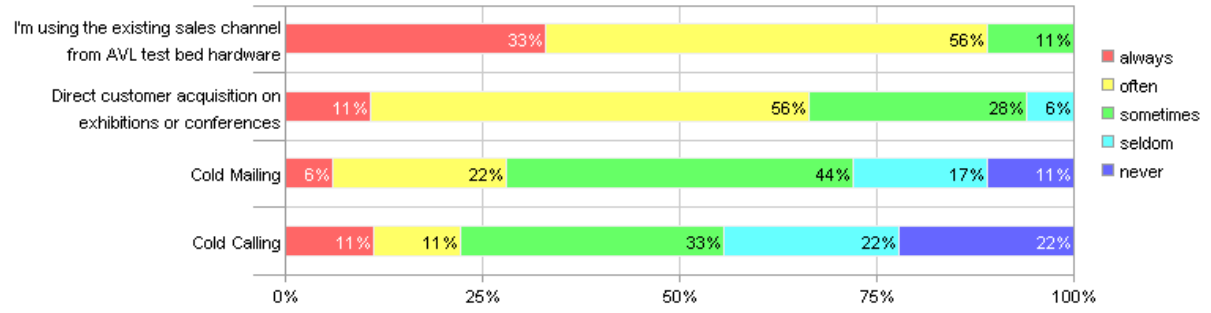
Figure 43: The starting point of the sales process for each product of IC department

Moving on to the personal strategies for the single sales stages, the answers of the open questions have been interpreted and summarised as shown in Table 7. While six people mention to listen to the customer and try to understand the customer needs, two people mention that their strategy of the first stage is to present the methodology as well as the benefits of the product. In other words, the clear majority of the test subjects quote to follow a passive stance while the minority tries to act in a more active way. In stage two, strategies like the comparison of the customer's actual solution (maybe a competitor's solution) versus the AVL solution or pointing out the benefits of AVL products, by using best practice examples or storytelling, have been mentioned by the test subjects. In addition, also demo projects in the framework of a free workshop have been quoted as strategies for this stage. Finally, the answers for stage three are connected with actions counteracting against the concerns of the customers. Therefore, four IC sales people indicate that their strategy is to arrange demo projects or workshops with the customer or simply arrange a web conference with product experts. In addition, three people quote that they start to negotiate with the customer about the framework of the license contract.

Summarised responses of question 5 of chapter 4 (see appendix A2)	
Recognition of needs:	**Amount of Answers**
Listen to customer, understand their calibration processes and business in general and find problems, pain and needs	6
Presenting the methodology of IC products and the resulting time and cost savings	2
Evaluation of options:	**Amount of Answers**
Evaluation of competing and actual used products and pointing out the strengths and benefits of IC products	2
Present how the products can solve problems, show benefits of AVL products by e.g. best practice examples or story telling	4
Demo installation in the framework of a free workshop	3
Resolution of concerns:	**Amount of Answers**
Arrange demo, webEx, workshop projects with experts; in general actions which try to counteract concerns	4
Start of negotiations and detailed discussions for instance about the contract framework	3

Table 7: Strategies/Actions of IC sales people for the different sales stage

The last question of the chapter deals with the acquisition approaches of new customers for IC products. The idea was to get a feeling about which acquisition methods are used by IC sales employees. The results of Figure 44 underline the statements, which have been presented in the introduction of this work. 89% of the sales people quote that they often use existing sales channels of AVL test bed hardware customers. This is followed by 67%, who quote the method of direct customer acquisition on exhibitions or conferences as an often used acquisition strategy. Finally the traditional *'cold calling'* (*'cold mailing'*) method is still rated as an strategy which is at least sometimes followed by more than the half – 72% (55%) – of the interview partners.



Base: n=18

Figure 44: Frequency of usage of different customer acquisition methods of IC sales people

In addition to the given statements, the test subjects quote that they use university networks and social networks as well as the experience of other customers in order to create new customer contacts (see question 6 of chapter 4 in appendix A2).

Discussion:

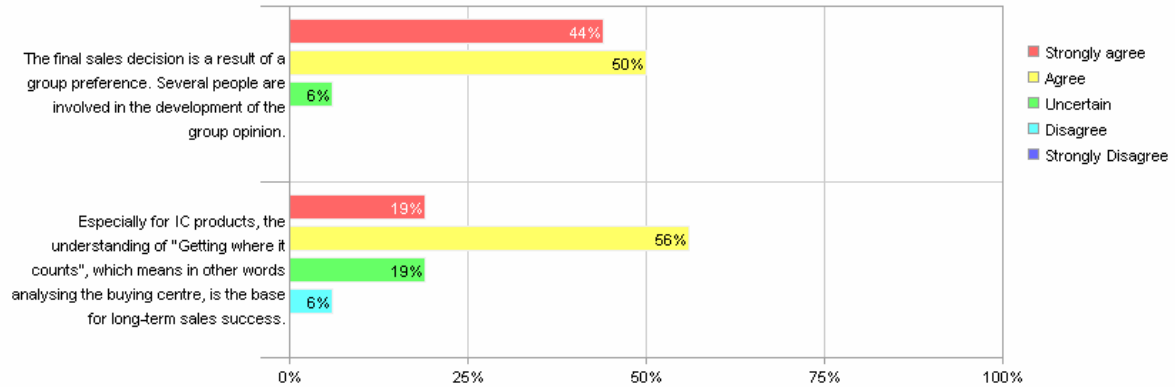
In this chapter, the characteristics of an IC customer's BC could be roughly described. While a clear trend concerning the general differences between IC products and other ITS products BC's could be observed for the products CRETA and fOX, the trend is a little lower for the product CAMEO. This can be explained by fact that CAMEO is the only product, which can be directly used at test bed (see CAMEO online in chapter 2.2.2) and therefore has similar end-users, which also have access other ITS hardware products. Therefore it can be claimed that the BC for CAMEO will be partly similar to the BC of other ITS products. Furthermore, *'Test Facility Managers'*, *'Calibration Engineers'* and *'Innovators or Methodologists'* are awarded with the highest influence power on the buying decision. When translating these different job positions in traditional BC roles, it can be claimed that the focus of power can be allocated not only to the *'Decision Makers'* but also to *'End Users'* or *'Influencers'*. This observation correlates also with the underlying power sources which have been described by *Patchen* (see chapter 2.3.4.2) and rated by the interview partners according to the importance for the BC members. As the *'Calibration Engineers'* and *'Innovators or Methodologist'* are calibration specialists and therefore use their expert knowledge to enforce their preferences concerning a buying alternative in BC discussions, it is obvious that the power source *'Expert Knowledge'* is of high importance. In addition the influence power of 'Test Bed Mangers' can be traced back to power source *'Hierarchical Power'*. This implies for IC purchasing situations, the claims of theory, that *'Hierarchical Power'* is not that important for B2B buying decisions, cannot be confirmed (see statements on page 33). Furthermore, the question about the starting point of the sales process results in a clear tendency for the products CRETA and fOX. For these products the majority of IC sales employees agree with the hypothesis, that the sales cycle really starts in the phase *'Recognition of Needs'*. However, for the product CAMEO this trend could not be confirmed. Around 40% of the test subjects are of the opinion that the need is already created when the sales process starts and thus the starting point is in stage two, or even three. Based on these findings, it cannot be assumed that the sales process always starts in the first stage. This implies that the BC analysis should include the determination of the sales stage of each BC member in order to apply the right strategy, for further sales actions. Moreover, the congruities, which could be observed in the strategies mentioned by IC sales people, have been summarised. It is remarkable that the mentioned strategies are not allocated to special BC members, rather they are very general and applied for every BC members. Finally, the acquisition methods of IC sales people are as expected very obvious. IC sales employees tend to use existing sales channels from other AVL customers as well as they try to get in contact with new customers in the framework of exhibitions and conferences.

Derived EVs for IC department:

- The BC constellation for the product CRETA (*), CAMEO (^{nt}) and fOX (**) differs from the typical BC of ITS hardware products.
- *'Test Facility Managers'* followed *by 'Calibration Engineers'* followed by *'Innovators or Methodologists'* are in descending order the most powerful BC members.
- *'Expert Knowledge'* and *'Hierarchical Power'* are the most important power sources for members of the IC customers BCs.
- For the product CRETA (**) CAMEO (^{nt}) and fOX (**), the purchasing process starts in the first stage of Rackham's *'Buyer Circle'*.
- Often used customer acquisition procedures, are the exploration of existing AVL sales channels (from PTE[72] or ITS) (***) as well as direct customers contact on exhibitions or conferences (*). In addition, university and social networks are used in order to get in contact with new customers.

3.1.6.5 Connection of sales success and sales theory and the idea of the proceeding of how the decision comes along

The fifth chapter included questions concerning the BC constellation and characteristics, the buying decision process, the connection between sales success and sales theory as well as a general open question about the specific challenges of selling IC products.
Regarding the results in Figure 45, it can be stated that the dominating majority of the test subjects (94%) at least agree with the idea that the IC customer's buying decision is a result of the multi-personal group opinion. Thus, also 75% of the interviewed people at least agree that the understanding of the BC – the so-called BC analysis – is the basis of long-term sales success.



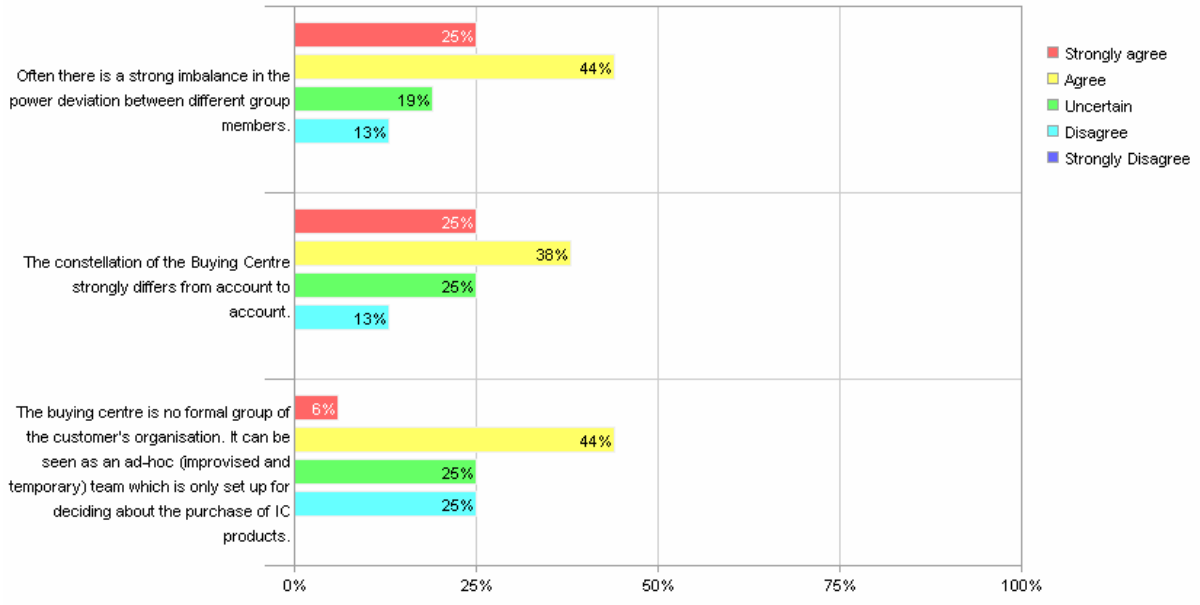
Base: n=16

Figure 45: How the sales decision comes along and what is important for long-term sales success

Moving on to the BC constellation (structure and involvement) of IC customer's the following could be stated (see Figure 46). 69% of the test subjects at least agree with the statement that the power deviation is not homogenous in IC customer's BC and also 63% agree that the constellation strongly depends on the account. The question about the temporary

[72] Business unit Powertrain Engineering of AVL Graz

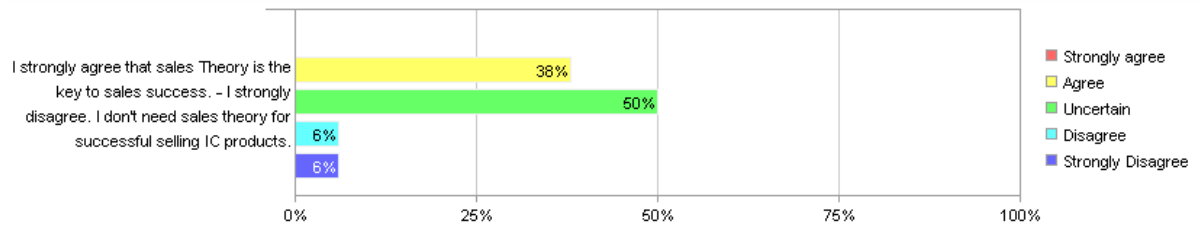
characteristic of the BC hits on no clear tendency. While 50% of the test subjects quote that they at least agree with the idea that the BC can be seen as an ad-hoc purchasing team, 25% are uncertain about this issue and 25% disagree.



Base: n=16

Figure 46: Characteristics of IC customer's buying centre

In addition, the next question results in no clear tendency of the observed group. While 38% of the test subjects follow the idea, that sales success is directly connected with the application of sales theory, 12% disagree with this claim and even 50% are uncertain (see Figure 47).



Base: n=16

Figure 47: Connection of sales success and sales theory

Finally, the chapter was closed with the open question about major challenges of selling IC products (see Table 8). The test subjects had the possibility to write down their personal experience in own words. Some congruent answers could be identified and have been summarised in the following statements.

Summarised responses of question 4 of chapter 5 (see appendix A2)	**Amount of answers**
Changing the methodology is a big risk for the customer. Competing against “working” in-house solutions means that the customer has to be 100% convinced.	3
To have the technical depth to firmly understand the customer calibration process and thus identify the needs and problems.	3
Market saturation (amount of calibration activities is limited) or timing of market entrance	3
IC products are not as good as they could be, sometimes the customers evaluate them as too complex	2
There are not enough resources in application support. The support is limited to the product level and does not go to the level of calibration methodology support.	2
Find the right decision maker	1

Table 8: Major challenges in selling IC products

Discussion:

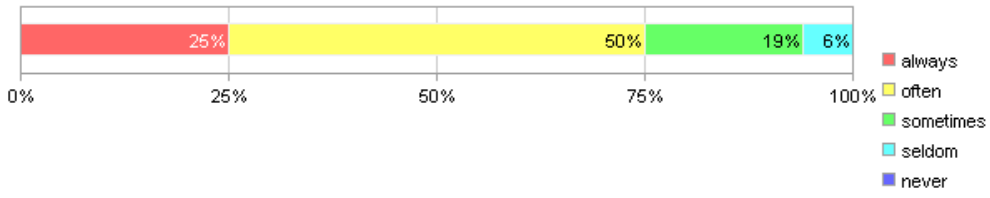
Summed up, IC sales people follow the theory of OBB and thus they are aware that the sales decision is a result of a so-called group opinion (see chapter 2.3.1). They see a high importance in analysing the BC in order to create the base for a long-term sales success with the customers. In addition, they try to understand the interactions in the BC and especially concentrate their actions on *‘getting where it counts’* (see *‘account entering strategy’* of *Rackham* in chapter 2.3.3.1.) This correlates with the results of the question about the formal characteristic of the BC centre. Half of the test subjects at least agree that there is no existing formal BC at the customer side, in other words often no active sales channel exists at the customer, when the IC products are sold the first time. If in half of the sales cases no purchasing team is waiting on customer side, the understanding of *‘getting where it counts’* can be seen as an elementary task. Thus considering Rackham’s ideas of entering an account when analysing the customer BC is awarded with a high importance. In addition, the half of sales experts are uncertain about the connection between sales success and the application of sales theory. Waiving the people who are uncertain about this issue, the clear majority of the rest agrees with the idea that sales theory is responsible for sales success. Finally, a few congruent opinions concerning the major challenges of selling IC products could be identified. For example, the high risk on customer side, to change the working calibration process, as well as the challenge to understand of the costumer’s calibration process in technical depth, could be mentioned as example for major challenges.

Derived EVs for IC department:

- As the buying decision in IC customer's BCs is always the result of a multi-personal interaction process (***), IC sales people rate BC analysis as an important task for long-term sales success (**).
- The BC constellation of IC BCs differs from customer to customer (*). In addition, it can be assumed that the different BC members influence the buying decision with an unequal degree (*).
- The typical BC for IC products is not a formal purchasing group, rather it can be seen as an informal ad-hoc group (^{nt}).

3.1.6.6 Documentation

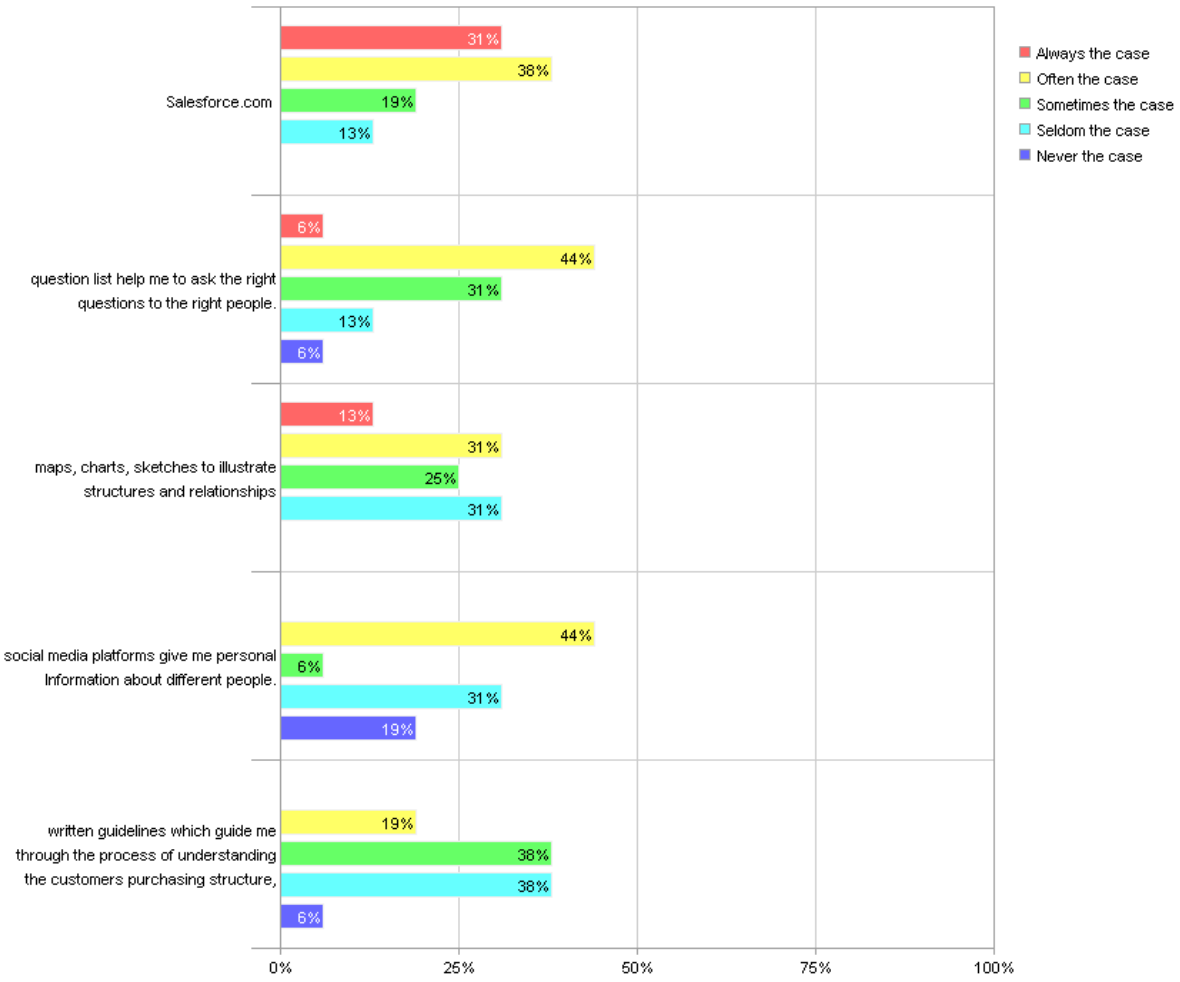
The last chapter of the international sales survey concentrated on how and how often sales people document their gained experience from customer meetings and which supporting methods are used in the customer analysing process.
Rated by 75% of the test subjects, the documentation is an at least often performed task (see Figure 48). Furthermore, the test subjects quote to use SFDC, email and personal memos and different Microsoft office solution to support the documentation process (see question 2 of chapter 6 in appendix A2).



Base: n=16

Figure 48: Frequency of documentation

Moving to the last question of the survey, which aimed to explore the used supporting tools during the analysis, some tendencies could be discovered. SFDC is the most often applied tool which supports the sales people during the BC analysis. 69% of the test subjects quote that they use it at least often. The second often used tools are question lists which help people to prepare customer meetings. This is followed by maps charts or sketches, which help to illustrate relationships and structures of the BC, as well as social media platforms, which are often used to provide information about the BC members (see Figure 49). 44% of the test subjects quote that they use these methods at least often. In contrary, a more rare application can be observed for written guidelines. Only 19% of the test subjects indicate that they often use written guidelines in order to support them when facing a new sales situation or analysing the customer BC.



Base: n=16

Figure 49: Used supporting tools

Discussion:

Summing up the chapter, the results show that IC sales people tend to document customer information which they gained on customer meetings on a regular basis. Therefore, they use the CRM system SFDC as well as standard office solutions like MS office. As AVL List has implemented the collaboration software SharePoint 2013, the documented MS office files are available for everybody who has access to the AVL network.

In addition, only SFDC can be rated as an often used supporting tool during the BC identification process. While prepared questions lists and visualised BC structures help the majority of the sales people at least sometimes during the identification procedure, social media platforms or written guidelines are rarely used.

All in all, the usage of a practical step-by-step guideline to analyse the BC, as for instance *Sieck & Goldmann* presents (see chapter 2.3.5.3), cannot be observed. Therefore, the development of an IC specific guideline which especially helps inexperienced sales people to analyse the customer BC and also to understand how the buying decision comes along, is rated as a long overdue task.

Derived EVs for IC sales situations:

- The clear majority of IC sales people often document the information they have gathered in customer meetings (**). They use SFDC, emails and MS Office solutions as documentation media.
- SFDC often supports IC sales people in analysing the customer's BC (**). In addition, question lists are used as interview support (**) and graphical methods like, sketches, charts or maps are used to visualise the gained information, at least sometimes (*).

3.1.7 Summary

The last chapter pointed out EVs, which describe the actual behaviour patterns and proceedings of IC sales people, when selling IC products. It could be observed that the sales staff is very familiar with the customer-oriented sales approach of *Rackham* and also follows his ideas, when entering and analysing a new account (**). Furthermore, the term BC as well as the BC approach in general, is common for the majority of the sales staff (**). Thus, they use the three *'focus areas'*, to rate the people of the customer according to their influence on the buying process. Furthermore, sales people use the classical BC roles of *Webster & Wind* to allocate formal tasks to the potential BC members. In general, it can be stated that sometimes they apply the theoretical ideas in practice (***). Concerning the customer acquisition, IC sales people tend to use existing AVL sales channels (***) as well as direct acquisition methods on exhibitions or conferences (*). Having determined a potential customer, IC sales people prepare themselves for analysing and entering the account in several ways. They try to identify the formal job position of the expected interview partners (***) and interview sales colleagues about the target account to get a first overview and feeling for the different stakeholders on customer side (***). Moving to the face-to-face customer meetings, sales people tend to get in personal communication with as many people as possible (***) in order to get an imagination of the informal structure of the BC (**), and who may be influencing the buying decision in what degree. In addition, typical actions at customer meetings are standard product presentations as well as detailed discussions about the customer's view of the calibration challenges (***). Although the majority of sales people quote that they do not follow a standard approach when analysing an IC customer (*), different strategies for the buying stages could be observed (see Table 7). Furthermore, after the BC is identified, IC sales people tend to set up a so-called 'selling centre' (**) and concentrate their personal actions on the *'focus of power'* (**). Finally, IC employees often store the information, which they gathered in the analysing process, in the database of SFDC (**). Moreover, SFDC is also often used as an information source during the analysis process and sometimes, sales people use question lists and graphical methods to support the analysis process (**).

Moving to the typical characteristics of IC BCs, the following could be discovered. A typical IC sales situation always hits on a multi-personal decision process on customer side (***). Furthermore, the sales employees follow the experience, that the BC constellation for purchasing situations of the IC products, CRETA (**), CAMEO (^{nt}) and fOX (**), look different than the BC constellation for ITS hardware products. Moreover, the first contact group at

customer side, are often *'end-users'* (**) and/or people of management positions (*). Following the experience of IC sales people, *'Test Facility Managers'* and *'Calibration Engineers'*, represent the group of people with the most influence power on the purchasing decision. Finally, the sales people are uncertain about the general characteristic if the BC is an informal ad-hoc group or a group, which is formally embedded in the organisational structure of the customer. As the BC constellation differs from customer to customer (*), by IC sales people, the BC analysis is rated as an important task to ensure long term sales success (**).

3.2 Practical Guideline for Analysing the Buying Centre of a new Customer

The previous chapter gave an overview of how IC sales employees behave when entering and analysing a new account. Especially the actions and behaviour patterns the employees perform in order to explore the BCs of their customers, have been paramount. It was observed, that the majority of IC sales employees do not follow a standard procedure when entering and analysing a new account, rather their personal approach depends on the underlying buying situation (see Figure 39). Furthermore, it could be observed that the BC constellation strongly differs from account to account and in addition, sometimes has a temporary characteristic (see Figure 46). Thus, a detailed BC analysis is seen as an elementary task when entering a new account. Based on these driving forces, this chapter will combine the proposals of literature (see chapter 2.3) and the empirical findings of the global sales survey, in order to develop an IC specific guideline, which should support sales people in analysing the customer. Especially the practical-oriented proposals of *Sieck & Goldmann* (see chapter 2.3.5.3) as well as the *'Buyer Circle'* concept of *Rackham* (see chapter 2.3.2) will be used as basis for the guideline. Furthermore, the ideas of *Büschken* and *Lewin & Donthu* concerning the determinants of the BC and the buying situations will be considered (see chapters 2.3.3.2 and 2.3.4.2).
Beginning with the assumption that a potential IC customer is located and the first customer meeting lies ahead, the guideline should lead the sales employees from this point, step-by-step through the BC analysis process. The guideline is directly addressed to the sales people, structured in four stages and each stage will be accompanied by supporting questions and IC specific EVs of chapter 3.1.6. In addition, graphical methods will be proposed to systematically visualise the findings of the BC analysis.

3.2.1 Phase 1 – Customer status and initial info hunting

As any information about the BC help sales people to prepare for the first customer meeting, it is prosed to start the analysis in advance of the first face-to-face customer contact. As you, as a sales employee, are not able to observe or communicate with people of the customer in a direct way, other information sources have to be used in this stage. This chapter leads you through actions, which can be performed.
At the beginning of the BC analysis it should be clarified if the target IC customer is already an existing AVL customer or if it is the first time that he is interested in doing business with AVL. For existing AVL customers it can be assumed that specific customer information concerning their purchasing behaviour are already available internally. For totally new AVL customers, the information procurement concerning their buying behaviour is based on available external information sources. Consequently, the information procurement differs for *'Existing AVL Customer'* and *'New AVL Customer'*. This distinction is seen as an important first step and thus the actions presented in Table 9 should help to fulfil this task.

Proposed Actions	
A1	Look up the account name in SFDC (and in the former customer databases) and check if the customer has a history with AVL (in adaption of Figure 33).
A2	Search for the customer's name in documents, which are available at IC SharePoint (in adaption of question 2 of chapter 6 in appendix A2).
A3	Ask your internal sales colleagues, especially these which are located at affiliates of the customer's region, if they know anything about former projects with the selected customer (in adaption of Figure 33).

Table 9: Proposed actions for the distinction of new IC customers

If the customer's status is identified, the following information sources (see Table 10) can be used in order to get a first impression of the buying situation, which lies ahead.

External information sources for 'New AVL Customers' & 'Existing AVL Customers'
• Use your external business network, for instance sales colleagues, former university colleagues or other customers to seek out information about the buying behaviour of the target customer (in adaption of question 6 of chapter 4 in appendix A2).
• Check the customer homepage for detailed information about its business areas and search for organisational charts, especially those in the area of powertrain calibration. Look for names of responsible people of this area and especially try to allocate your contact person in such a chart (in adaption of question 1 of chapter 3 in appendix A2).
• Check social media platforms like Xing, LinkedIn etc. for information about employees of your target company. Usually these media serves with information about job descriptions and the area of responsibilities of employees (in adaption of Figure 49).
• Get in touch with your contact partner of the customer company, e.g. via email or WebEx, to seek out general information about the customer situation.
Internal information sources for 'Existing AVL Customers'
• With the help of SFDC, identify who has documented his/her experience with your target customer and get in contact with him/her. Interview the AVL employees concerning his/her experience with the customer (in adaption of Figure 49).
• Use the data stored in SFDC as information source (in adaption of Figure 49).

Table 10: External and internal information sources for data procurement of IC buying centre analysis

When following these actions, it may be possible that a lot of information concerning the customer buying behaviour can be collected in advance of the first customer meeting. Furthermore, as the documented BC constellation is only valid for the underlying buying

situation[73], it is proposed to concentrate on the information procurement in this stage, also on the collection of information about the buying situation. Thus, Table 11 presents questions which should lead you through the first phase of the BC analysis process. With the help of the previous identified information sources, the sales people should try to answer as many questions as possible, before they go to the first customer meeting.

BC membership related questions	
Q1	Who will participate in the first meeting? Who may be part of the BC? What is their job position? Who can be allocated at an organisational chart of the customers? Can the hierarchical relationship between the people on customer side be identified? (in adaption of point 1 of chapter 2.3.5.3)
Purchasing situation related questions	
Q2	What is the customers actual product portfolio concerning the calibration process? In which area of powertrain calibration is the customer working in: Heavy duty, light duty, commercial vehicles or passenger cars? In which products is the customer interested in? (in adaption of question 1 of chapter 3 in appendix A2)
Additional questions if the customer is an existing AVL customer	
Q3	Who was involved in the historic purchasing process on customers' side? May they also be part of the BC for IC products? What roles did they represent in the BC of former sales cases? Which product(s) has the customer bought in history? Does the customer have a BC installed, which manages the purchases process of test bed or calibration products?
Personal related questions	
Q4	Do I have enough knowledge about the products or should I consult a technical specialist to support me at the customer meeting? (in adaption of summarised responses of question 4 of chapter 3 in appendix A2)

Table 11: Supporting questions for the first phase of the buying centre analysis

Answering as much of these questions in advance of a first customer meeting will help sales employees to prepare properly for the first face-to-face customer meeting. Thus the likelihood that the customer is served with all desired information rises and you as sales responsible can use the majority of the precious time at the customer meeting to start actively understanding the BC situation as well as the customer needs and problems.

All in all the pre-meeting info hunting will be connected with many uncertainties. You may not be able to answer all of the questions in this stage, especially these which are connected with the constellation of the BC. However, as you are facing an IC sales situation, you can alternatively fall back on EVs, to get an idea of who you may meet and what you have to expect at the first customer meeting. Thus, Table 12 lists expectations concerning the people

[73] See statements of *Lewin & Donthu* in chapter 2.3.3.2 or *Büschken* in Figure 13.

of the first customer meeting and the customers buying behaviour which have been derived from the findings of the empirical survey.

EV1	**Expected people at the first customer meeting with descending likelihood (in adaption of Figure 35)**
End-users of the product	In IC business, the end users are mainly people working at the customer's testing facilities. This could be for instance, calibration engineers, test engineers, or other test bed employees. As some of IC products can also be used aside of the test bed, in so-called offline applications, you may get in contact with end-user, which do not work at the test bed environment.
Managers	This could be calibration team leaders, or test facility managers.
Employees of the customers R&D department	Innovators or methodologist which are interested in the methodology and the functionalities of the IC calibration solutions.
Employees of IT department	People who are in charge of the software and network policies as well as the security requirements.
EV2	**Expected buying behaviour of IC customers (in adaption of Figure 45)**
Usually companies which buy IC products make the decision depending on more than one person's opinion. Therefore, you can expect a multi-personal buying decision process on customer side. This implies that the buying decision is not made by a single decision maker, rather the decision is a result of a multi-personal interaction process of the BC members (see Figure 45). In addition, you can expect that the influence power on the buying decision will be unequally distributed throughout the BC members (see Figure 46.)	

Table 12: Experience values for IC purchasing situations

Summed up, the target of the pre-meeting phase is to collect as much information as possible about the customers' purchasing situation and its buying behaviour in order to prepare properly for the face-to-face customer meeting. Knowing if the customer has already a history with AVL or not, clarifies which information sources can be used. At the end of this phase, the collected information about the involved people on customer side should be documented in a systematic form, as it is proposed in Template T1 (see Figure 50). This template represents the starting point for the understanding of *'who is who'* at the customer side and who is involved in the buying decision. T1 should help sales people to keep track of the players on customer side and give them a formal instrument to distinguish between them in a systematic way. In addition, Template T2 (see Figure 51) represents the framework for documenting all customer specific information. Furthermore, both templates suggest to allocate a unique name of the BC at the top right of the template in order to clearly connect a specific buying situation with the group of people involved on customer side, from the very beginning. This will help sales people in future situation to easily connect the information documented in different templates. All in all, the documented information up to this can now be used as a basis to develop a personal strategy for the first customer meeting as well as to prepare tailored presentation for the target audience.

Template T1	IC Sales Documentation	BC Name: BCXYMAY2014

Players of the target customer

Meeting Name:						
Date:			Customer Name:			
Documenter:			Location:			
No	**Name**	**Job Position**	**Hierarchical Level***	**Interests****	**Belongs to Focus of*****	**Likelihood of BC member********
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Legend:	
*	1 = Operative Level / 2 = Team Leading Level / 3 = Management Level
**	1 = General Product Features/ 2 = Methodology/ 3 = Business Values/ 4 = Benchmark Results
***	1 = Receptivity/ 2 = Dissatisfaction /3 = Power
****	1 = Extremely Unlikely/ 2 = Unlikely/ 3 = Neutral/4 = Likely/ 5 = Extremely Likely

Space for Comments:	

Figure 50: Template for the documentation of information concerning meeting participants

Template T2	IC Sales Documentation	BC Name: BCXYMAY2014

Purchasing Situation for BC Analysis

1. Personal Information

Name:	Date:
Job Position:	Affiliate:

2. General Customer Information

Customer Name:		Customer Status:	
Contact Person, Initiator of first Meeting (incl. job position):			
# Test beds:		# AVL Test beds:	
# Calibration Engineers:			
Calibration Target:			
Actual Calibration Software Product Portfolio:			

3. Expected Purchasing Situation

a. Buy class:		c. Product Type:	
b. Purchase Importance:		d. Purchase Volume:	

4. Analysed Historical Purchase Situation*

a. Buy class:		c. Product Type:	
b. Purchase Importance:		d. Purchase Volume:	

People involved on AVL side: (Name/Job Position)	1.
	2.
	3.
People involved on Customer side: (Name/Job Position/BC Role)	1.
	2.
	3.

* Only for existing AVL customers

Legend	
#	The rhombus symbol represents the term amount
3.a.	See chapter 2.3.3.2 and choose between **New Task /Modified Rebuy/ Straight Rebuy**
3.b.	Importance of Purchase Situation for customers Business Success: **Low/Moderate/High**
3.c.	Name of IC product(s)
3.d	Amount of estimated purchase volume: # of licenses.
4.a.	See 3.a
4.b.	See 3.b
4.c.	Decide between Software Product (SP) /Hardware Product (HP) and mention the name of it.
4.d.	Amount of estimated purchase volume: in €

Figure 51: Template for documentation of purchasing situation

3.2.2 Phase 2 – Basic and strategic buying centre map

The next stage of the BC analysis continues with concrete actions for customer meetings. At first, the expected sales situation of phase one should be proved for its validity. Therefore, you should have template T2 in mind and put the main focus of the customer dialogue on questions which help, to complete your picture of the underlying buying situation. Furthermore, T1 should be used again, to document new findings concerning the group of people on customer side. In this stage, it is assumed that you are in direct contact with the people of customer and can use them as direct information source.
Moving to concrete actions of the BC analysis, the following Questions (Q), Actions (A) and Experience Values (EV) should help to utilise the time with the customer in a most effective way.

Q1	Who of the participants of the first customer meeting may be anyhow involved in the IC purchasing process and thus are potential members of the BC? What are their names, their jobs, their positions and their responsibility areas? (in adaption of statements of point 1 in chapter 2.2.4.3)
A1	At the beginning of the customer meeting it is proposed to start with a meet & greet session. Therefore, you should encourage everybody who is participating in the meeting to present himself (name, job position, area of responsibility). In addition, ask them about their expectations concerning the product presentation, and what information is important for them. After your product presentation try to get in dialogue with people who showed receptivity in order to get a feeling about who is member of the BC. Finally complete and correct the points in template T1 and T2
EV1	Look for people of the following groups: test facility managers, calibration engineers, innovators/methodologists and IT administrators (in adaption of Figure 36)
Q2	To which focus area do the single participants belong to? Which traditional BC roles can be assigned to the people? (in adaption of the statements of chapter 2.3.3.1)
A2	Use receptive people to seek out the required information. In addition, the dialogue with every participant will give you a hint if they are directly facing a problem, are just interested in the product or just have to participate at the meeting because of formal policies. Note that on the one hand not all meeting participants will be part of the BC and on the other hand not all BC members will be part of the meeting. Document the gathered information in Template T1.
EV2	The roles Users, Decision Maker, Buyer, and Influencer are common in IC business (in adaption of Questions 9 of chapter 2 in appendix A7).
Q3	Which other people may be involved in the buying decisions, and which did not participate at the customer meetings? Do they use external consultants? How can they be allocated? (in adaption of point 1 in chapter 2.2.4.3)
A3	Use receptive people as information source for the identification of other potential BC members. Ask them questions like: Who else of your company may be interest in a product presentation? Who else is dissatisfied with actual solutions in the calibration area? Do not waste too much time in presenting things to the receptive people. Try to give them the floor to explain you the customer situation (see statements of chapter 2.3.3.1)
EV	Look for people responsible for IT issues (in adaption of question 3 of chapter 3 in appendix A2).

Table 13: Supporting question for creating the basic BC map

Following these steps should make it possible to identify the majority of the people, who will have an influence on the buying decision. Thus it should be possible to complete the missing information of Template T1 of phase one. Furthermore, you may start to have a clear idea which people of the customer side are really involved in the buying decision. Thus, the next step proposes to transfer the finally identified BC members in a structured map, the so-called Basic BC Map (BBCM) (see Figure 52). In addition, the outcome of A1-A3 of Table 13 has to be implemented in the map. The map items are explained in the legend which can be found

in Figure 53. All in all, the illustration of the BC members in a structured way will help to document the formal structure of the BC members.

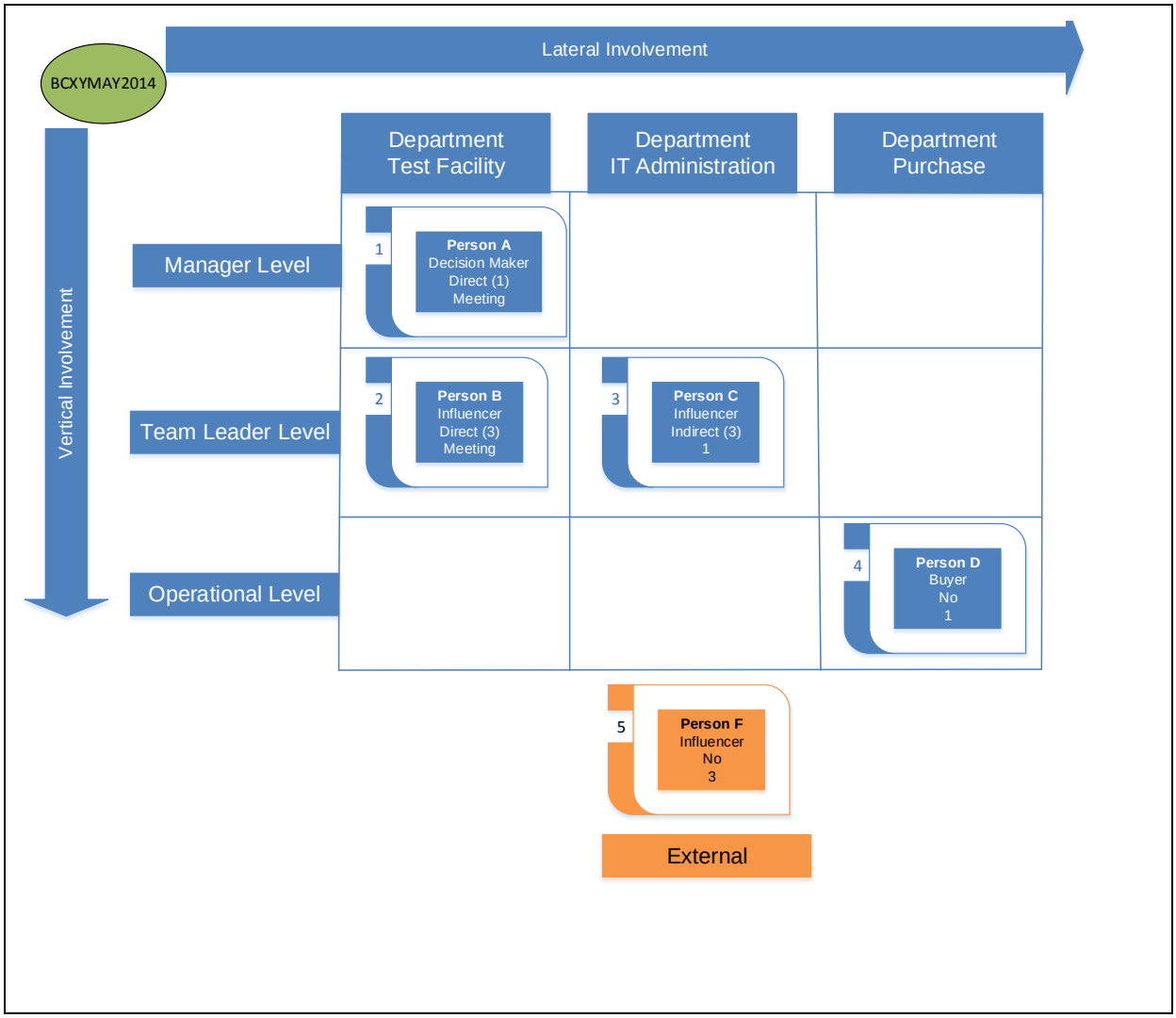


Figure 52: Example of the Basic BC Map

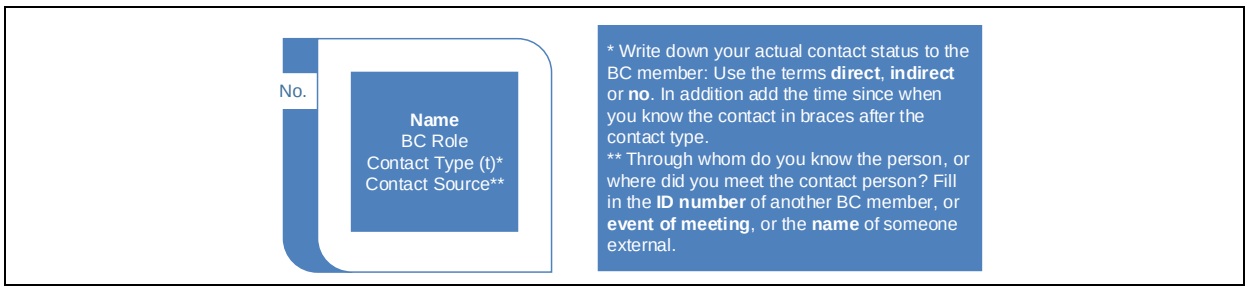


Figure 53: Legend for Basic BC Map

At this point, it has to be noted that the development of the map is not a static process. Every time when you are in contact with people of the customer you will extend the map with new information. With growing customer experience, you may delete items of the BC Map and add new ones. Thus, another aim of the map is to monitor the situation of the customer in order to simplify and accelerate future sales situations.

After the development of the BBCM, you should continue to collect more information about the items of the map. Having the people of the BC in front of your eyes, gives you the possibility to assess their attitude to your product and to get a feeling for their personality and their influence power. Therefore, you should ask yourself the following questions and perform the proposed actions in order to collect strategic information about the BC members.

Q4	How do the single BC members see our products? (in adaption of the statements of point 2 in chapter 2.3.5.3.)
A4	Rate the single people according to their attitude to the target product. Use the terms *'Coach'*, *'Positive Attitude'*, *'Neutral Attitude'*, *'Negative Attitude'*, and *'Enemy'* and assign them to the identified BC members on the BC map (in adaption of the statements of point 2 in chapter 2.3.5.3.)
Q5	Which BC member is located in what sales stage at the moment?
A5	Try to assign the terms[74] RoN*, EoO** and RoC*** to each of the BC members (in adaption of the statements of chapter 2.3.2)
EV5	The general experience concerning new IC customers shows that the rule is to start in the RoN phase. Only for the product CAMEO there is a slight possibility that some members of the BC may be already in the EoO phase (in adaption of Figure 43).
Q6	Which BC members are influencing the BC decision in what degree? Which BC members have the ability to influence the opinion of others? (in adaption of point 4 in chapter 2.3.5.3)
A6	Use the terms *'high'*, *'moderate'*, and *'low'* to document the degree of influence on the buying decision for each BC member in the BC map. Furthermore, the influence on others should be displayed with arrows in the BC Map.
EV6	The following BC members are rated with descending influence power on the buying decision: Test Facility Manager > Calibration Engineers > Innovators or Methodologists (see Figure 41). In addition, the most effective power sources in IC BCs are the *'Expert Power'* and the *'Hierarchical Power'* (Figure 42).

Table 14: Leading question for the development of the strategic BC map

Answering the questions of Table 14, gives you the possibility to visualise the so-called informal structure of the BC as it is proposed in Figure 54. Each BC member, who is labelled in the BBCM with a unique number, can be located in the Strategic BC Map (SBCM) depending on two parameters: The actual sales stage and the influence power on the decision. Furthermore, the colour codes help to visualise the BC member's attitude to the product we are facing to sell. Finally, also the interpersonal influences can be visualised with the help of arrows. The width of the arrows shows the degree of the influence power (For instance, a thick arrow represents a *'high'* influence power on the target person while a thin arrow means *'low'* influence power). Finally, BC member, for which the knowledge about the three characteristics is not established yet, are allocated in the question mark box.

[74] *Recognition of Needs; ** Evaluation of Options; ***Resolution of Concerns. For further information about the focus areas see chapter 2.3.2.

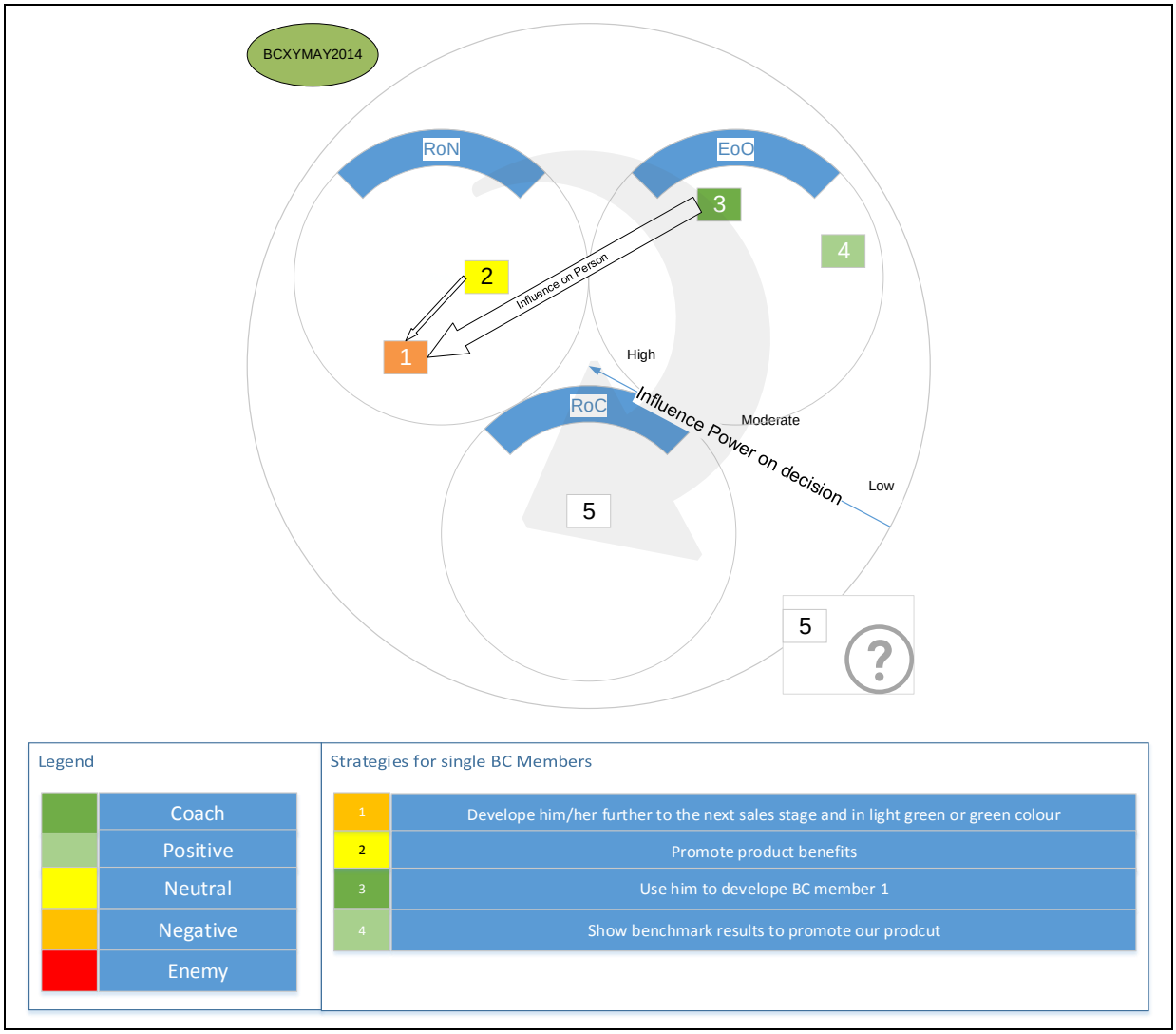


Figure 54: Example of Strategic BC Map

Based on this information you can start to develop specific strategies concerning the penetration of the BC. For instance, as proposed in Figure 54 you can use a sponsor which is in the sales stage EoO, to develop people with high influence, but are in a neutral or negative position and in the RoN stage. As one specific BC member already recognises the need, just he/she has to be encouraged to communicate it to the right people, the ones with high influence on the buying decision. The ideal picture of the strategic map is when you see only green boxes in the cycle of RoC. Thus, the strategies should aim to get the people with high influence as fast as possible in last sales stage as well as develop their attitude concerning IC products in a positive direction. Furthermore, your actions should also aim to reduce the colour red as good as possible from the map, or at least to transfer the red and orange icons to the area of the outer edge of the strategic map, which means to reduce their influence power. The desired development of the BC members is shown in the SBCM with the help of the grey arrow.

3.2.3 Phase 3 – Care strategy

Depending on the size and the constellation of the BC, in a next step it is proposed to think about setting up a *'selling centre'* (see statements of point 5 in chapter 2.3.5.3.). The EV shows that the BC members may represent different hierarchical structures or belong to different departments (for instance Calibration Engineers belong to a different hierarchical level than Test Facility Managers; IT Administrators and Methodologist may belong to a different department than Calibration Engineers). Caused by the different hierarchical and functional levels of the people on customer side, it is not seen as expedient that, you as sales representative manage all customer relationships solely. Therefore, it is proposed to determine who of IC department should be responsible for whom of the BC and should create a long-term relationship. For the selection of the right communication partner, you can use for instance, the job position or the hierarchical position of the BC members in order to assign a suitable communication partner. In point five in chapter 2.3.5.3, possible candidates of the selling company, who may be suitable for setting up a relationship with people of the customer, are listed. Furthermore, Table 15 summarises the ideas which lead you through the development of the so-called Advanced BC Map (ABCM). In addition, Figure 55 shows an example of the ABCM, where a fictive BC constellation and the proposed suitable communication partners for an IC sales situation are illustrated.

Q1	Who of the seller company should start a long-term relationship with whom of the BC members? (in adaption of point 5 in chapter 2.3.5.3)
A1	Use similar task-related job positions in order to find the best communication partner. Also think about the age, the experience and the hierarchical level and ensure that the differences in these personal characteristics are not too big. Also use soft facts to find the best communication partner. In the end, extend the BBCM to the ABCM. (in adaption of point 5 in chapter 2.3.5.3)
EV1	The BC members often tend to belong to different organisational structures and levels (in adaption of question 3 of chapter 3 in appendix A7).

Table 15: Selling centre development

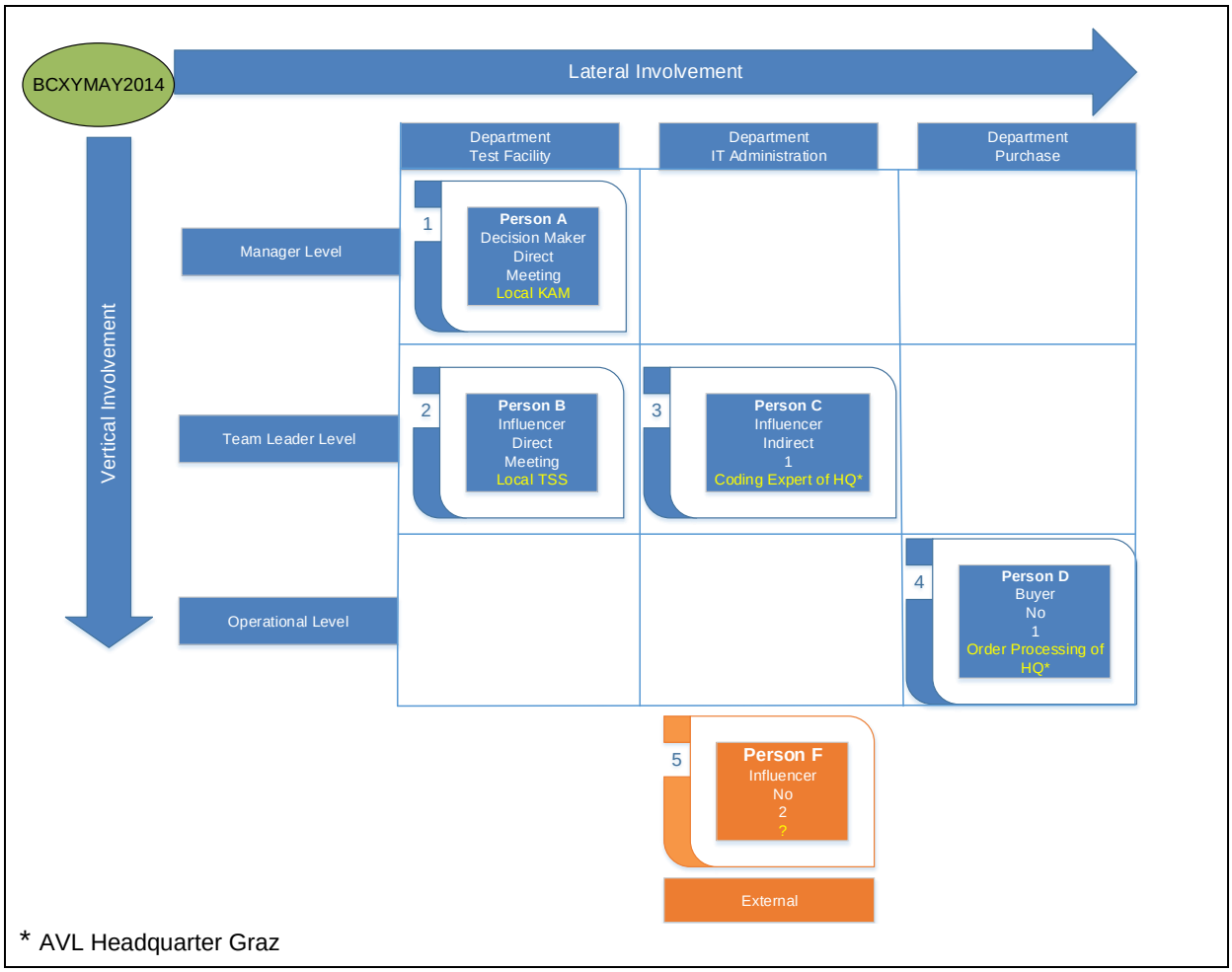


Figure 55: Advanced BC Map

At this point, it has to be noted, that the selection of the right communication partner must not be a purely rational decision. Sometimes also soft facts, like similar hobbies or private interests can help to find a suitable communication partner between the selling organisation and the customer BC (Sieck & Goldmann, 2007, p. 92) (Sieck & Goldmann, 2007, p. 92). Therefore, after-business-events represent a high potential to seek out private information of the BC members (see question 8 of chapter 3 in appendix A7).

3.2.4 Phase 4 – Monitoring plan

As already mentioned before, the BC maps developed in stage one and two, are embedded in a dynamic environment and thus will change over time (see the statements of *Matthew, Hague, & Hague* in chapter 2.3.3). Furthermore, the BC structure and involvement is influenced by the purchasing situation (see statements of *Lewin & Donthu* in chapter 2.3.3.2). Consequently, you may find a little different BC in future IC sales situations. Based on these assumptions, we propose to install a monitoring strategy in order to achieve a long-term sales success with the target customer. Depending on the strategic value of the account and the historical and expected future sales size, you should determine the monitoring intensity and monitoring actions. Therefore, a monitoring plan as proposed in Figure 56 should be used to determine the monitoring strategy.

Template T3	IC Sales Documentation	BC Name:	BCXYMAY2014

BC Monitoring Plan

Log Date	BC Member	IC Responsible	Monitoring Frequency*	Monitoring Action**	Changed Template or Map***

Legend:

*The term monitoring frequency describes the amount of monitoring actions per year.

**A monitoring action represents any task resulting in a short dialogue with the BC member in order to get an update of the customer situation and the involvement of the BC member in IC purchasing issues.

***In this column, T1, T2, Basic BC Map, Strategic BC Map, Advanced BC Map should be noted if there were any changes.

Figure 56: BC monitoring plan

3.2.5 Overview

The installation and execution of the monitoring plan, as proposed in the previous chapter, is considered as on-going task of the BC analysis. The documented information of each stage ensures a better understanding of the customers BC and therefore the modus operandi of the decision making process. Furthermore, the templates and map created in the analysis process, should be stored in an internal database, for instance in MS SharePoint of AVL network or in SFDC, in order to make them accessible for all employees. This enhances the data procurement and accelerates the BC analysis process for future IC sales situations. Finally, in order to give an overview of the whole analysis, Figure 57 summarised the whole process in a structural diagram.

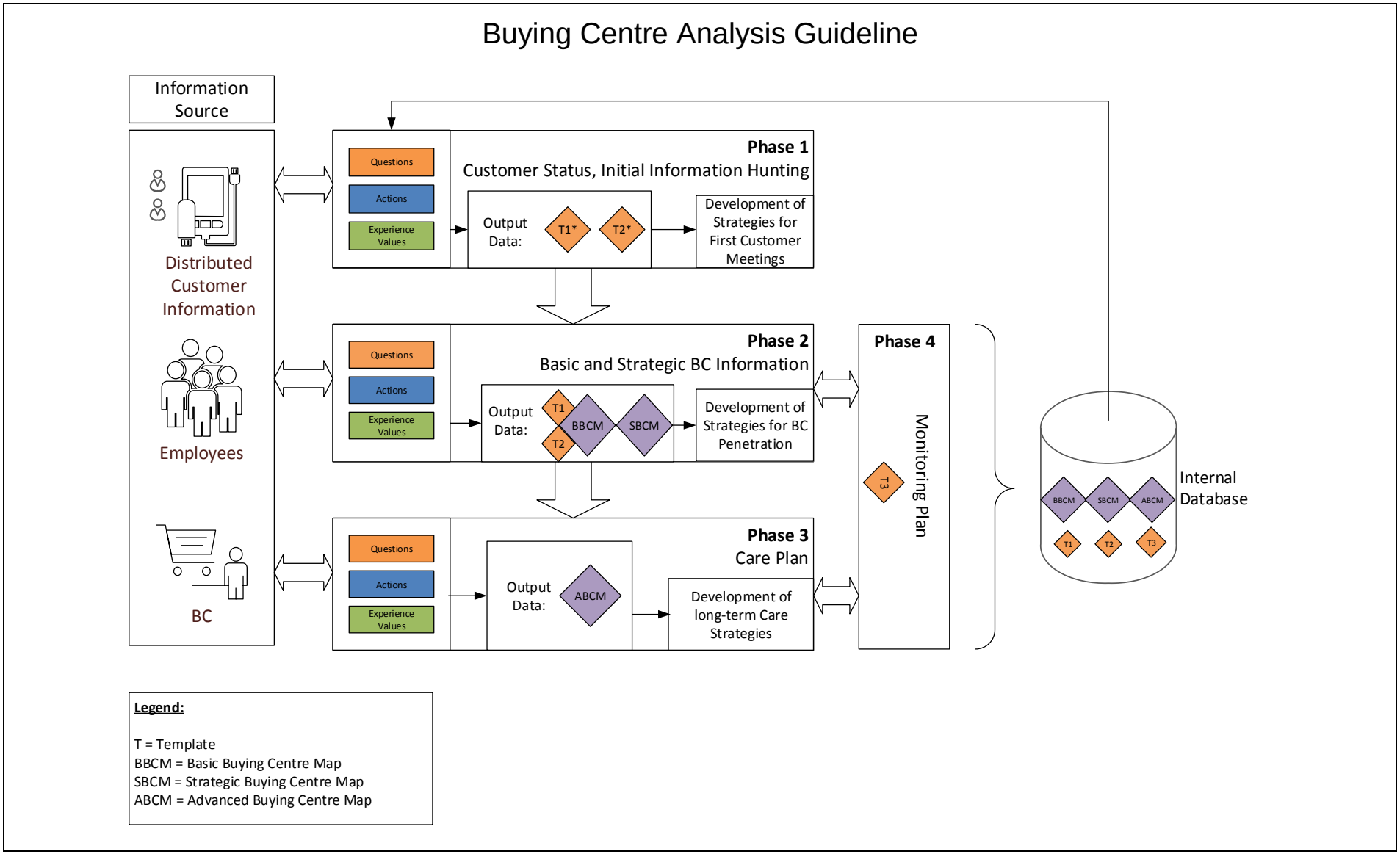


Figure 57: Overview of the buying centre analysis guideline

3.3 Concept of a Buying Centre Analysis through the Sales Force

The previous chapter presented proposals, which should support IC sales employees in understanding the customer purchasing behaviour in a qualitative way. Therefore, a practical guideline was developed to support sales employees by determining the buying situation, the BC members and their formal roles in the buying process, when entering a new account. Furthermore, the guideline proposed a SBCM, which aims to estimate and document qualitative influence information of the single BC members. With the help of this systematic procedure, the sales employees should be able to analyse the BC in a qualitative way and create a customer-related data set, from which personal sales strategies for entering and penetrating an account, can be derived. All in all, the guideline was directly addressed to sales people of IC department and it was assumed that the sales people use the customer as a direct information source in order to analyse the BC of a customer.

The BC analysis concept used in this chapter, follows a little different approach. As already described by *Brinkmann* in chapter 2.3.5.2, it is assumes that information concerning the BC behaviour often already exists in the selling company, and therefore an internal survey of the sales force can deliver data to analyse the BC. Caused by this idea, the BC analysis concept of this chapter is not addressed to the sales employees; rather it is proposed as a method for marketing employees in order to collect specific customer information. In respect to the IC department's structure, the BDMs[75] are possible applicators of the concept. Furthermore, as this analysis requires a certain experience with the customer, only BCs of existing customers can be analysed. It can be seen as an advanced BC analysis concept, which delivers quantitative data concerning the BC. As the concept of this stage will follow the ideas of *Brinkmann's* approach, the following lines will summarise the ideas already described in the theoretical part of the work.

In chapter 2.3.4.2, the basic ideas of a multi-personal decision process have been pointed out and used as a basis for understanding the buying decision process in a BC. It was established that the BC of the customer makes decisions based on a so-called *'group preference'* concerning an evoked set of alternatives. In respect of one specific buying situation, the determination of this *'group preference'* was explained with the help of two factors: (1) the *'individual preferences'* of the single BC members and (2) the *'influence power'* of the BC members on the buying decision. Consequently, the *'group preference'* was formulated as a function of the *'individual preferences'* of the BC members and their relative *'influence power'* (see Equation 1 on page 34).

Further on, different ideas how to collect the needed information about the *'individual preferences'* and the *'influence power'*, have been discussed and based on the theoretical construct of the multi-personal decision process, the challenges of proper data generation in B2B markets have been pointed out. The hypothesis of *Brinkmann* described, that the information procurement in form of a direct customer survey – as it is used in classical market research – results in a data generation problem because of multiple reasons (see chapter 2.3.5.1). Therefore, *Brinkmann* compares different alternative methods of information

[75] The BDMs of IC department are responsible for the creation of market data (see chapter 1.2.6)

procurement about their applicability for the purpose of BC analysis. As already mentioned, the results point out that the change from the classical market research approach to the questioning of internal sales experts, can overcome the data generation problem (see statements of chapter 2.3.5.2). In connection with a special survey design the BC analysis on basis of internal sales force information is rated to provide at least the same quality of data, as the classical market research approach would deliver. According to the empirical study of Brinkmann (2006), in which direct and indirect measurement methods have been checked for the applicability for BC analysis, the so-called MeLimCA is rated as the best method to measure the needed data (Brinkmann, 2006, p. 187)(Brinkmann, 2006, p. 187).
Driven by these findings and caused by the relatively small effort the approach of Brinkmann requires (see the benefits of Brinkmann's approach in chapter 2.3.5.2), the BC analysis through the internal sales force was selected to be applied for the analysis of one specific BC of IC department. Therefore, a concept, tailored for IC department, where Brinkmann's approach is embedded, was developed and will be presented in the following sections. Furthermore, the targets of the BC analysis concept are formulated in the following lines:

- Identification of BC members and description of the underlying buying situation
- Measurement of the *'individual preferences'* of the BC members concerning a set of multi- attributive products and estimation of the importance of the single attributes as well as the part-worth utilities for the single attribute-levels
- Measurement of the *'influence power'* of the single BC members
- Derivation of a *'group preference'* for an existing set of buying alternatives (IC product and its competing products)

3.3.1 Pre-conditions

In order to perform the BC analysis on basis of internal sales force information, several pre-conditions have to be taken in consideration. As quoted by Brinkmann (2006), apart of the existence of a personal sales approach (which means that the sales employees are in personal (face-to-face) contact with the customer), also the existence of a multi-personal decision process on customer side has to be guaranteed. In addition, the interactions between the sales employee and the customer have to be of regular nature in order to ensure a high information quality (p. 145)(p. 145). Furthermore, in order to make the application of the conjoint measurement feasible (MeLimCA), it has to be guaranteed that the target purchasing object has a multi-attributive character (Klein, 2002, p. 8) (Klein, 2002, p. 8). With other words, it has to be ensured that the investigated product group, for which a preference measurement should be applied, can be described with the help of concrete attributes and attribute-levels fulfilling certain requirements[76].

[76] The requirements for the product attributes and attribute-level have been described in chapter 2.3.4.3.3.

3.3.2 Selection of the target buying centre and the interview partners

The very first task of the BC analysis is to select (under consideration of the mentioned pre-conditions) an existing target customer and a product group of IC department for which the analysis should be executed. After the determination of these two points, a person delivering the information concerning the BC has to be found. As the choice of the interview partner influences the quality of the gathered information and thus the forecast quality of the customer behaviour, *Brinkmann* sets up three hypotheses, which should support the choice of the right interview partner (see chapter 2.3.5.2). Although only one of the hypotheses was confirmed (Brinkmann, 2006, p. 187) the hypotheses are rated as good ideas, which should be considered when selecting an interview partner. Therefore, the ideas are listed again:

- Search for sales people with long customer relation
- Search for experienced sales people
- Search for sales people with good sales performance

Furthermore, Brinkmann (2006) rates KAM's and field representatives as a high potential information sources concerning data about the customer's preferences and internal relationship (p.88).

3.3.3 Concept of data generation in department calibration application

After the selection of the interview partner(s), the product group and the target customer, the concept of data generation will lead the investigator of IC department through the steps of the MeLimCA method. Figure 58 shows the basic interview concept, which consists of three phases. In stage one and stage three, the active participation of the interview partner is required. Stage two is used to process the information of phase one in order to convert the data into a certain design, as it is required for stage three.

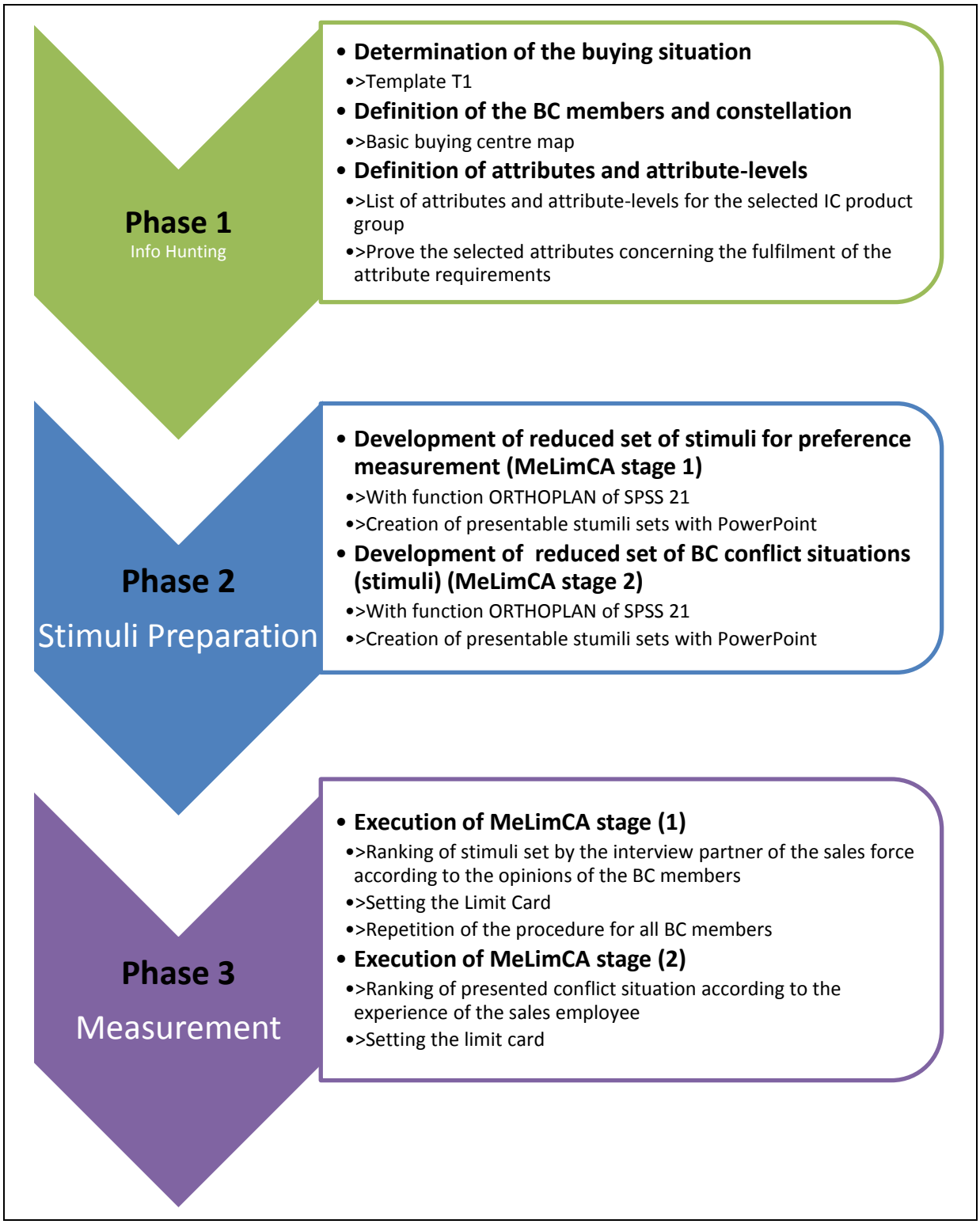


Figure 58: Concept of data generation for BC analysis in IC department

The first phase is a classical expert interview in order to collect information concerning the three topics. At first the buying situation, for which the BC should be analysed has to be described. This proposal is supported by the statements of chapter 2.3.4.2, where it was explained, that the validity of an analysed group preference is only given for the underlying buying situation. Thus, it is proposed to characterise the purchasing situation with the help of template T2 (see Figure 51). The second topic of the interview is a detailed discussion about

the actual BC in order to determine the BC members and the BC constellation. Thus, the development of a BBCM (see Figure 52) is proposed as another task of the interview. Third, the determination of the attributes and attribute-levels of the selected product group, is the last topic of the interview. With the help of test subject's knowledge and possible benchmarking data of the product group, the attributes and attribute-levels have to be determined in respect to the requirements of point 1 in chapter 2.3.4.3.3.

Next, based on the information gathered in phase one, phase two can be started. Following Brinkmann (2006), in order to prepare the preference measurement of the MeLimCA, the attributes and attribute-levels[77] have to be transformed into a reduced design[78] (p.155). For this task, the function ORTHOPLAN of SPSS, which creates a reduced design based on the Adelmanns plan[79], should be used. Furthermore, in order to prepare the influence measurement of the second stage of MeLimCA (see Figure 15), a second reduced design has to be created. According to the ideas of chapter 2.3.4.3.4, the reduced design of the conflict situations can also be developed with the same approach. Finally, the developed sets of stimuli for the preference and the influence measurement have to be transferred in a way they can be presented to the interview partners. Therefore, in the last step of this stage, it is proposed to import the developed set of stimuli of SPSS into a PowerPoint presentation. This enables, that the measurement in the third phase, does not require the active participation of an interviewer, rather the PowerPoint presentation can be mailed and the test subjects can perform the measurement on their own.

In the third phase, the real measurement of the preference and influence information has to be executed. Therefore, at the beginning of each PowerPoint, an introduction describes the tasks of the test subjects. This explanation has to include for which BC members the ranking should be done, how the ranking should be done and finally how the *'limit card'* can be set (see point (4) of chapter 2.3.4.3.3). An example of such an instruction will be presented in chapter 3.4.2.3. Finally, the interview partner should be able to fulfil the ranking of the presented stimuli. With the output of the measurement, which is a ranking of the presented sets of stimuli of both MeLimCA stages, the data can now be used for the conjoint analytical estimation algorithm.

3.3.4 Evaluation of data

In a next step, the ranked sets of stimuli have to be evaluated. Following the proposals of Backhaus et al. (2006), this can be done with the help of procedure CONJOINT of SPSS (p. 605)(p. 605). As the procedure CONJOINT in SPSS has no graphical interface, a short code, containing all information required for the application, has to be written manually. Therefore, the syntax of the code will be presented in form of the application example in appendix A5. According to IBM Corporation (2011), the output of the procedure CONJOINT are part-worth utilities for each attribute-level. Similar to a regression coefficient, these part-worth utilities provide a quantitative measurement for the preference of the attribute-levels. As the part-

[77] See statements .of chapter 2.3.4.3.1.
[78] See statements of point 2 in chapter 2.3.4.3.3.
[79] See statements of chapter 2.3.4.3.3.

worth utilities of different attributes use the same scale, they can be simply added in order to compose the overall utility value (overall preference) of any multi-attributive object. Furthermore, a high part-worth utility represents a high preference (p. 3)(p. 3). According to Backhaus et al. (2006) the overall utility of a product can be calculated with the formula shown in Table 16 (pp. 509-591)(pp. 509-591).

$U_{kn} = \mu_n + \beta_{Am} + \beta_{Bm} + \beta_{Cm} \ldots + \beta_{nm}$
With:
U_{kn} = Overall utility value of stimulus k for test subject n
μ_n = Constant value of the utility estimation[80]
β_{nm} = Part-worth utility for attribute-level m of attribute n

Table 16: Calculation of the overall utility value for a selected stimulus on individual level

Besides, of the part-worth utilities, the procedure CONJOINT also calculates the relative importance of the single attributes and provides statistical information about the quality of the estimated part-worth utilities (see appendix A9).

Following the concept of chapter 3.3.3, the procedure CONJOINT has to be applied two times. At first, the procedure has to be used to estimate the part-worth utilities of the attribute-levels as well as the relative importance of the attributes on an individual level (MeLimCA stage 1). With other words the output of the procedure CONJOINT are preference data of the attribute-levels for each BC member. Second, the procedure CONJOINT has to be used to evaluate the *'relative influence'* of the single BC members (MeLimCA stage 2). Although also in this stage the part-worth utilities are estimated, only the *'relative influence'* of the attributes (which are in this stage the single BC members) are used for further calculation of the *'group-related utility value'* (see also statements of chapter 2.3.4.3.4).

3.3.5 Calculation of the group-related utility value of concrete products

Following the MeLimCA method, the data of chapter 3.3.4 can now be used to calculate the '*group-related utility value'* for specific products (see Figure 15). Based on these values the products can then be compared and the *'group preference'* of the selected BC can be derived[81].

Therefore, in the first step, the competing products have to be described with the help of selected attribute-levels. Next, the *'overall utility values'* of the concrete products have to be calculated on individual level (for each BC member) by simply adding the connected part-worth utilities of the selected attributes levels (see the preference structure model of chapter 2.3.4.3.1.). In addition, the position of the *'limit card'* has to be considered. Therefore, the procedure of the LCA offers a transformation function for the *'overall utility value on individual level'* in order to calculate the *'transformed overall utility value on individual level'* (see

[80] The constant value μ_n is calculated by the execution of the procedure CONJOINT of SPSS and can be interpreted as the basic utility, from which the other attribute levels differ in a positive or negative way (Backhaus et al., 2006, p. 591).For further information about the utility estimation see appendix A9.

[81] The term *'group-preference'*, as it was also used in chapter 2.3.4, can be understood as the ranking of different buying alternatives based on their *'group-related utility value'.*

Equation 2). Finally, the *'group-related utility value'* can be calculated by using the *'downward integration model'* (see Equation 4). Following this model, the *'transformed overall utility values on individual level'* of the products are weighted by the *'relative influence'* of the BC members (output of second procedure CONJOINT) and summed up to the *'group-related utility value'*. The repetition of this procedure for each competing product produces several quantitative values, which can be compared in order to show the preference of the BC concerning the selected products. In addition, following the first-choice-rule (see chapter 2.3.4.3.4), a prognosis of the buying decision of the BC can be derived.

3.4 Application of the Buying Centre Analysis Concept

With the aim to apply Brinkmann's approach for the BC analysis in IC department, specific people of the sales personnel have been interviewed. Based on the gathered information, the tasks as described in chapter 3.3.1 have been accomplished. Due to the limited time horizon of this thesis, it was only possible to accomplish the BC analysis for one customer concerning one product group of IC business. However, as the idea is to show the application of the analysis concept for IC products, the execution of one BC analysis is seen as adequate. The following sections will present the application of the concept which has been described in chapter 3.3.

3.4.1 Selection of target buying centre and the interview partners

Following the proposal of the BC analysis concept, (see chapter 3.3.2) the target BC and target product group as well as a suitable interview partner had to be found in the first step. In respect of the framework of this thesis and the newness of the BC analysis for the IC department, some additional requirements concerning the interview partner have been formulated.

- To simplify the communication to the interview partner, the interview partner had to be located in AVL headquarter Graz.
- The interview partner needs to find enough time in his/her busy schedule for the interview of stage one (expected time one hour) and the ranking procedure of stage three (expected time of one hour)
- The interview partner has to have the willingness to share detailed personal experience concerning existing customer relationships

Furthermore, as no specification concerning the target customer and the target product group was requested by IC department, the BC analysis in the framework of the thesis was oriented in a first step on the determination of a potential interview partner. Depending on the interview partner, the target customer and the target product group was determined in a second step. Considering the requirements described in chapter 3.3.2, the selection of the interview partners have been done in consultation with employees of ITS department. Especially Mr Georg Steiner, who is Regional Business Manager in AVL Graz supported the search for potential interview partners. However, one problem occurred in the discussion – the limited availability of IC sales personnel at the AVL headquarter Graz. Because of the

organisational structure of AVL, international customers are mainly managed by the regional affiliates (see Figure 3). As the majority of IC customers are located abroad, also the majority of people with experience in selling IC products, are not stationed in Graz. Therefore, the list of potential interview partners was short. However, three people have been identified as potential interview partners (see Table 17).

Name	Position	Responsibility for Customer
[redacted]	Sales Manager	[redacted]
[redacted]	Sales Manager	[redacted]
[redacted]	Department Manger ITS/ICD	[redacted]

Table 17: Potential interview partners for MeLimCA

With the aim to encourage the listed employees to participate in the expert interview, a short information email was sent to the chosen people. The email included information about the topic, the procedural method and the time horizon of the interview concept. Finally, Nicolas [redacted] was chosen as the person best fulfilling the requirements of the analysis. Although he is not a KAM, his longstanding customer experience and high expertise in personal sales of the [redacted], qualified him as the best interview partner, for this research. Finally, in consultation with Mr [redacted], the IC customer [redacted] was determined as suitable analysis target.

3.4.2 Application of data generation concept

After the selection of the interview partner, the target BC and the target product group, the data generation for the BC analysis could be started. Following the concept of BC analysis, the next three chapters will describe the execution of the three phases of data generation and present the results of the single steps.

3.4.2.1 Phase 1

In the first phase, Mr [redacted] was invited to an interview in order to provide the desired information (see Interview 3 in appendix A12). At first, the buying situation was determined and documented with the help of template T2 (as the BC constellation is already known by [redacted], point 4 of T2 was skipped at this point). In Figure 59, the characterised buying situation as well as other general customer information can be seen. As some of the data are confidential market data, they will not be displayed in this thesis.

Template T2	IC Sales Documentation	BC Name: [redacted]

Purchasing Situation for BC Analysis

1. Personal Information

Name:	[redacted]	Date:	21.5.2013
Position:	Department Manager [redacted]	Affiliate:	HQ Graz

2. General Customer Information

Customer Name:	[redacted]	Customer Status:	Existing AVL Customer
Contact Person; Initiator of first Meeting:	SC		
# Test beds:	SC	# AVL Test beds:	SC
# Calibration Engineers:	SC		
Calibration Target:	SC		
Actual Calibration Software Product Portfolio:	SC		

3. Expected Buying Situation

a. Buy class:	New Task	c. Product Type:	[redacted]
b. Purchase Importance:	Moderate	d. Purchase Volume:	SC

Legend:	
SC	Strictly confidential
#	The rhombus symbol represents the term amount
3.a.	See chapter 2.3.3.2 and choose between **New Task /Modified Rebuy/ Straight Rebuy**
3.b.	Importance of purchase situation for customers business success: **Low/Moderate/High**
3.c.	Type and Name of IC product(s)
3.d	Amount of estimated purchase volume: # of licenses.

Figure 59: Characterisation of buying situation for BC analysis of [redacted]

In a next step, the investigation of the BC of the selected customers was another subject matter of the first interview with the sales expert. The aim was to identify the members of the BC as well as the roles (see chapter 2.3.3.1) these people represent.
With the use of the BBCM, the BC constellation was documented as shown in Figure 60.

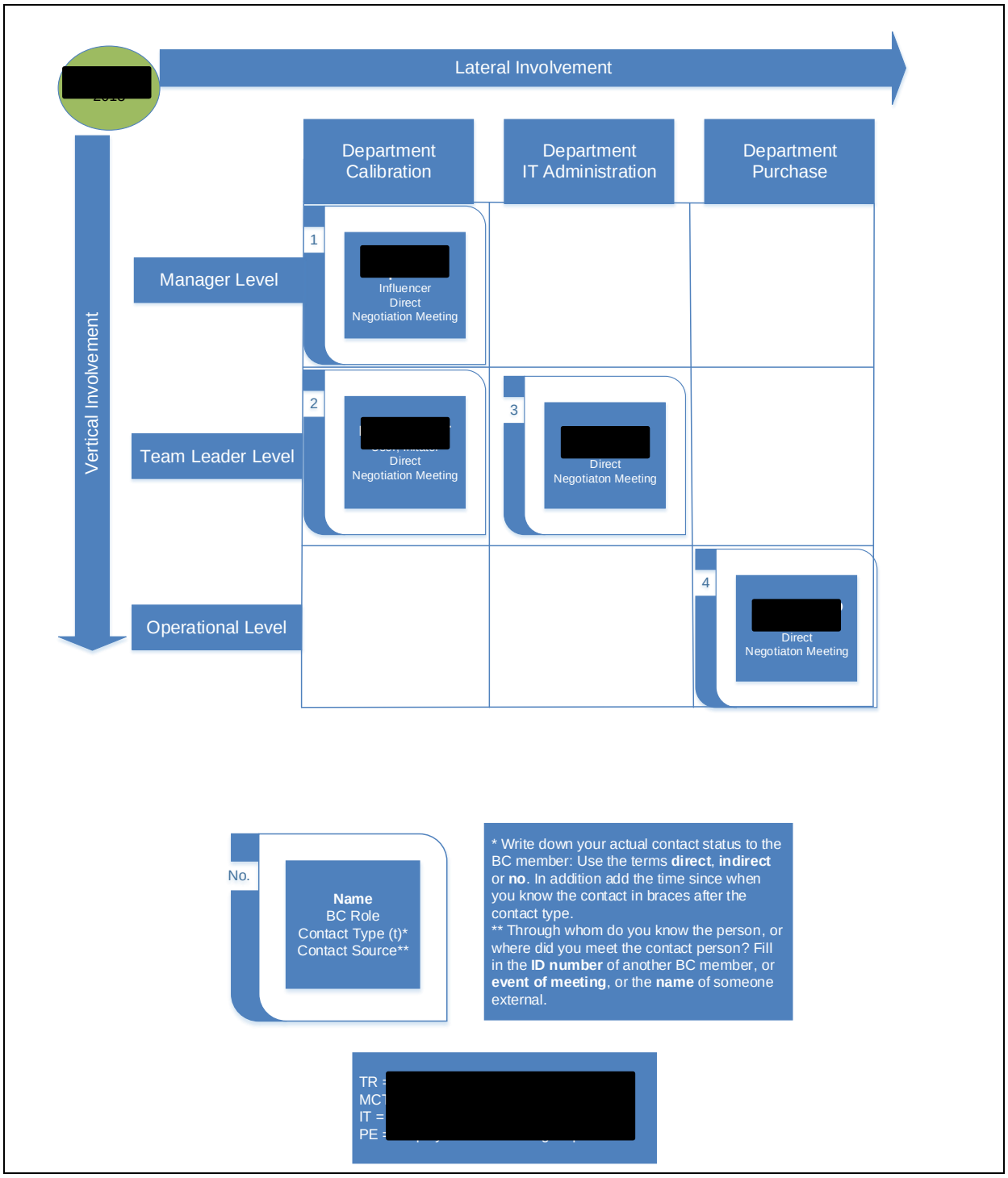


Figure 60: Buying centre constellation of [redacted]

Because of confidential issues, the documentation waives to present the names of the BC members and thus only the job position is used to describe the BC members. As for the further procedure especially the names (in our case the job description) and the amount of BC members are important, the usage of the SBCM was waived at this point.

After the description of the purchasing situation and the BC constellation, the last task of the interview concentrated on the development of product attributes and attribute-levels for the product group [redacted]. Considering the framework for the choice of attributes (see point 1 of

chapter 2.3.4.3.3) six attributes (with three attribute-levels each) could be determined for the product group [redacted] (see Table 18).

Nr.	Attribute	Attribute-levels
1	Data consistency	• Reporting • Monitoring • Notifying
2	Customisation (Time from idea - to implementation)	• 1 Month • 3 Month • 5 Month
3	Availability of data	• World-wide • Company-wide • Department-wide
4	Maintenance effort (internal + external service costs)	• Reference Value -20% • Reference Value • Reference Value +20%
5	Usability	• Easy • Moderate • Demanding
6	ROI (time until the savings, due to efficiency increase, amortise the costs)	• 13,5 Month • 18 Month • 22,5 Month

Table 18: Attributes and attribute-levels for the product group [redacted]

- The attribute *'data consistency'* refers to the implemented features, which ensure the consistency and the completeness of the calibration data. Therefore, the features reporting, monitoring and notifying can be implemented. Reporting describes a function, which automatically creates reports of the calibration data status, when the user starts this function. The user has to use this function proactively in order to ensure the log of data change. Monitoring means that the status change of data is automatically reported and logged. To display the data change the user must still use the report function and display the changes. Finally, notification means that when entering a calibration project, a notification of the status and of the data change is automatically send to the user.
- The term customisation describes the time, which is needed to implement an idea, need or wish of the customer in the existing system. Therefore, the three timespans one, three and five months were selected.
- The third attribute is connected with the availability of the data meaning in which area people can cooperate in the similar project using the same calibration data. Therefore the three possibilities where seen as representative attribute-levels: *'World-wide'* means that the calibration data management system is a web based platform and can

be used by employees from all over the world via an internet access. *'Company-wide'* means that you have to be logged in the company network in order to be able to access the calibration data. Finally, *'Department-wide'* means that the calibration database can only be accessed by people, who belong to the same department.

- The maintenance effort is described with the help of internal and external service costs. Internal service costs are calculated by the multiplication of cost per man-week and needed man-weeks for internal service issues. The external service cost estimated with a fixed value per licence. Finally, we get a value for the overall service cost per licence. In our case a reference value for the service cost was fixed and because of data confidentially issues the real value will not be displayed in this work. By adding and subtracting 20% of the reference value the other two attribute-levels were determined.
- As the usability in general is difficult to measure, the attribute-levels *'easy'*, *'moderate'* and *'difficult'* are vague definitions. However, as the usability is one of the most important attributes of software products it cannot be ignored. To get an imagination of the meaning of the three values, we allocated a certain timespan, which a new user needs in order to manage the data of a standard calibration task, to each of the three terms. Also here, the exact value is kept in secret because of confidential issues but as the expert interview partner has a concrete value for each term in mind, it is seen as sufficient to use the simplified terms.
- Finally, the last attribute, which could be identified was named ROI[82]. In this case term ROI cannot be interpreted in a classical way and has to be understood as follows: The term ROI describes the timespan, which is needed until the savings, which are cause by the efficiency increase of the new product, overshoot the product costs. The three timespans, 13,5 month, 18 month and 22,5 month were selected.

3.4.2.2 Phase 2

In phase 1, six attributes with three attribute-levels each, were determined for the product category [redacted]. With the help of the procedure ORTHOPLAN[83], a reduced set of stimuli[84] could be developed in a systematic way. The result was eighteen different stimulus, which are listed in Table 19. In a second step, the same approach was used for the second stage of the MeLimCA, the indirect influence measurement of the individual BC members (See the statements of Chapter 2.3.4.3.4). The results for the customer [redacted] are displayed in Table 20.

[82] "ROI is represented as a ratio of the expected financial gains (benefits) of a project divided by its total costs. As a formula it appears as: ROI = (net benefits/total cost). In the equation above, net benefits equals total benefits minus total cost. It is the incremental financial gain (or loss)" (Applied Geographics, Inc., 2013, p. 1).
[83] See statements of chapter 2.3.4.3.3.
[84] See chapter 2.3.4.3.3 for more information about the design of the reduced set of stimuli.

Stimuli-ID	Data Consistency	Customisation	Availability of Data	Maintenance Effort	Usability	Return on Investment
1	Monitoring	3 Month	World-wide	Reference Value +20%	Moderate	22,5 Month
2	Reporting	5 Month	Department-wide	Reference Value +20%	Moderate	13,5 Month
3	Notifying	1 Month	World-wide	Reference Value +20%	Demanding	22,5 Month
4	Notifying	1 Month	Department-wide	Reference Value +20%	Easy	13,5 Month
5	Monitoring	1 Month	Company-wide	Reference Value -20%	Demanding	13,5 Month
6	Reporting	3 Month	World-wide	Reference Value -20%	Demanding	13,5 Month
7	Reporting	1 Month	Company-wide	Reference Value	Moderate	22,5 Month
8	Monitoring	1 Month	Department-wide	Reference Value -20%	Moderate	18 Month
9	Reporting	3 Month	Department-wide	Reference Value -20%	Easy	22,5 Month
10	Notifying	5 Month	Company-wide	Reference Value -20%	Easy	22,5 Month
11	Monitoring	5 Month	World-wide	Reference Value	Easy	13,5 Month
12	Monitoring	3 Month	Company-wide	Reference Value +20%	Easy	18 Month
13	Notifying	3 Month	Department-wide	Reference Value	Demanding	18 Month
14	Notifying	5 Month	World-wide	Reference Value -20%	Moderate	18 Month
15	Reporting	1 Month	World-wide	Reference Value	Easy	18 Month
16	Notifying	3 Month	Company-wide	Reference Value	Moderate	13,5 Month
17	Reporting	5 Month	Company-wide	Reference Value +20%	Demanding	18 Month
18	Monitoring	5 Month	Department-wide	Reference Value	Demanding	22,5 Month

Table 19: Reduced set of stimuli for individual preference measurement

Stimulus-ID				
1	Contra	Possible	Contra	Pro
2	Contra	Contra	Pro	Possible
3	Possible	Pro	Contra	Possible
4	Possible	Contra	Possible	Pro
5	Possible	Possible	Pro	Contra
6	Pro	Contra	Contra	Contra
7	Pro	Pro	Pro	Pro
8	Contra	Pro	Possible	Contra
9	Pro	Possible	Possible	Possible

Table 20: Reduced set of stimuli for influence measurement

As already mentioned, the presentation of the stimuli to the test subjects was done with the help of the program PowerPoint. Therefore, the stimuli were imported into PowerPoint and for each stimulus, a separate slide was developed (see Figure 61). On the top of each slide, the job position of the BC member was displayed in order to make it clear for what participant of the BC, the preference rating should be carried out. At the end of each stimulus, a space for the ranking value was considered so that the test subjects could write down their rated rank at a standardised spot. In addition, the order of the product attributes was randomised from card to card to minimise the position effect (see chapter 2.3.4.3.3). Furthermore, the *'limit card'* was designed and added at the beginning of each PowerPoint presentation. Finally, the completion of five different PowerPoint presentations (four preference measurements and one influence measurement) for the customer [redacted] lead to the final phase of the interview process, the measurement phase.

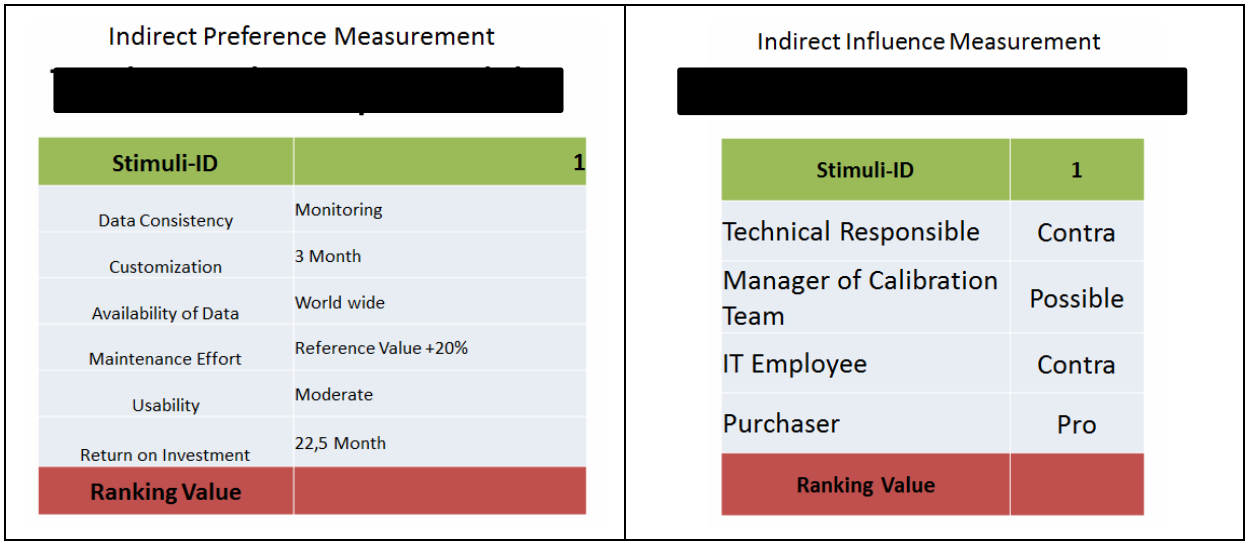


Figure 61: Example of presented stimuli for preference (left) and influence (right) measurement

3.4.2.3 Phase 3

Beginning with instructions about the procedure of the MeLimCA measurement method, at the beginning of each PowerPoint the test subject was pleased to set himself into a concrete sales situation with the customer, which he has chosen in the first interview. Stimulated by the job position (for instance [redacted]) of one BC member, the developed set of stimuli (see Table 18) was presented to the interview partner. Now the instruction for the interview partner was to rank the different purchasing possibilities in the way, the imagined BC member would do it. Therefore, the test subjects should award ranking number from one to eighteen, while the proposal which might be chosen most likely, should be ranked with the value one, those least likely with the number eighteen. In addition, the interviewed person had to set the *'limit card'* after the proposal, which the imagined BC member just might buy. This procedure was repeated for each BC member. The ranking results for all BC members of [redacted] BC is shown in Table 21. The numbers in the ranking columns represent the stimulus ID of Table 19.

	Ranking Result			
	Ranking of TR	**Ranking of IT**	**Ranking of MCT**	**Ranking of PE**
Rank 1	4	6	10	5
Rank 2	11	14	4	6
Rank 3	9	5	14	11
Rank 4	10	10	16	16
Rank 5	12	15	13	8
Rank 6	8	11	8	14
Rank 7	15	16	11	15
Rank 8	16	7	3	13
Rank 9	7	1	12	9
Rank 10	1	3	5	10
Rank 11	3	12	9*	2
Rank 12	5	17	17*	4
Rank 13	14*	9	18*	12
Rank 14	17*	8	15*	17
Rank 15	2*	13*	7*	7
Rank 16	6*	18*	6*	18
Rank 17	13*	4*	1*	3*
Rank 18	18*	2*	2*	1*

Legend:	
*	The test subjects would not buy this stimuli
TR	[redacted]
IT	[redacted]
MCT	[redacted]
PE	[redacted]
	Position of the *'limit card'*

Table 21: Ranking result of preference measurement

The second part of phase three, which aimed to measure the influence relationship between the BC members in an indirect way, was executed with the same proceeding as the first one. The developed conflict situations of the BC (see Table 20) were, presented on single cards to the sales expert (see right side of Figure 61) and should be ranked from most to least likely, that a proposal will be chosen from the BC, considering the described conflict situations. Finally, the ranking with values from one to nine (most likely=1, least likely=9) and the setting of the *'limit card'* completed phase 3. The result of the influence measurement is shown in Table 22. The stimulus ID refers to Table 20.

Ranking Result	
	Stimulus ID
Rank 1	7
Rank 2	9
Rank 3	3
Rank 4	5
Rank 5	4
Rank 6	8
Rank 7	1
Rank 8	2
Rank 9	6

Table 22: Ranking result of influence measurement

3.4.3 Evaluation of data

Following the concept of chapter 3.3, the next task represented the estimation of the part-worth utilities for the single attribute-levels, as well as the relative importance of the attributes for both stages of MeLimCA. Therefore, two procedures CONJOINT were written in SPSS 21 (The detailed code of procedure CONJOINT for MeLimCA stage 1, as well as the definition of the commands is presented in appendix A5). The first procedure CONJOINT calculated the part-worth utilities of the single attribute-levels of the product group [redacted] for the single BC members on individual level. The whole data set is presented in appendix A3. In order to give an example, Figure 62 illustrates the part-worth utilities of the single attribute-levels based on the ranking of the BC member, [redacted]

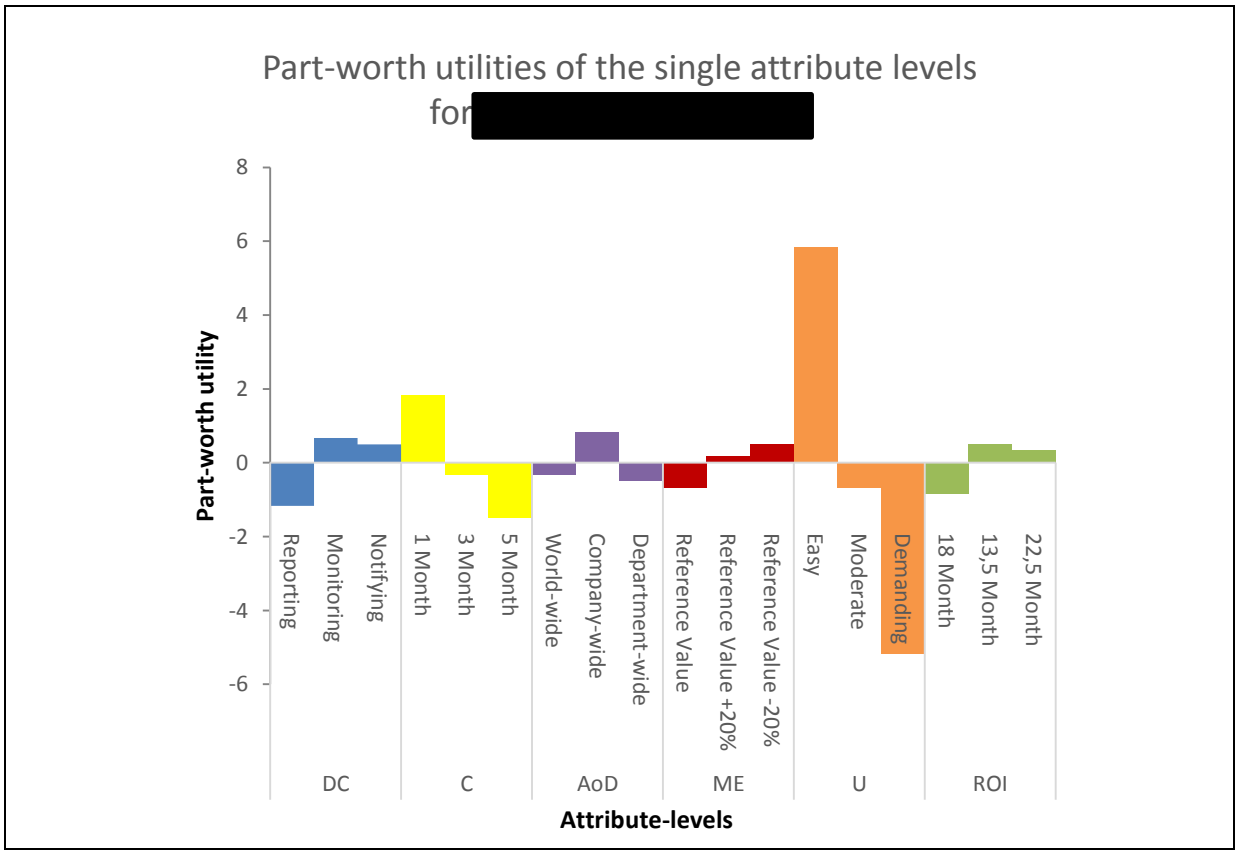


Figure 62: Estimated part-worth utilities of the single attribute-levels for [redacted]

In addition, the procedure CONJOINT also calculated the relative importance of the single attributes. As described in chapter 2.3.4.3.3, the relative importance of an attribute can be interpreted as power of the attribute to change the overall preference imagination of a test subject concerning a multi-attributive object. With other words, the change of an attribute-level of an attribute with low relative importance will have a low influence on the change of the overall utility of the product. Although, the information about the relative importance in MeLimCA stage 1 is not important for the further calculation of the *'group-related utility value'*, it is a good possibility to show which attributes are more or less important for the single BC members. Therefore, Figure 63 shows a summary of the relative importance of the single product attributes for the different BC members.

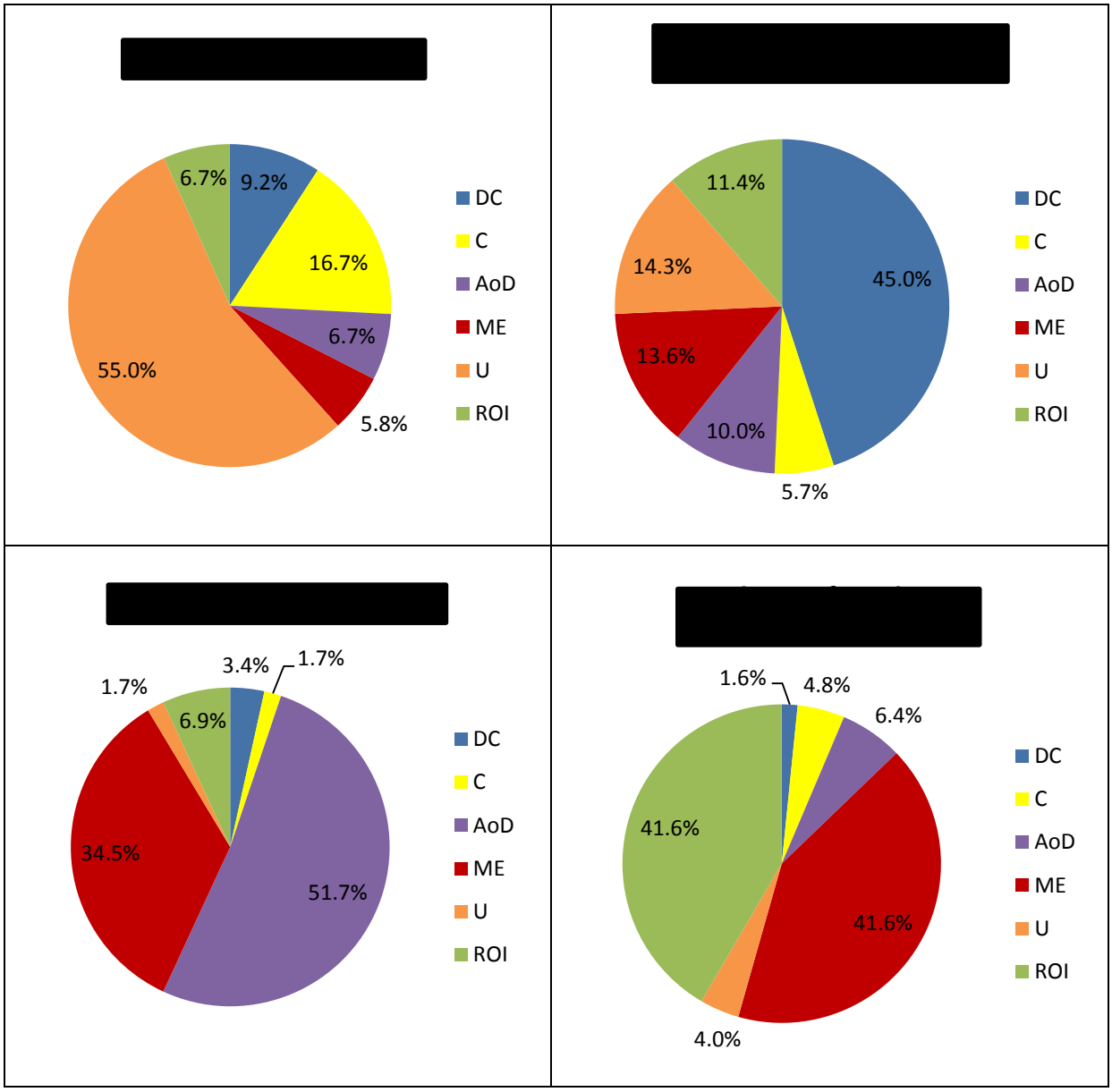


Figure 63: Relative importance of product attributes

As Figure 63 illustrates, the different product attributes are of different importance for the different BC members. For example, it can be seen that the usability is the most important product attribute for the BC member [redacted], which means that his overall utility feeling of a products is to 55% influence by the attribute-level of the attribute usability.

In contrary, [redacted] rate the attribute usability with an ignorable small value. All in all, these information about the product attribute importance can be used by the sales employees in order to concentrate the individual sales dialogue with the BC members on the most important product attributes.
Moving to the second procedure CONJOINT, which aims to estimate the influence power of the single BC members, Figure 64 illustrates the relative importance of the attributes, which are in this case the BC members. It can be seen that the [redacted] has the most power, or with other words, the most influence on the buying decision. The group buying decision is to 36.4% influenced by the preference ideas of the [redacted] This is followed by the [redacted], who contributes with 27.3% to the formation of the group preference. Finally, the [redacted] have the lowest influence on the buying decision, each with 18.2%. Further on, the relative influence will be also named weighting factor (w_i =weighting factor for BC member i).

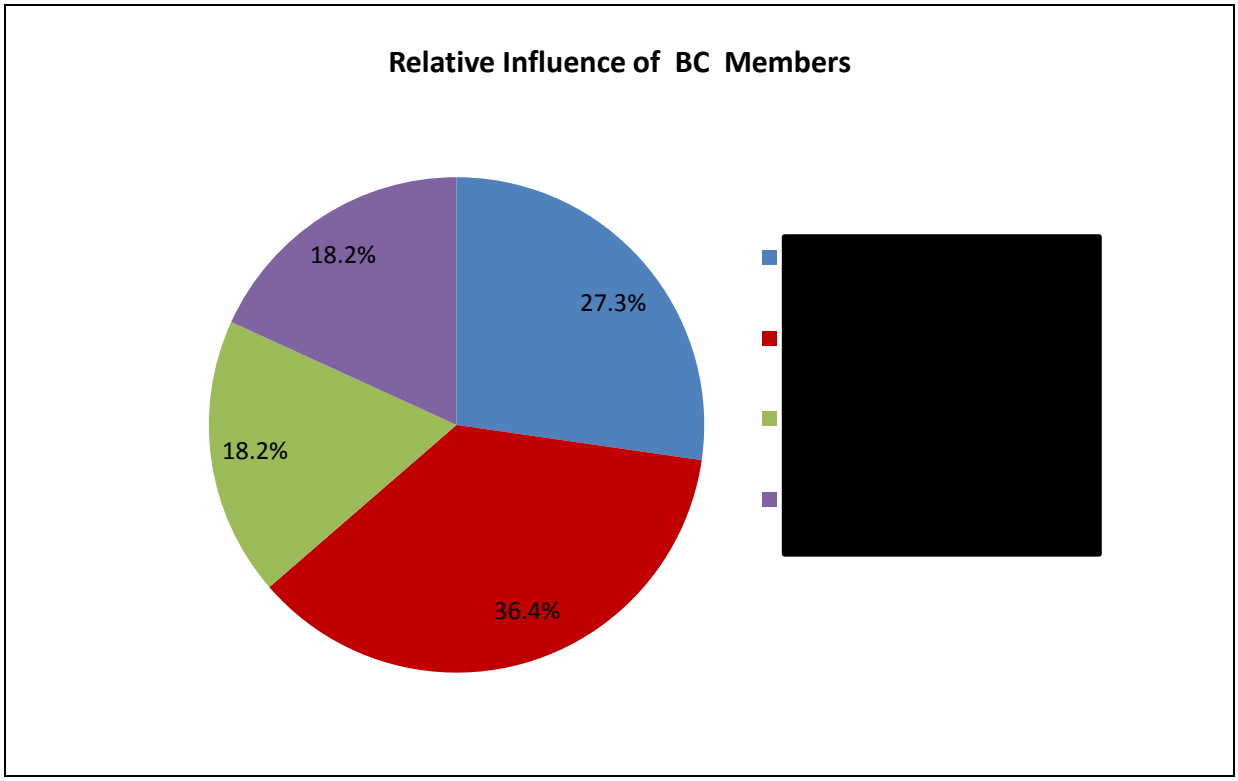


Figure 64: Relative influence of BC members

Finally the data of the first and the second procedure CONJOINT of SPSS can now be used for the calculation of the *'group-related utility value'* for concrete products of the product group [redacted].

3.4.4 Calculation of the group-related utility value

Following the concept of the BC analysis, the *'group-related utility values'* (the group is in our case the BC of the customer [redacted]) of competing products can now be calculated. Therefore, at first, the selected products are described by using the attribute-levels,

determined in chapter 3.4.2.1. Table 23 shows the selected products and its connected attribute-levels.

Attributes	[redacted]	**Competitor**	**In-house**
Data consistency	Notifying	Monitoring	Monitoring
Customisation	3 Month	5 Month	1 Month
Availability of data	World-wide	Company-wide	Department-wide
Maintenance effort	Reference Value -20%	Reference Value +20%	Reference Value +20%
Usability	Easy	Demanding	Moderate
ROI	18 Month	18 Month	13,5 Month

Table 23: Selected products of [redacted] product group and their attribute-levels

In a next step, the *'overall utility values'* of the products have to be calculated on individual level (for each BC member) by simply adding-up the estimated part-worth utilities of the attribute-levels. In addition, in consideration of the LCA procedure, the *'overall utility values'* of the products have to be transformed into the *'transformed overall utility values'* based on the position of the *'limit card'*. Therefore, Equation 2 and the information of Table 21 was used. Table 24 shows an example of the calculation of the *'transformed overall utility value'* for the BC [redacted].

Calculation of transformed overall utility values for BC member [redacted]			
Attributes	**Part-worth utilities of attribute-levels for product:**		
	[redacted]	**Competitor**	**In-house**
Data consistency	0.500	0.667	0.667
Customisation	-0.333	-1.500	1.833
Availability of data	-0.333	0.833	-0.500
Maintenance effort	0.500	0.167	0.167
Usability	5.833	-5.167	-0.667
ROI	-0.833	-0.833	0.500
Constant Value (μ_n)	**9.5**		
Overall utility value (U_{kn})	**14.833**	**3.677**	**11.500**
Limit Card Consideration (after Rank 12)	*Limit Card* Position: after rank 12		
Transformed overall utility value (U_{kn}^{L})	**8.333**	**-2.833**	**5.000**

Table 24: Calculation of the transformed overall utility value on individual basis

The calculation of the *'transformed overall utility values'* for the other BC members can be seen in appendix A10.

Finally, the *'group-related utility value'* for the selected product is calculated by using the *'downward integration'* model of MeLimCA (see Equation 4). The *'transformed overall utility values'* of the individual BC members are weighted by their *'relative influence'* (see Figure 64) of the BC members and summed up. In Table 25, the *'transformed overall utility values'* of the single BC members as well as the weighting factors of the single BC members are listed.

BC Members	[redacted]	**Competitor**	**In-house**
Transformed overall utility value of **TR**	8.33	-2.83	5.00
Weighting factor **TR**	0.273		
Transformed overall utility value' of **MCT**	9.67	0.33	-1.67
Weighting factor MCT	0.364		
Transformed overall utility value of **IT**	12.67	2.83	-4.00
Weighting factor **IT**	0.182		
Transformed overall utility value of **PE**	14.33	3.50	6.50
Weighting factor **PE**	0.182		

Table 25: Input data for the calculation of the group-related utility values for the competing products

Finally, with the summarised results displayed in Table 25, the *'group-related overall utility value'* was calculated with the formula explained in Table 26. Table 27 summarises the calculated values for the selected competing products of the product group [redacted].

General Equation (adapted from chapter 2.3.4.3.4):

$$U_c = \sum_{i=1}^{I} U_{kn}^{L} \cdot w_i$$

With:

U_c = group-related utility value for product c

U_{kn}^{L} = transformed overall utility value for product c of BC member i

w_i = weighting factor of BC member i

I = amount of BC members

Example of the calculation for the product [redacted]:

-8.33*0.273 + 9.67*0.364 + 12.67*0.182 + 14.33*0.182 = 10.70

Table 26: General equation and example of the calculation of the group-related utility value

	Competing products of product group [redacted]		
	[redacted]	Competitor	In-house
Group-related utility value	10.70	0.50	1.21

Table 27: Resulting group-related utility values for the competing products

The simulation of the buying decision or group preference can now be derived with the help of the first-choice-rule. As the *'group-related utility value'* of the product [redacted] shows the highest positive value, it can be expected that the BC of [redacted] will decide to buy the product [redacted], in respect of the underlying buying situation.

3.4.5 Discussion about the application of BC analysis concept

All in all, although the application of the BC analysis concept did not hit on major problems, the application of the BC analysis for all products of IC department has to be challenged. As the analysed product group represented the least complex product group of IC department, and the product is described with six attributes (with three possible attribute-levels each), the reduced test design nearly hits the size limit of possible evaluable stimuli. As a higher number of attributes (and attribute-levels) results in a test size, which is not measureable by the test subject any more, it has to be checked if the other IC products can be described with maximum six attributes in a sufficient way.

Furthermore, besides of the *'group-related utility values'*, the analysis provides additional useful information about the customer. Assuming that the different product attributes can be interpreted as *'decision criteria'* (see chapter 2.3.2), on basis which the customer makes his choice, their importance for the single BC members can be derived (see Figure 63). Thus, the sales people can use this information to concentrate the sales dialogue with a specific BC member, on his/her most important *'decision criteria'*. The importance of the 'decision criteria' can also be calculated on group level. Therefore, the *'relative importance'* of the attributes on individual level is simply weighted by the *'influence power'* of the single BC members and adding up the resulting values. The result in the relative attribute importance on group level – in our case on level of the BC centre (see appendix A11).

Moving to the quality of the data, the following has to be stated. Although the measurement was only done by one sales representative, and therefore the validity about the data has to be challenged, the adherence of the procedural method proposed and proved by Brinkmann should provide data with sufficient quality. Furthermore, the standard error gives information about the quality of evaluated regression models. Moreover, another argument can be found for the correctness of the data. The predicted buying decision of the BC with the help of the MeLimCA method, fits best to the real behaviour of the BC. With other words, the BC really behave as it was predicted. In order to underline the validity of the data, the following chapter will summarise a discussion about the results with the sales expert [redacted] and will compare the results of the analysis with his personal experience concerning the selected BC.

3.4.6 Validity of the results

In the framework of a final expert interview, the results of MeLimCA were discussed with [redacted] (see appendix A12). Beginning with the question about the correctness of the *'group related utility values'*, [redacted] stated that the results for the three competing products represent absolutely the real situation. Furthermore, the following customer story from [redacted] underlines the validity of the prognosis of the buying decision.

> *In the past, the customer [redacted] worked with an in-house software tool. After a little while, the performance of the tool was rated as insufficient and therefore the BC started to look for alternative software solution. Next, the customer hit on a competitor's product, evaluated the product and rated it as worth buying. Finally, the search for an alternative product ended with the product [redacted], which was bought by the BC.*

The behaviour of the customer, which is described in this short episode, can be also seen in the results of the MeLimCA. The insufficient in-house solution and the non-buying intention for the product of the Competitor is represented by the low utility values 0.5 and 1.21 (see Table 27). In addition, the utility value 10.7, which was the highest result of the evaluation, reflects the final buying decision.

Moving to the intermediate results of the MeLimCA stage 1 and 2, also here [redacted] observed a high conformity between the calculated values and the real situation. Especially the relative importance of the product attributes on individual level are rated as extremely representative. Regarding the part-worth utilities of the single attribute-levels, he noticed a few deviations from the real situation and explained them with wrong estimations he made during the ranking process.

Moreover, the results of stage 2 are also rated by [redacted] as very representative for the real power deviation in the BC. Also in this point, [redacted] presented a short customer story to underlines the quality of the results.

> *The [redacted] was the main driver who pushed the search for a new software solution forward. He found the product [redacted], felt confident with it and promoted it at the [redacted] Although the [redacted] had no detailed idea of the technical product attributes, he trusted his engineer and promoted it at a higher management level in order to get the budget for it. Finally, with the approval of the [redacted], the manager succeeded to convince the board and got the budget.*

Following this story, it can be derived that the Technical Responsible and the Manager of the Calibration Team have absolutely the most power in the BC and are therefore the main driving forces in the decision process. This situation can also be observed in the in the results of MeLimCA stage 2 (see Figure 64). Furthermore, [redacted] stated that in a direct rating he would estimate that 70% of the buying decision is caused by the preferences of the BC members, [redacted]. As his direct estimation is nearly similar to the calculated values, also in this point, high data validity can be assumed. Finally, [redacted] summarised that he was surprised that the results reflect the real situation at the customer in such a realistic way. As he had some concerns about the correctness of his ranking, he quoted that the number stimuli, which had to be ranked in the

measurement phase, was on the upper limit for a realistic estimation. He agreed with the proposal of theory, that 20 is the maximal amount of possible stimuli, which can be rated in a realistic way. Finally, driven by the good quality of the calculated data and the relative small effort of the whole analysis process, the concept gets a good reputation by [redacted] and the further application of the concept is desired.

3.4.7 Alternative data evaluation with AVL CAMEO^{TM}

During the application of the BC analysis concept, the idea to use AVL CAMEO^{TM} as alternative software solution for the evaluation of the measured BC data arose. Driven by the idea, that CAMEO Offline also uses a regression analysis to model the behaviour of different parameter values, based on a systematically designed test, the possible application of CAEMO Offline as evaluation tool for the CONJOINT analysis will be examined. Due to the limit time horizon, only the evaluation of the MeLimCA stage one will be shown.
Following the workflow of CAMEO Offline, at first the test data have to be imported in the program. Therefore, the test design of Phase 2 (see *'plan file'* of SPSS ORTHOPLAN in Figure 69) and the connected measurement results of Phase 3 (Table 21) have to be transformed in a way that CAMEO Offline can use them. In addition, as a high preference of the measurement is connected with a high utility value and a low rank, the ranking values of the preference measurement have to be transformed into concrete utility values (see Table 28). With other words the ranking scale is replaced by a rating scale, where the same distances between the single rating values are assumed[85]. Next, for each BC member the utility values have to be allocated to the each stimulus of the design. The finished input data set for CAMEO can be seen in Table 29. Furthermore, as CAMEO Offline can only read *'ASCII text file'* the data were imported in Excel and stored in this data type.

[85] This procedure is supported by the ideas of Klein (2002), who states that the SPSS CONJOINT transforms the ranking-scale into a rating-scale, in which the rating values are equidistant, in order to use an OLS regression for the estimation of the part-worth utilities (p. 25).

Ranking Result Transformation for CAMEO				
	Ranking of TR	**Ranking of IT**	**Ranking of MCT**	**Ranking of PE**
Rank 1 →Utility Value 18	4	6	10	5
Rank 2 →Utility Value 17	11	14	4	6
Rank 3 →Utility Value 16	9	5	14	11
Rank 4 →Utility Value 15	10	10	16	16
Rank 5 →Utility Value 14	12	15	13	8
Rank 6 →Utility Value 13	8	11	8	14
Rank 7 →Utility Value 12	15	16	11	15
Rank 8 →Utility Value 11	16	7	3	13
Rank 9 →Utility Value 10	7	1	12	9
Rank 10→Utility Value 9	1	3	5	10
Rank 11→Utility Value 8	3	12	9	2
Rank 12→Utility Value 7	5	17	17	4
Rank 13→Utility Value 6	14	9	18	12
Rank 14→Utility Value 5	17	8	15	17
Rank 15→Utility Value 4	2	13	7	7
Rank 16→Utility Value 3	6	18	6	18
Rank 17→Utility Value 2	13	4	1	3
Rank 18→Utility Value 1	18	2	2	1
Legend:				
TR	[redacted]			
IT	[redacted]			
MCT	[redacted]			
PE	[redacted]			

Table 28: Transformation of ranking measurement into concrete utility values

Formulated in words, Table 28 shows for example that the stimulus represented with the ID 16 was rated by the [redacted] on rank 8 and therefore the utility value 11 is assigned, by the [redacted] on rank 7 and therefore the utility value 12 is assigned, etc. .In a next step, all 18 stimuli are listed with ascending stimulus ID and with the connected utility value rated by the BC members (see Table 29).

	Test Design exported from 'plan file' of SPSS ORTHOPLAN (attributes with their attribute-levels)						Concrete Utility Values for each BC member			
Stimuli ID	**DC**	**C**	**AoD**	**ME**	**U**	**ROI**	**TR**	**IT**	**MCT**	**PE**
1	2	2	1	2	2	3	9	10	2	1
2	1	3	3	2	2	2	4	1	1	8
3	3	1	1	2	3	3	8	9	11	2
4	3	1	3	2	1	2	18	2	17	7
5	2	1	2	3	3	2	7	16	9	18
6	1	2	1	3	3	2	3	18	3	17
7	1	1	2	1	2	3	10	11	4	4
8	2	1	3	3	2	1	13	5	13	14
9	1	2	3	3	1	3	16	6	8	10
10	3	3	2	3	1	3	15	15	18	9
11	2	3	1	1	1	2	17	13	12	16
12	2	2	2	2	1	1	14	8	10	6
13	3	2	3	1	3	1	2	4	14	11
14	3	3	1	3	2	1	6	17	16	13
15	1	1	1	1	1	1	12	14	5	12
16	3	2	2	1	2	2	11	12	15	15
17	1	3	2	2	3	1	5	7	7	5
18	2	3	3	1	3	3	1	3	6	3

Table 29: Input data for CAMEO Offline

Moreover, the values of the test design, which are shown in Table 29, can be interpreted with the help of Table 30. As describe in appendix A4, SPSS ORTHOPLAN allocates to each attribute-level a concrete number and uses them to create the test design. As CAMEO can only import values in the mask, the test design of SPSS could be directly used.

Attribute	**Value in the test design**	**Attribute-levels**
Data Consistency (DC)	1	Reporting
	2	Monitoring
	3	Notifying
Customisation (C)	1	1 Month
	2	3 Month
	3	5 Month
Availability of Data (AoD)	1	World-wide
	2	Company-wide
	3	Department-wide
Maintenance effort (ME)	1	Reference Value
	2	Reference Value +20%
	3	Reference Value -20%
Usability (U)	1	Easy
	2	Moderate
	3	Demanding
Return of Investment (ROI)	1	18 Month
	2	13,5 Month
	3	22 Month

Table 30: Value used in the test design to describe the attribute-levels

In a next step the data set prepared in Excel, has to be imported into CAMEO Offline via the *'Import Data Wizard'*. After the import, the test design can be visualised in a so-called *'variation vs. variation'* graphic. Figure 65 shows an example of the test design created by ORTHOPLAN and illustrated with CAMEO.

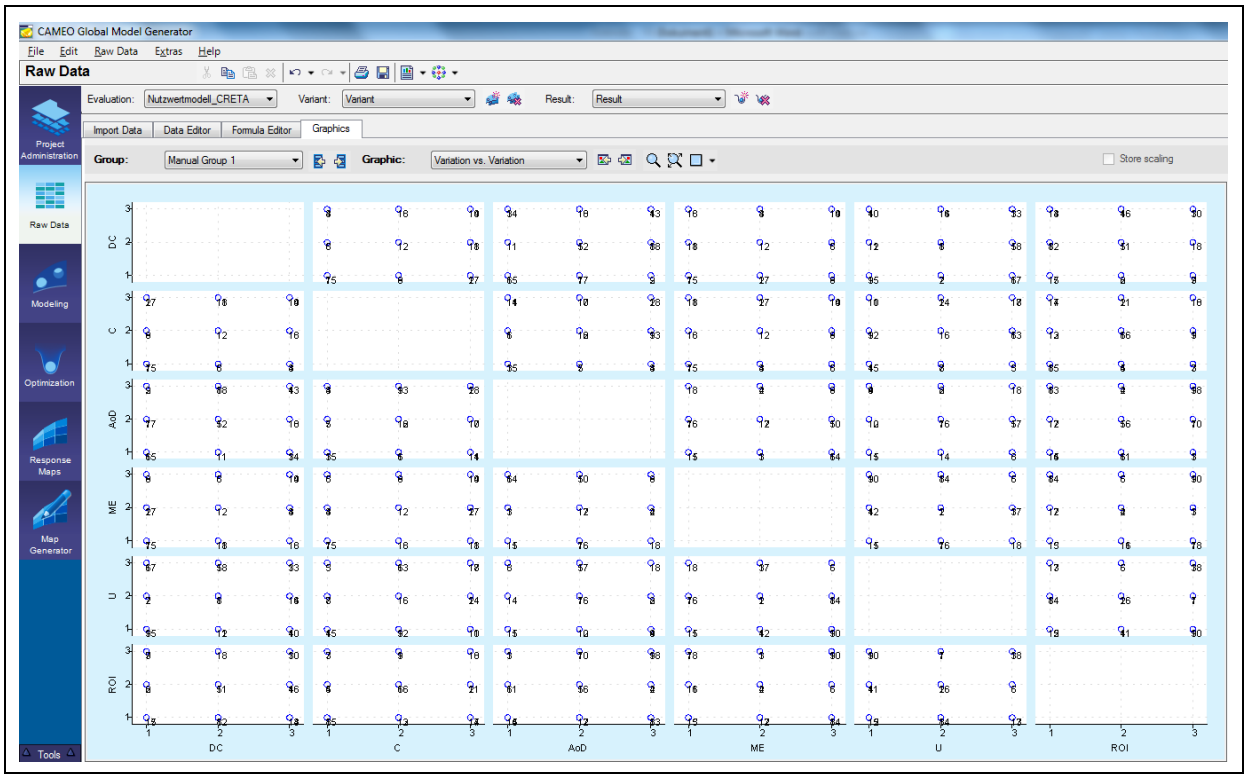


Figure 65: Test Design of SPSS ORTHOPLAN illustrated with CAMEO offline

In next step, the variation and response parameters have to be chosen. Therefore, in the register *'Data Editor'*, the columns of the single attributes have to be selected as *'variation'*, and the columns of the measurements of the single BC members have to be selected as *'*response' (see Figure 66).

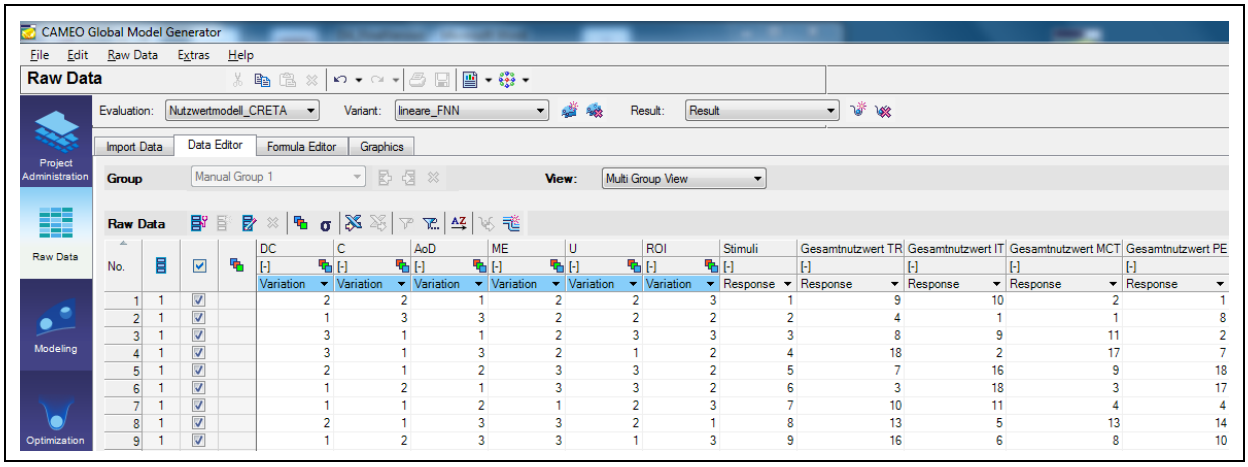


Figure 66: Selection of variation and response parameters with CAMEO

Completing these tasks finalises the workflow step *'raw data'* and brings us to the next workflow step, the *'modelling'* phase. In this phase, the raw data is modelled in order to display the contribution of the attribute and attribute-levels to the overall utility value of a product (in respect to a BC member). With other words, the influence of the variation

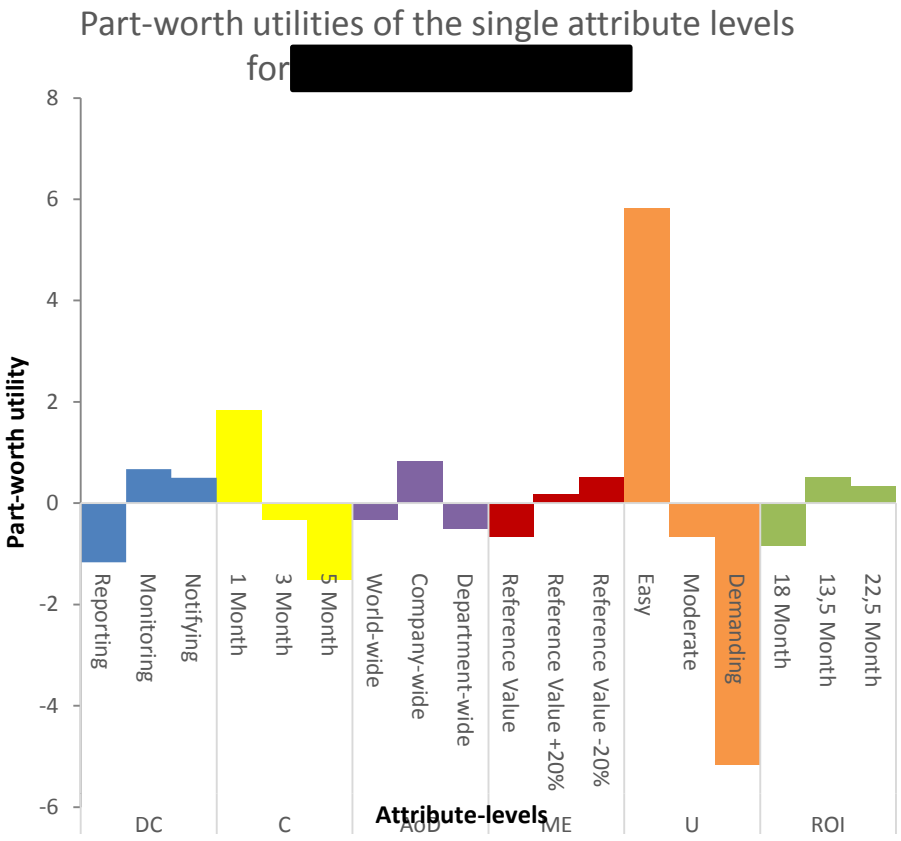
parameters (attributes and attribute-levels) on the response parameters (measured utility values on individual level) is calculated. Therefore, CAMEO offers three different modelling algorithms the user can choose of (see Table 31).

Free Poly Model (FPM)	Free Poly Model is a polynomial regression model which permits interaction up to the fifth order between input quantities.
Fast Neural Networks (FNN)	A neural network is a computer program designed in analogy to the natural networks in our brain. They are characterised by their ability to recognize particular patterns that occur in different repeated processes.
Intelligent Neural Networks (INN)	An Intelligent Neural Network is a neuro-fuzzy model which is trained by a special training algorithm.

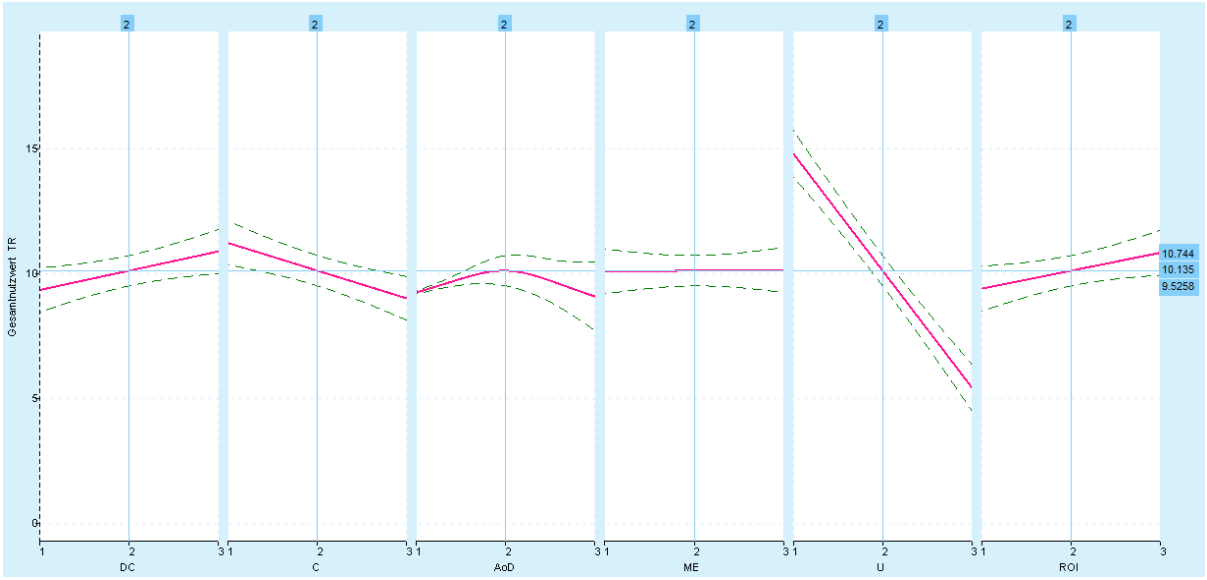
Table 31: Modelling algorithms of CAMEO (AVL List GmbH, 2011, pp. 220-238)(AVL List GmbH, 2011, pp. 220-238)

The usage of these different modelling algorithms creates different output data. Figure 67 shows a comparison of the results of the procedure CONJOINT of SPSS with the different modelling algorithms of CAMEO for the data of the [redacted]

SPSS Procedure CONJOINT



CAMEO FNN – 1st order



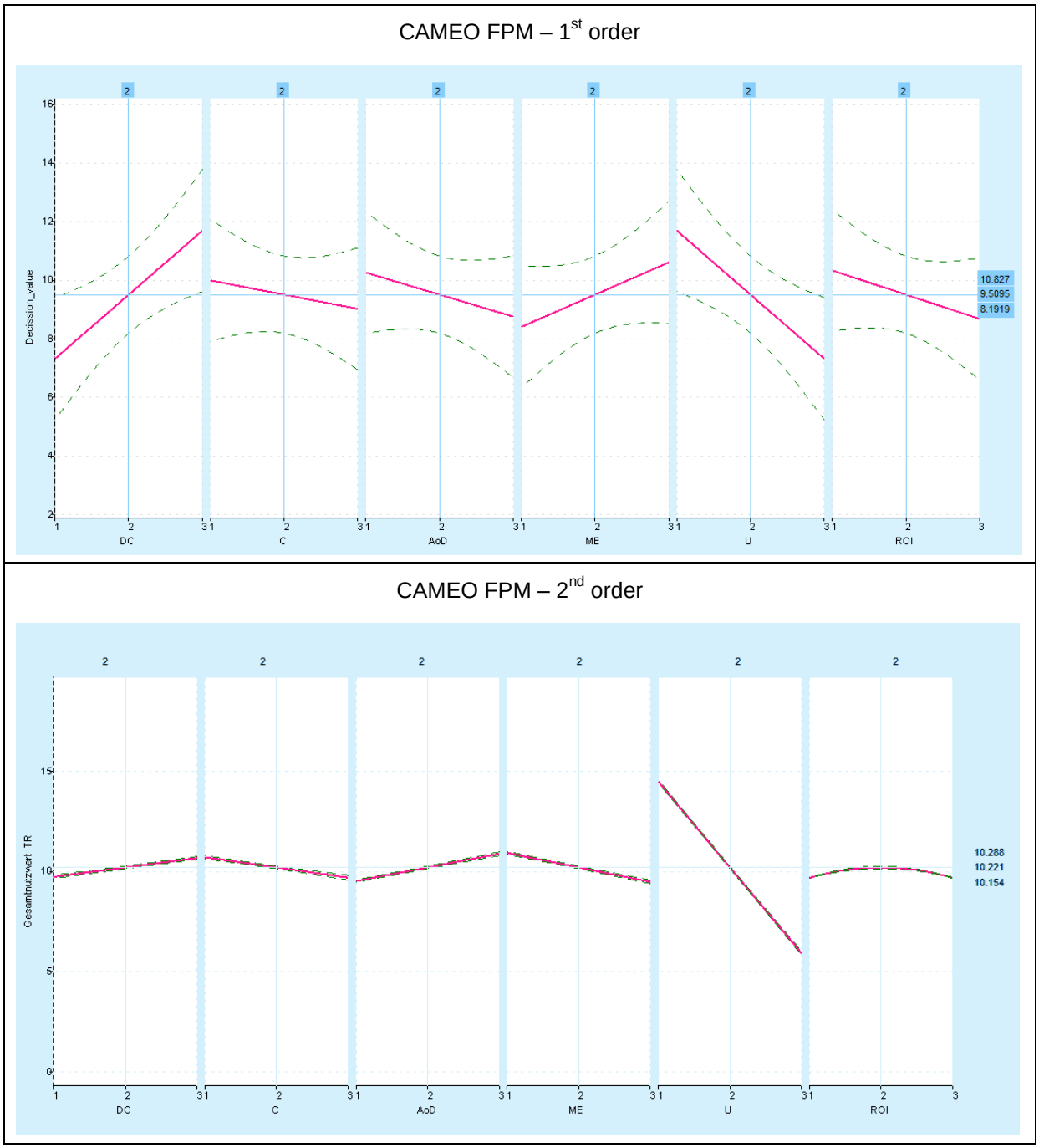


Figure 67: Comparison between different modelling algorithms

As Figure 67 shows, although the different modelling algorithms of CAMEO produce different output values, the trends of the single attributes are often similar to the output of the results, created with SPSS. The modelling algorithm FNN 1st order has the highest similarity to the SPSS results. Therefore, it can be assumed that CAMEO is at least able to deliver useful data for the estimation of part-worth utilities for the attribute-levels of the product attributes. In order to understand why differences of the absolute part-worth utility values occur, the mathematical background of the algorithms has to be compared in detail. As this would go way beyond the scope of this thesis, this task is skipped at the moment and left open for further research activities. On this point, only the theoretical application of CAMEO as a software solution for market research activities should be mentioned. Furthermore, the usage

of CAMEO offers additional possibilities. Besides of the classical regression analysis, CAMEO offers other algorithms which can be chosen and may fit better to model the measured behaviour. In addition to the modelling of the part-worth utilities for the single BC members, a formula, similar to the downward integration model, can be integrated and used as target for the optimisation of the product composition. With other words, CAMEO offers the possibility to optimise the calculated models in respect to the power deviation in the selected BC and therefore creates an ideal product for the selected BC. Figure 63 shows an example of the formula, which can be used as optimisation target as well as the optimisation result.

Optimisation Target Formula:

Optimisation Results:

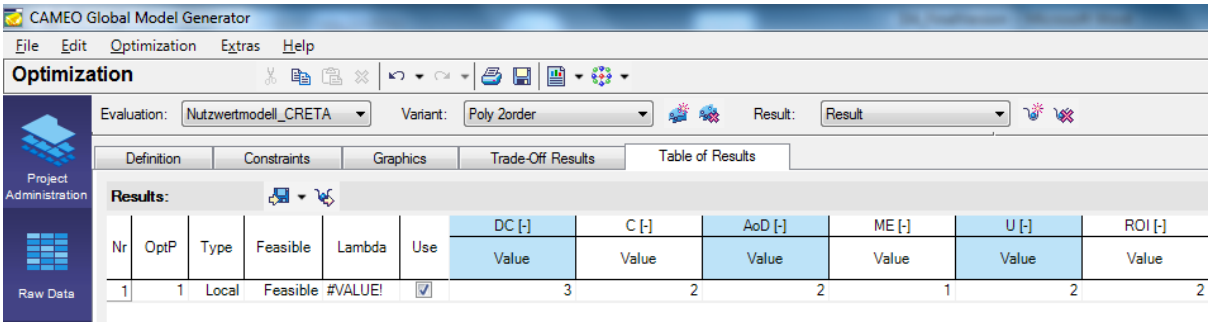


Figure 68: Optimisation target formula and optimisation results

As these application possibilities show, the usage of CAMEO in this field of science is rated with a high potential for the future.

4 Conclusion and Outlook

In the practical part of the thesis, the two major targets of chapter 1.3 were achieved. The following lines will summarise the findings and present an outlook for the future.
At first, in chapter 3.2, a practical guideline, directly addressed to sales people, could be developed. Based on the theoretical principals of the buying centre (BC) analysis and organisational buying behaviour (OBB) as well as world-wide empirical survey of the IC sales people (see chapter 3.1), the guideline was specifically designed for the products of department Calibration Application (IC) of AVL List GmbH. As summarised in the following lines, the guideline consist of four stages, which should lead the sales employees of IC department through the BC analysis process.

(1) The first phase described how to collect customer information in the pre-sales phase, where no physical contact to the customer is established. In addition, two templates are proposed, which aim to collect information concerning the buying situation and the potential BC members of the customer and document them in a systematic way.
(2) The second phase proposed questions, actions, and experience values, with the purpose to create a graphical illustration of the BC, the so-called Basic BC Map (BBCM). Furthermore, a Strategic BC Map (SBCM) has been established to document strategic information of the BC member, for example the power of a single buying centre member to influence the buying decision. Moreover, an example showed how this information can be used to create micro sales strategies (strategies for each BC member) and find ways to penetrate the holistic BC of the account in the most efficient way.
(3) The third phase, dealt with the topic of long-term seller-buyer relationships, or as the name of this phase implies, the development of BC care strategies. Depending on the size of the BC, it is proposed to set up a selling centre in order to manage the target account in an appropriate way.
(4) Finally, driven by statements of literature that the BC of an account is not a static construct, the last stage proposed a template to set up a monitoring plan, which determines future actions to keep the BC data up-to-date.

Parallel to the guideline, the evaluation of the international sales survey could identify specialities of the IC departments BCs. For example in could be proved that in the majority of the sales situations, the BCs for IC department's products look different from the BCs of ITS hardware products. Moreover, it was observed that the BC constellation differs from account to account and no standardised BC analysis concept is established in IC department yet. Because of these findings, the analysis of the customer's BC from the very beginning of a customer relationship has been clarified as an important task. For the future, the following proposals can be derived.

- Performing the BC analysis in a standardised way helps to form a data set of BC information, which can be used for upcoming sales events, future research and evaluation tasks.

- The templates and maps, which are single Excel sheets and Visio graphics at the moment, could be implemented in the input mask of the electronic customer relationship management system (SFDC) to simplify the data storage, and to give all sales people easy access to the data. Furthermore, automatic algorithms could evaluate the data sets and show general trends for the BCs of different regions or products.
- The documentation of the international sales survey, which was used as information source for the guideline development, offers young sales people a possibility to get a feeling of typical BC characteristics of IC products.

Moving to the second topic of the practical part, a concept for a quantitative BC analysis was presented. The analysis concept is based on the ideas of *Brinkmann*, who proposes to use the internal sales force to collect data of the target BC. Furthermore, the so-called multi-step limit conjoint analysis (MeLimCA) was embedded in the concept and used as measurement and evaluation instrument. The concept describes in three main steps, which pre-conditions have to be fulfilled, how the needed information can be generated and how to use and process the measured data for a quantitative statement about the buying centre's behaviour.
Summarising the core of the concept, it is describes how to create indirect tests, which measure the BC member's preferences concerning the target purchasing product (stage 1) as well as the relative influence power of the single BC members (stage 2) and derive based on these two information the so-called '*group-related utility value'.*

- In the first stage, the utility, which a BC member would asses to different multi-attributive products (a set of theoretical products has been created by combining selected product attributes and attribute-levels in a systematically way according to a test design), is indirectly measured by ranking them from most to least preferred by a selected test person. The results of the measurement in combination with the test design is used to perform an statistical estimation (OLS-regression) of the part-worth utilities of the single attribute-levels. Further on the relative importance of the product attributes are derived by a simple calculation.
- The second stage follows the same procedure with the difference that the ranking process was not made for different theoretical products but for different conflict situations in the BC. The results of this stage were values about the relative influence power of the BC members on the buying decision.
- Based on the results of both stages and with the help of a so-called *'integration model'*, the calculation of the '*group-related utility value'* was described. Repeating this for several products and comparing the *'group-related utility values'* allows the simulation of a buying decision of the BC, or with other words the determination of the so called BC preference concerning a set of product alternatives. Furthermore, the *'relative importance'* of the product attributes, which can be interpreted as the customer's *'decision criteria'*, were derived on individual (for each BC member) and on group level (for the whole BC).

In a final step, the application of the concept was presented exemplarily for a concrete BC and a concrete buying situation of an IC department's customer. The analysis shows that the

BC of the selected customer consists of four people, which have different influence power on the buying decision. Furthermore, the analysis reveals that the single BC members evaluate the single product attributes with a remarkable different importance. Finally, the analysed data was used to calculate the *'group-related utility values'* of selected products (one product of department calibration application of AVL List GmbH and two competing products). The results showed that the BC rated the IC product with the highest utility value and thus it was predicted that the BC decides to buy the product of AVL in the expected circumstances.
As the validity of the data has to be challenged, the results of the applied concept were discussed in the framework of an interview with an experienced sales expert of IC department. The expert followed that the results fit perfectly to the real situation. Therefore, the practical validity of the data could be proved and the concept was evaluated as a good possibility for IC department to generate quantitative data for the BCs of their customers. In addition, the intermediate results of the MeLimCA were awarded with a high practical relevance.
Moreover, for future research, the following possible activities can be derived.

- The BC Analysis with the MeLimCA procedure can be performed through directly questioning the people of the customer. The data produced through the classical data generation concept can then be compared to the results of the practical example of chapter 3.4 and another statement concerning the data quality can be derived.
- The application of the quantitative BC analysis concept for other BCs of IC products may point out further similarities of IC product's BCs. The quantitative explanation of the typical IC BC can reduce the effort for developing customer-tailored sales strategies.
- As described in the last chapter of the thesis, the application of the product CAMEO of IC department as evaluation tools has to be examined in future examples. As the different modelling algorithms produce different values, it has to be examined which modelling algorithm fits best to represent the real BC situation.

All in all, it is assumed that the two concepts which have been developed, will help IC department to create a better understanding of their customers and to create effective strategies to increase sales in future. By storing the analysis results over a longer period, a data base will be created and sales people will be able to inform themselves about BC situations at the customer in detail.
The following statements of Rackham will finalise the thesis and underline again the importance of BC analysis.

> If we assess a sales strategy's success by its impact on the customer, then it follows that the better we understand the customer decision process and how we influence it, the better our strategy will be. […] Effective strategy begins with an understanding of how people *buy*. The strategies you develop as a result of adopting the buyer's perspective are a powerful way to guide your actions through difficult competitive sales (Rackham, 1989, p. 16)(Rackham, 1989, p. 16).

5 Bibliography

Addelman, S. (1962, February). Symetrical and Asymetrical Fractional Factorial Plans. *Technometrics, 4*(1), pp. 47-58.

Applied Geographics, Inc. (2013). *Federal Geographic Data Committee.* Retrieved August 10, 2013, from http://www.fgdc.gov/policyandplanning/newspbp/EconomicJustification_ROI-CBA-Tutorial_v2_052809_FinalVersa.pdf

AVL List GmbH. (2009, March 17). *CAMEO.* Retrieved July 25, 2013, from https://www.avl.com/c/document_library/get_file?uuid=f6da45ac-6d27-4b94-8d45-c330e92cffcc&groupId=10138

AVL List GmbH. (2010, October). *CAMEO Transmission.* Retrieved July 5, 2013, from https://www.avl.com/c/document_library/get_file?uuid=bd929801-f2bd-4cbf-804c-344d24026577&groupId=10138

AVL List GmbH. (2011, March). Basics & Beyond the Basics AVL CAMEO 2011 [User's Guide]. Graz, Steiermark, Österreich.

AVL List GmbH. (2013a). *AVL - Passion and Results*. Retrieved June 10, 2013, from https://www.avl.com/cameo

AVL List GmbH. (2013b). *AVL Simulation and Testing Solutions Catalouge 2013.* Retrieved July 20, 2013, from https://www.avl.com/html/static/emag/ITS_e_2013/index.html#/1/

AVL List GmbH. (2013c). *AVL - Passion and Results*. Retrieved Juli 30, 2013, from www.avl.com/creta

AVL List GmbH. (2013d). *AVL - Passion and Results*. Retrieved Juli 30, 2013, from www.avl.com/cameo

AVLCALIBRATIONTEC. (2012, Febuary). *AVL CRETA Calibration Data Management.* Retrieved Juli 29, 2013, from www.youtube.com/watch?v=urDXIdXaeTQ

Backhaus, K. (2003). *Industriegütermarketing* (7th ed.). München: Vahlen.

Backhaus, K., & Voeth, M. (2009). *Industriegütermarketing* (9th ed.). München: Vahlen.

Backhaus, K., Erichson, B., & Weiber, R. (2011). *Fortgeschrittene Multivariante Analysemethoden.* Berlin: Springer.

Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2006). *Multivariante Analysemethoden* (11th ed.). Berlin: Springer.

Baier, D., & Brusch, M. (2009). *Conjoint-analyse: Methoden - Anwedungen - Praxisbeispiele.* Berlin, Heidelberg: Springer.

Bortz, J., & Döring, N. (2006). *Forschungsmethoden und Evaluation für Human und Sozialwissenschaftler* (4th ed.). Heidelberg: Springer.

Brinkmann, J. (2006). *Buying Center-Analyse auf der Basis von Vertriebsinformationen.* (W. H. Engelhardt, & M. Kleinaltenkamp, Eds.) Wiesbaden: Gabler.

Büschken, J. (1994). *Multipersonale Kaufentscheidungen.* Wiesbaden: Gabler.

b-wise GmbH. (2011). *business-wissen.de*. (J. Fleig, Editor) Retrieved May 23, 2013, from buisness-wissen.de: http://www.business-wissen.de/handbuch/kundenanalyse/welches-wissen-ueber-den-kunden-wichtig-ist/

Choffray, J. M., & Lilien, G. L. (1978, April). Assessing response to industrial marketing strategy. *Journal of Marketing, 42*(2), pp. 20-31.

Corfman, K. P., & Lehmann, D. R. (1987). Models of Cooperative Group Decision-Making and Relative Influence: An Empirical Investigation of Family Purchase Decisions. *Journal of Consumer Research, 14*, pp. 1-13.

Dawes, P. L., Patterson, P. G., & Lee, D. Y. (1996). Internal and External Buying Center Membership in High Technology Business Markets. (J. P. Inc., Ed.) *The Journal of High Technology Management Reserach, 7*(1), pp. 107-127.

Dobes, T. (2003). Schnelle und Markespezifische Kalibrierung von modernen Fahrzeugantrieben. *Motor & Umwelt* (pp. 7-8). Graz: AVL List GmbH.

Fill, C., & Fill, K. E. (2005). *Business to Business Marketing: Relationships, systems and communications.* Essex: Pearsion Education Limited.

Fließ, S. (2000). Industrielles Kaufverhalten. In M. Kleinaltenkamp, & W. Plinke, *Technischer Vertrieb. Grundlagen des Business-to-Business Marketing* (pp. 251-369). Berlin: Springer.

Gemünden, P. D., & Hölzle, K. (2011). *Innovationmanagement.de*. (D. P. Harland, Editor) Retrieved May 5, 2013, from http://www.innovationsmanagement.de/innovatoren/promotorenmodell.html

Hillig, T. (2006). *Verfahrensvarianten der Conjoint-Analyse zur Prognose von Kaufentscheidungen.* Wiesbaden: Gabler.

Hoepner, G. (2011). *Wirtschaftswiki FH-Aachen*. Retrieved May 24, 2013, from https://www.wirtschaftswiki.fh-aachen.de/index.php?title=Kunde

Howard, J. A., & Sheth, J. N. (1969). *The theory of buyer behavior.* New York: Wiley.

IBM Corporation. (2011). *IBM SPSS Conjoint 20.* Retrieved Juli 29, 2013, from ftp://public.dhe.ibm.com/software/analytics/spss/documentation/statistics/20.0/de/client/Manuals/IBM_SPSS_Conjoint.pdf

Johnston, W. J., & Lewin, J. E. (1996). Organization Buying Behaviour: Toward an Itegrative Framework. *Journal of Business Research, 35*, pp. 1-15.

Klein, M. (2002). Die Conjoint-Analyse: eine Einführung in das Verfahren mit einem Ausblick auf mögliche sozialwissenschaftliche Anwendungen. *ZA-Information / Zentralarchiv für empirische Sozialforschung, 50*, pp. 7-45.

Kleinaltenkamp, M., & Saab, S. (2009). *Technischer vertrieb.* Berlin: Springer.

Kögeler, H.-M. (2013). Bedatung von Steuergeräten. In H. Eichelseder, *313.016: VKM-Funktionsentwicklung* (pp. 75-90). Technical University of Graz.

Kunzfeld, A. (2010, October). *Business Development Konzept 2010 [PPT presentation]*. Presented at ITS Segement Meeting of AVL List GmbH, Graz.

Langouët, H., Métivier, L., Sinoquet, D., & Tran, Q.-H. (2008). Optimization for engine calibration. *EngOpt 2008 - International Conference on Engineering Optimization.* Rio de Janeiro.

LeCossec, M. (2013, January 16). Sales and Marketing approach in IC Department Graz. (M. Drescher, Interviewer)

Lewin, J. E., & Donthu, N. (2005). The influence of purchase situation on buying centre structure and involvement: A select meta-analysis of organizational buying behaviour research. *Journal of Business Research, 58*, pp. 1381-1390.

Louviere, J. J. (1988). Analyzing Decision Making. Metric Conjoint Analysis. *Quantitative Applications in the Social Sciences, 67*.

Lüdigk, A. (2013). Turnover excl. Graz for ITS Products for March 2012 [Data File]. Retrieved from company database of AVL List GmbH.

Martini, E. (2012). Strategy Update 2012. Retrieved from company database of AVL List GmbH.

Martini, E. (2013, July 26). Explanation of the Calibration Process. (M. Drescher, Interviewer)

Matthew, H., Hague, P., & Hague, N. (2013). *B2B International: Market research with Intelligence.* Retrieved April 26, 2013, from http://www.b2binternational.com/publications/white-papers/b2b-marketing/

Mayring, P. (2002). *Einführung in die qualitative Sozialforschung.* Weihnheim und Basel: Beltz Verlag.

Müller, W. (2005). *Fachhochschule Dortmund.* Retrieved from http://www.fh-dortmund.de/de/oeffentl/medien/schriften/Wolfgang_Mueller_-_Grundzuege_der_Conjoint-Analyse.pdf

Nabenhauer Consulting GmbH. (2012). *Presales Marketing*. Retrieved May 23, 2013, from http://www.presalesmarketing-blog.com/2012/03/was-ist-die-aufgabe-des-marketing/

Neumann, B. R. (1997). *Patent No. 5,598,825.* United States.

Patchen, M. (1974, April). The locus and basis of influence on orgnizational decisions. *Organizational Behaviour and Human Performance, 11*(2), pp. 195-221.

Rackham, N. (1989). *Major account sales strategies.* New York: McGraw-Hill.

Ramirez, G. (2013, January 25). Getting Ready for Social Media [PPT presentation]. Presented at Social Media Workshop at AVL List GmbH, Graz.

Rask, E., & Sellnau, M. (2004). Simulation-Based Engine Calibration: Tools, Techniques and Application. *SAE International.* Detroit.

Schuch, N. (2013, September 3). Discussion about the results of MeLimCA. (M. Drescher, Interviewer)

SCOOP & SPOON GmbH. (2013). *scoop and spoon: the marketing and technology agency*. Retrieved June 10, 2013, from http://www.scoopandspoon.com/

Sieck, H., & Goldmann, A. (2007). *Erfolgreich verkaufen im B2B.* Wiesbaden: Gabler.

Stadie, E. (1998). *Medial gestützte Limit Conjoint-Analyse als Innovationstest für technologische Basisinnovationen: eine explorative Analyse.* Münster: LIT.

Stump, R. L., & Heide, J. B. (1996, November). Controlling supplier opportunism in industrial relationships. *Journal of Marketing Research, 43*(4), pp. 431-441.

Vagias, W. M. (2006). *Clemson University.* (C. I. Tourism, Ed.) Retrieved April 18, 2013, from http://www.clemson.edu/centers-institutes/tourism/documents/sample-scales.pdf

Voeth, M. (2004, July). Analyse multipersonaler Kaufentscheidungen mit mehrstufigern Limit Conjoint-Analysen. *Zeitschrift für Betriebswirtschaft, 74*(2), pp. 719-741.

Voeth, M., & Hahn, C. (1998). Limit Conjoint Analyse. *Marketing ZFP: Journal of Reasearch and Management, 20*(2), pp. 119-132.

Weiber, R., & Jacob, F. (1999). Kundenbezogene Informationsgewinnung. In M. Kleinaltenkamp, & W. Plinke, *Technischer Vertrieb: Grundlagen des Business-to-Business Marketing* (pp. 523-611). Berlin: Springer.

Weiber, R., & Rosendahl, T. (1997). Anwendungsprobleme der Conjoint-Analyse. Die Eignung conjointanalytischer Untersuchungsansätze zur Abbildung realer Entscheidungsprozesse. *Marketing ZFP: Journal of Research and Management, 19*(2), pp. 107-118.

6 List of Figures

7 List of Tables

8 Appendix

A1 Interview partners world-wide survey

The following table presents all interview partners for the world-wide sales survey which could be identified.

No.	Affiliate	Name	Position
1	Iberica	Francisco Ivorra	Sales Manager IBE/MAT
2	China	Zhang Hong	ABM-M
3	China	Zhu Kun	ITS-P Sales Manager
4	China	Jin Lei	ITS-M Sales Engineer
5	China	Huang Dianping	ITS-P Sales Engineer
6	China	Wang Chenglong	ITS-M TSS-MO
7	India	Sirohi Kapil	Test Engineer, ITS/Sales
8	India	Ganeshprakash Mahalingam	TSS
9	India	Gite Satish	Business Unit Manager
10	Italy	Daniele Bistolfi	Sales Engineer ITS/INST_ITS
11	Nordiska	Neil Coghlan	TSS ITS/TSS Europe
12	Nordiska	Mats Ivarson	Calibration Engineer
13	Nordiska	Tobias Ljunggren	ABM M Sweden
14	Germany	Daniel Veith	TSS ITS/TSS Germany
15	Germany	Jens Beckhoff	Sales Engineer
16	Germany	Tobias Rein	KAM
17	Germany	Rainer Winkler	Sales Engineer
18	Germany	Henry Diehl	Sales Engineer
19	Germany	Philip Richter	KAM
20	Germany	Faouzi Takni	Sales Engineer
21	Germany	Mihael Vuksic	KAM
22	Germany	Stefan Lunkenheimer	KAM
23	Germany	Nadin Sazonoff	Sales Engineer
24	Germany	Bernhard Zemann	GAM
25	Germany	Achim Nickel	TSS MO Germany/Europe
26	Germany	Stefan Bergold	ABM M Germany
27	France	Nicolas Pereira	TSS
28	France	Laurent Remy	TSS
29	France	Kevin Faliere	ABM
30	UK	James Morris	ABM
31	Europe	Gerald Sommer	RBM
32	US	Siegfried Röck	Dir. Bus. Dev. Instrumentation
33	Japan	Nukui Takashi	AM Honda
34	Japan	Mikami Takashi	ITS/TKY Software Engineer
35	Japan	Tashiro Chihiro	ABM M
36	South America	Leonardo Giglio	ABM M

A2 Evaluation of open questions of the international sales survey

The following table shows the categorisation of the answers of all open questions of the international sales survey. As the open questions were not mandatory, the amount of the given answers is different from question to question.

Summarised responses of question 3 of chapter 1	**Amount of Answers**
Europe	9
Asia	4
Summarised responses of question 4 of chapter 2	**Amount of Answers**
Rackham	11
Other Theories	3
Books of KAM	2
Books of CRM	1
Not in contact with sales theory yet	1
Summarised responses of question 10 of chapter 2	**Amount of Answers**
People think about SFDC or in general about CRM or Reporting Systems	4
People try to explain the areas or the sales phases	4
Decision Criteria	1
Too complex to use every day	1
Summarised responses of question 1 of chapter 3	**Amount of Answers**
Understand customer's needs or problems concerning calibration topic	4
Searching for competitors	1
Get information from the internet	1
Get information about customer's product portfolio, service situation, or project status	3
Summarised responses of question 2 of chapter 4	**Amount of Answers**
Get in contact with other customers	1
Summarised responses of question 3 of chapter 3	**Amount of Answers**
IT Administrator	1
Summarised responses of question 4 of chapter 3	**Amount of Answers**
KAM mentions that for customer visit he tries to have a TSS with him	1
Summarised responses of question 8 of chapter 3	**Amount of Answers**

Step 1: Collecting Information about the customer (online and internal): Step 2: Analyse the actual situation (calibration set up), the used products, the tasks and the requirements of the customer and search for problems/dissatisfaction Step 3: Presenting general overview about IC solutions Step 4: Define Personal Strategy	3
Summarised responses of question 9 of chapter 3	**Amount of Answers**
Understand Customers Product Portfolio and search for existing AVL Products	2
Identify need and dissatisfaction	4
Search the right contact person or identify BC structure	4
Summarised responses of question 5 of chapter 4	**Amount of Answers**
Recognition of needs:	
Listen to customer, understand their calibration process and business in general, and find problems, pain, needs	6
Presenting advanced methodology of IC products and the resulting time and cost savings	2
Evaluation of Options:	
Evaluation of competing and actual used products/ Present comparison to AVL	2
Present how the products can solve problems/ Show benefits of AVL products	2
Best Practice Examples /Story Telling	2
Demo installation in the framework of a free workshop	3
Resolution of Concerns:	
Arrange Demo, WebEx, Workshop Projects with Experts/ In general actions which try to counteract concerns	4
Start of Negotiations and detailed discussions about the e.g. contract framework	3
Summarised responses of question 6 of chapter 4	**Amount of Answers**
Customer contacts us, often no need to search for them	1
Creating contact with the help of other contacts	1
University Network or Social Network	2
Summarised responses of question 3 of chapter 5	**Amount of Answers**
Try to contact and expert right away and arrange a follow up meeting with	2

him	
Answer in general on my own knowledge, contact an expert and come back with the detailed answer	1
Summarised responses of question 4 of chapter 5	**Amount of Answers**
Changing the methodology is a big risk for the customer. Competing against “working” in-house solutions means that the customer has to be 100% convinced.	3
To have the technical depth to firmly understand the customer’s calibration process and thus the needs and problems.	3
Market saturation (amount of calibration activities is limited) or timing of market entrance	3
IC products are not as good as they could be, sometimes the customer’s evaluate them as too complex	2
There are not enough resources in application support. The support is limited to the product level and does not go to the level of calibration methodology support.	2
Find the right decision maker	1
Summarised responses of question 2 of chapter 6	**Amount of Answers**
SFDC	7
Email or personal memo	8
MS Office (Word, Excel, OneNote, SharePoint)	5

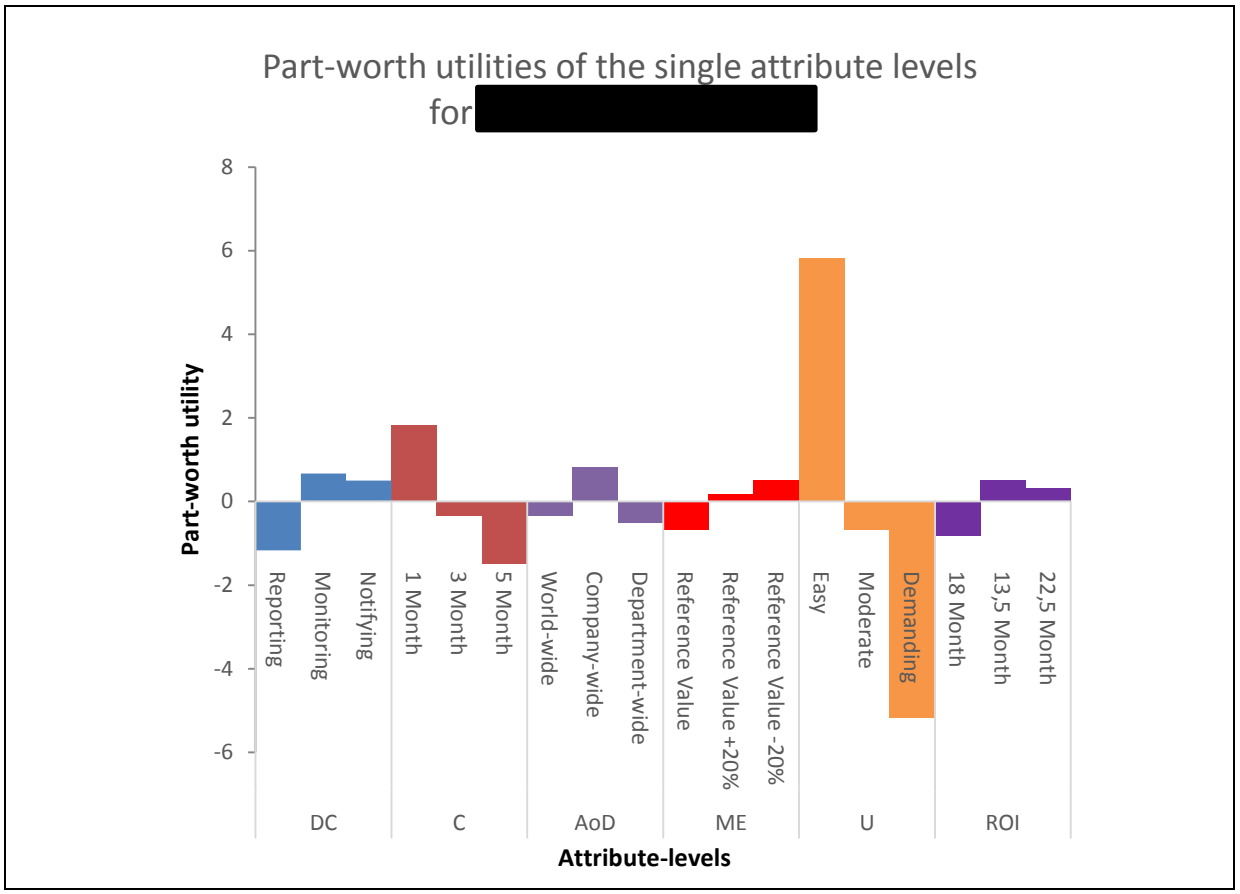
A3 Conjoint results

The following tables and figure show the results of the procedure CONJOINT of SPSS 21, which was used for the calculation of the part-worth utilities and the relative importance of the product attributes of MeLimCA Stage 1 and Stage 2.

Results of MeLimCA Stage 1

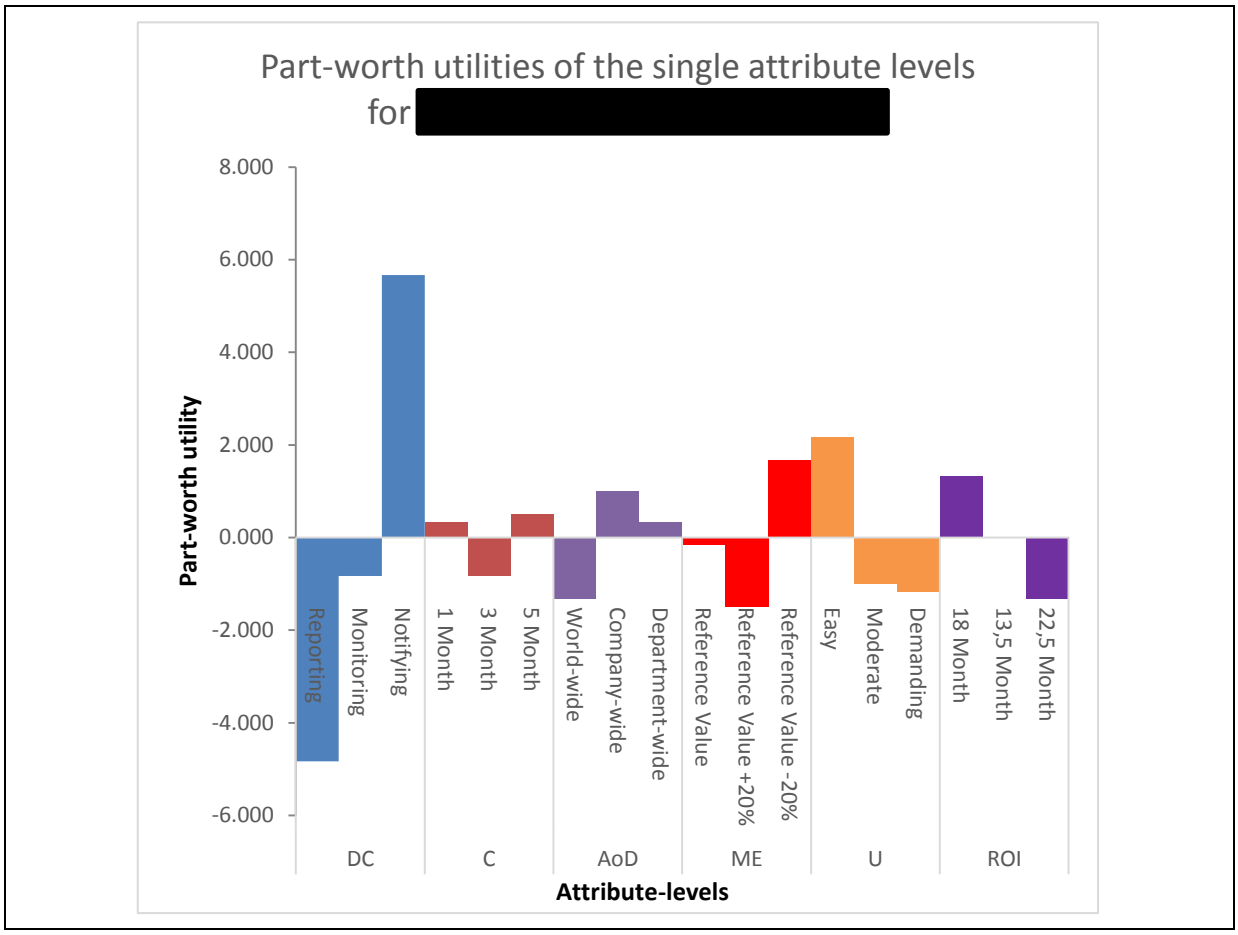
Part-worth utilities [redacted]			
		utility estimation	standard error
DC	Reporting	-1.167	1.094
	Monitoring	0.667	1.094
	Notifying	0.500	1.094
C	1 Month	1.833	1.094
	3 Month	-0.333	1.094
	5 Month	-1.500	1.094
AoD	World-wide	-0.333	1.094
	Company-wide	0.833	1.094
	Department-wide	-0.500	1.094
ME	Reference Value	-0.667	1.094
	Reference Value +20%	0.167	1.094
	Reference Value -20%	0.500	1.094
U	Easy	5.833	1.094
	Moderate	-0.667	1.094
	Demanding	-5.167	1.094
ROI	18 Month	-0.833	1.094
	13.5 Month	0.500	1.094
	22.5 Month	0.333	1.094
(Constant)		9.500	0.773

Relative importance of the attributes for [redacted]	
DC	9.167%
C	16.667%
AoD	6.667%
ME	5.833%
U	55.000%
ROI	6.667%


Part-worth utilities of the single attribute levels
for [redacted]
Part-worth utility
8
6
4
2
0
-2
-4
-6
Reporting
Monitoring
Notifying
1 Month
3 Month
5 Month
World-wide
Company-wide
Department-wide
Reference Value
Reference Value +20%
Reference Value -20%
Easy
Moderate
Demanding
18 Month
13,5 Month
22,5 Month
DC
C
AoD
ME
U
ROI
Attribute-levels

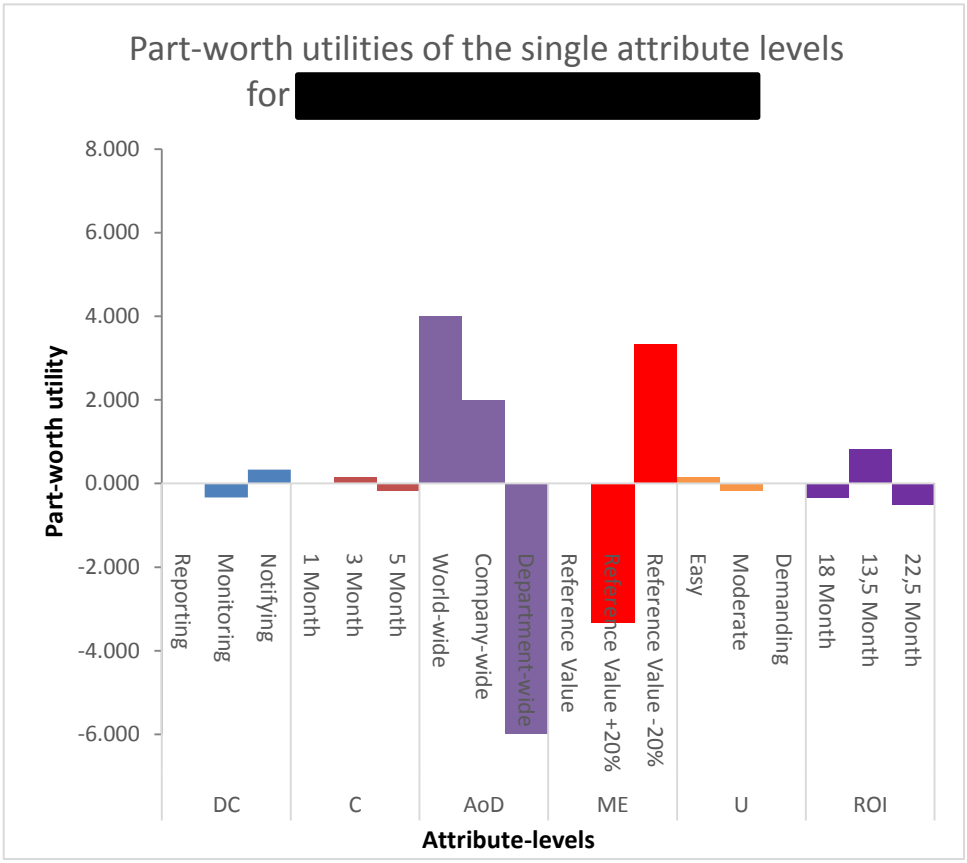
Part-worth utilities for [redacted]			
		utility estimation	standard error
DC	Reporting	-4.833	0.814
	Monitoring	-0.833	0.814
	Notifying	5.667	0.814
C	1 Month	0.333	0.814
	3 Month	-0.833	0.814
	5 Month	0.500	0.814
AoD	World-wide	-1.333	0.814
	Company-wide	1.000	0.814
	Department-wide	0.333	0.814
ME	Reference Value	-0.167	0.814
	Reference Value +20%	-1.500	0.814
	Reference Value -20%	1.667	0.814
U	Easy	2.167	0.814
	Moderate	-1.000	0.814
	Demanding	-1.167	0.814
ROI	18 Month	1.333	0.814
	13.5 Month	0.000	0.814
	22.5 Month	-1.333	0.814
(Constant)		9.500	0.576

Relative importance of the attribute for [redacted]	
DC	45.000%
C	5.714%
AoD	10.000%
ME	13.571%
U	14.286%
ROI	11.429%


Part-worth utilities of the single attribute levels
for [redacted]
8.000
6.000
4.000
2.000
0.000
-2.000
-4.000
-6.000
Part-worth utility
Reporting
Monitoring
Notifying
1 Month
3 Month
5 Month
World-wide
Company-wide
Department-wide
Reference Value
Reference Value +20%
Reference Value -20%
Easy
Moderate
Demanding
18 Month
13,5 Month
22,5 Month
DC
C
AoD
ME
U
ROI
Attribute-levels

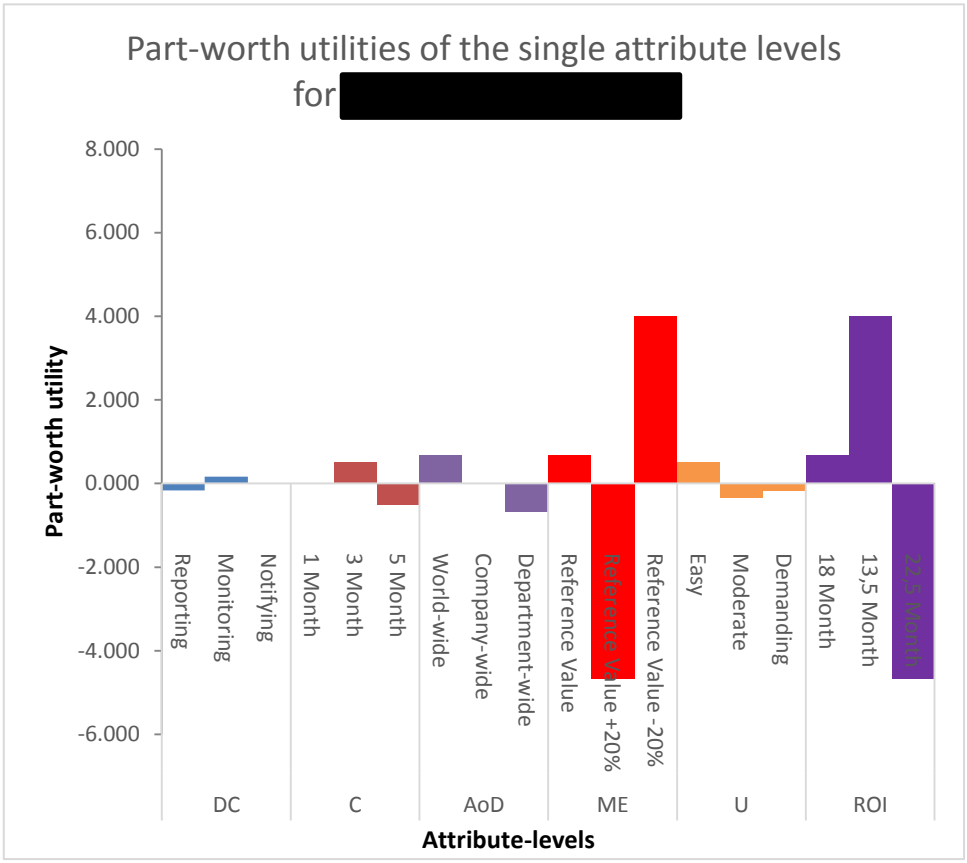
Part-worth utilities for [redacted]			
		utility estimation	standard error
DC	Reporting	0.000	0.390
	Monitoring	-0.333	0.390
	Notifying	0.333	0.390
C	1 Month	0.000	0.390
	3 Month	0.167	0.390
	5 Month	-0.167	0.390
AoD	World-wide	4.000	0.390
	Company-wide	2.000	0.390
	Department-wide	-6.000	0.390
ME	Reference Value	0.000	0.390
	Reference Value +20%	-3.333	0.390
	Reference Value -20%	3.333	0.390
U	Easy	0.167	0.390
	Moderate	-0.167	0.390
	Demanding	0.000	0.390
ROI	18 Month	-0.333	0.390
	13.5 Month	0.833	0.390
	22.5 Month	-0.500	0.390
(Constant)		9.500	0.276

Relative importance of the attribute for [redacted]	
DC	3.448%
C	1.724%
AoD	51.724%
ME	34.483%
U	1.724%
ROI	6.897%


Part-worth utilities of the single attribute levels
for [redacted]
8.000
6.000
4.000
2.000
0.000
-2.000
-4.000
-6.000
Part-worth utility
Reporting
Monitoring
Notifying
1 Month
3 Month
5 Month
World-wide
Company-wide
Department-wide
Reference Value
Reference Value +20%
Reference Value -20%
Easy
Moderate
Demanding
18 Month
13,5 Month
22,5 Month
DC
C
AoD
ME
U
ROI
Attribute-levels

Part-worth utilities for [redacted]			
		utility estimation	standard error
DC	Reporting	-0.167	0.574
	Monitoring	0.167	0.574
	Notifying	0.000	0.574
C	1 Month	0.000	0.574
	3 Month	0.500	0.574
	5 Month	-0.500	0.574
AoD	World-wide	0.667	0.574
	Company-wide	0.000	0.574
	Department-wide	-0.667	0.574
ME	Reference Value	0.667	0.574
	Reference Value +20%	-4.667	0.574
	Reference Value -20%	4.000	0.574
U	Easy	0.500	0.574
	Moderate	-0.333	0.574
	Demanding	-0.167	0.574
ROI	18 Month	0.667	0.574
	13.5 Month	4.000	0.574
	22.5 Month	-4.667	0.574
(Constant)		9.500	0.406

Relative importance of the attribute for [redacted]	
DC	1.600%
C	4.800%
AoD	6.400%
ME	41.600%
U	4.000%
ROI	41.600%


Part-worth utilities of the single attribute levels for [redacted]
8.000
6.000
4.000
2.000
0.000
-2.000
-4.000
-6.000
Part-worth utility
Reporting
Monitoring
Notifying
1 Month
3 Month
5 Month
World-wide
Company-wide
Department-wide
Reference Value
Reference Value +20%
Reference Value -20%
Easy
Moderate
Demanding
18 Month
13,5 Month
22,5 Month
DC
C
AoD
ME
U
ROI
Attribute-levels

Results of MeLimCA Stage 2

Part-worth utilities for **conflict situations in BC of** [redacted]		
		utility estimation
TR	Pro	1.000
	Possible	1.000
	Contra	-2.000
MCT	Pro	1.667
	Possible	0.667
	Contra	-2.333
IT	Pro	0.667
	Possible	0.667
	Contra	-1.333
PE	Pro	0.667
	Possible	0.667
	Contra	-1.333
(Constant)		5.000

Relative importance of the BC Members	
TR	27.273%
MCT	36.364%
IT	18.182%
PE	18.182%

A4 Procedure ORTHOPLAN of IBM SPSS 21

According to IBM Corporation (2011), the procedure ORTHOPLAN creates an orthogonal main effect design which can be used for statistical test of factors. The aim is to decrease the amount of factor combinations in order to decrease the test effort. Thus, ORTHOPLAN creates a set of attribute combinations, which is small enough to be evaluated by a test person but big enough to determine the relative importance of each factor (pp. 5-8)(pp. 5-8).

The procedure can be executed by selecting to following point in the menu:
Data > Orthogonal design > Generate
With this command, a wizard is started and leads the user through the process of creating an orthogonal design. At first, the user has to enter the Attribute Name (e.g. *'Usability'*), Attribute Label (*'U'*). Next, he/she has to define concrete attribute-levels to the attribute. In this step SPSS connect consecutive numbers with the name of the attribute-level. For example, number 1 is connected with attribute-level *'easy'*, number to is connected with attribute-level '*moderate'*, etc. Following these steps for all attributes creates a orthogonal main effect design for the desired test. In our example, the orthogonal design is used to create different product composition of multi-attributive products.
Finally, the design can be displayed with the following command:
Data > Orthogonal design > Display

An example of an *'orthogonal design'* can be seen in Figure 69. This design exists of eighteen different combinations of the product attribute-levels. This design is stored in a normal SPSS data file and can be used by other procedures and functions, e.g. the procedure CONJOINT, of SPSS 21.

PLAN_PREF_CRETA.sav [DatenSet1] - IBM SPSS Statistics Daten-Editor

Datei Bearbeiten Ansicht Daten Transformieren Analysieren Direktmarketing Diagramme Extras Fenster Hilfe

20 : C

	DC	C	AoD	ME	U	ROI	STATUS_	CARD_
1	2,00	2,00	1,00	2,00	2,00	3,00	0	1
2	1,00	3,00	3,00	2,00	2,00	2,00	0	2
3	3,00	1,00	1,00	2,00	3,00	3,00	0	3
4	3,00	1,00	3,00	2,00	1,00	2,00	0	4
5	2,00	1,00	2,00	3,00	3,00	2,00	0	5
6	1,00	2,00	1,00	3,00	3,00	2,00	0	6
7	1,00	1,00	2,00	1,00	2,00	3,00	0	7
8	2,00	1,00	3,00	3,00	2,00	1,00	0	8
9	1,00	2,00	3,00	3,00	1,00	3,00	0	9
10	3,00	3,00	2,00	3,00	1,00	3,00	0	10
11	2,00	3,00	1,00	1,00	1,00	2,00	0	11
12	2,00	2,00	2,00	2,00	1,00	1,00	0	12
13	3,00	2,00	3,00	1,00	3,00	1,00	0	13
14	3,00	3,00	1,00	3,00	2,00	1,00	0	14
15	1,00	1,00	1,00	1,00	1,00	1,00	0	15
16	3,00	2,00	2,00	1,00	2,00	2,00	0	16
17	1,00	3,00	2,00	2,00	3,00	1,00	0	17
18	2,00	3,00	3,00	1,00	3,00	3,00	0	18

Figure 69: Plan file which displays the test design of conjoint analysis (created with SPSS ORTHOPLAN).

A5 Procedure CONJOINT of IBM SPSS 21

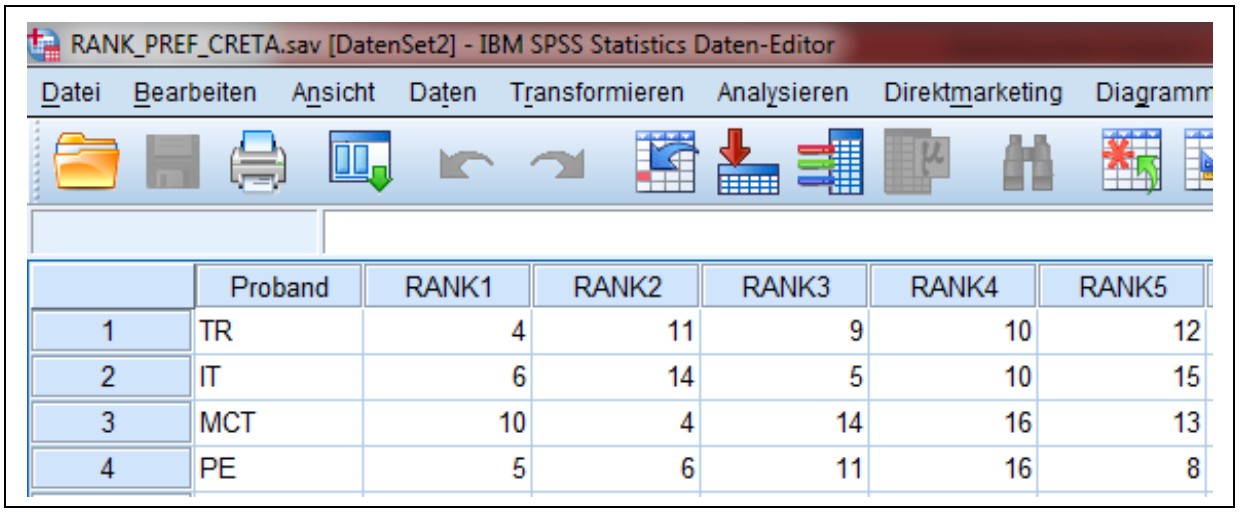
The procedure CONJOINT of SPSS 21 has no graphical interface and has to be executed over the command line of SPSS. Therefore the command syntax for the command CONJOINT has to be considered. On basis of the following example, which shows the command syntax for the calculation of the part-worth utilities of the product group [redacted] (MeLimCA stage 1), the single lines of the syntax will be described.

```
CONJOINT PLAN = 'C:\SPSS_Files\Stage 1\PLAN_PREF_[redacted].sav'
/DATA='C:\SPSS_Files\Stage 1\RANK_PREF_[redacted].sav'
/SEQUENCE = RANK1 TO RANK18
/SUBJECT = Proband
/PRINT = all
/PLOT=all
/UTILITY = 'C:\SPSS_Files\Stage 1\PREF_NUTZ_[redacted].sav'.

SUBTITLE "Auflistung der Gesamtnutzwerte".

GET FILE "C:\SPSS_Files\Stage 1\PREF_NUTZ_[redacted].sav"
LIST.
```

According to IBM Corporation (2011), in general the procedure CONJOINT requires two data sets and the information how the preference was measured. The first data set is called the *'plan file'* and includes the set of stimuli which was developed with the function ORTHOPLAN (see appendix A4). The '*plan file'* is implemented in the CONJOINT syntax as shown in the first line of the example. The second data set, which is needed to execute the procedure CONJOINT is the so-called *'data file'*. This file includes the information of the test subject's preferences concerning the different stimuli and has to be written manually. Depending on how the preferences were collected, the data is stored in different ways (pp. 11-12)(pp. 11-12). For our example, the preferences were measured with a simple ranking of the stimuli. Thus, the most preferred stimulus was allocated the RANK1 and the least preferred stimulus was allocated the RANK18 (our reduced design for the product group [redacted] existed of 18 different stimulus, see appendix A4). Thus, an SPSS data file was generated (RANK_PREF_[redacted].sav) which included the variables RANK1 until RANK18. Furthermore, in order to include the preference ranking of different test subject's (in our example the four BC members of the BC of [redacted]) in one data file, the string variable *'Proband'* has also been added to the data set. Thus, each ranking of the test subjects was implemented in the *'data file'* by allocating the number of the stimuli card (see last column of Figure 69) to the evaluated rank. With other words, the [redacted] (abbreviation TR in Figure 70) ranked the stimuli 4 (card 4 of Figure 69) on the first place an therefore prefers this stimuli most of all.



	Proband	RANK1	RANK2	RANK3	RANK4	RANK5
1	TR	4	11	9	10	12
2	IT	6	14	5	10	15
3	MCT	10	4	14	16	13
4	PE	5	6	11	16	8

Figure 70: Data file procedure CONJOINT of SPSS 21

In addition to the development of the *'data file'*, the method how the preferences are stored has also be explained in the CONJOINT syntax. Thus, the third line of the code uses the sub-command SEQUENCE, which describes that card numbers are sequentially stored in the *'data file'*, from most to least preferred, from RANK1 to RANK18 (IBM Corporation, 2011, pp. 12-13)(IBM Corporation, 2011, pp. 12-13). Moreover the ID variable *'Proband'* has to be included in the CONJOINT syntax (see line four of the syntax), in order to clarify that the preference measurements are connected with different test subject's.

Besides of these mandatory input data, the procedure CONJOINT provides addition subsequence's, which are used to define how the output should look like, for example which graphics should be plotted (PLOT) or which tables should be printed (PRINT). Furthermore, the sub-command utility creates an SPSS data file where detailed information for each test subjects are stored.

Finally, one sub-command is missing which was not used in this example. The sub-command FACTOR enables to implement a model which describes the expected relationship between the single attribute-levels (See also attribute specific evaluation function in point 2 of chapter 2.3.4.3.3.). As the attributes of our analysis method are mainly qualitative attributes, the usage of the sub-command FACTOR was ignored. Thus, SPSS CONJOINT automatically uses a DISCRETE model, which assumes that the attribute-levels are categorical and no expectation of the relationship between the attribute-level and the utility is made.

After the implementation of these point, the procedure CONJOINT can be executed. The outputs of the procedure CONJOINT, applied for the BC example, can be seen in appendix A3.

A6 International sales survey

This chapter presents the content of the international sales survey, which was sent out to the test subjects of AVL List GmbH on 10.04.2013.

Welcome

Welcome to an internal survey of AVL List GmbH.

Please take your time to take an active part in this survey. Your experience and opinion is important for a study in the area of IC Sales!

This survey is executed on behalf of IC Department Graz

Introduction

The purpose of the survey

This survey should give information about the personal behaviour and the individual approach of AVL sales people when selling IC products. In addition, the special focus lies in exploring the opinions of sales people regarding to the awareness and the importance of understanding the OBB and structure.
Therefore, the following questions and statements have been formulated. The results will be evaluated and documented in my diploma thesis and will be available for anybody who is interested in this topic, with the beginning of August 2013. Please note that the questionnaire is completely anonymous, with the data being used only for evaluation and documentation in my thesis. Please note that you cannot give a "right" or "wrong" answer in this survey. Please try to answer the questions as accurate as possible.
I want to thank you in advance for your participation in this survey and want to please you to take little time to read the instructions carefully and answer the questions honestly. The survey will take you about 15 minutes. If you have no experience in selling IC products, I want to excuse for the circumstances and please you to skip the survey right away.

Best Regards
Markus Drescher
AVL Graz

Chapter 1 – Personal Information and Sales Experience

1. How long have you been working in the area of sales?									
less than 1 year	☐	between 1 and 2 years	☐	between 3 and 5 years	☐	between 6 and 9 years	☐	more than 10 years	☐

2. Since when do you sell IC products?									
less than 1 year	☐	between 1 and 2 years	☐	between 3 and 5 years	☐	between 6 and 9 years	☐	more than 10 years	☐

3. In which geographical region did you gain your sales experience?
Please enter the name of your country or the name of the affiliate. (If this answer endangers your anonymity, please go to the next question)

4. What is the name of your actual position inside AVL?			
	☐	Sales Engineer	
	☐	Affiliate Business Manager (ABM)	
	☐	Key Account Manager (KAM)	
	☐	Technical Sales Support (TSS)	
	☐	Global Account Manager (GAM)	
	☐	Other job name. Please type in the name:	

5. How would you describe your practical experience with the products?			
Please rate your practical experience for each product according to the following categories.			
	I come from the technical area. Therefore I have experience in working with the product in a practical way.	My practical experience with the product does not go beyond the product trainings for sales personnel.	I have no practical experience with the product.
CRETA	☐	☐	☐
CAMEO	☐	☐	☐
fOX	☐	☐	☐

6. How would you describe your practical experience with the products?
Please rate your knowledge for each product according to the following categories (or of the related competing products)?

	I have a detailed knowledge of the methodology, the functionalities and features of the product.	I have a detailed knowledge about the features and the functionalities of the product.	I have a basic knowledge about the product and its basic functionalities.	I have almost none knowledge of the product.
CRETA	☐	☐	☐	☐
CAMEO	☐	☐	☐	☐
fOX	☐	☐	☐	☐
competing product of CRETA	☐	☐	☐	☐
competing product of CAMEO	☐	☐	☐	☐
competing product of fOX	☐	☐	☐	☐

Chapter 2 – Sales Theory and the term "buying centre"

1. Have you ever studied sales theory?		
	☐	Yes, I have learned about sales theory during my studies.
	☐	Yes, I have learned about sales theory on my own.
	☐	No, I have not been in contact with sales theory yet.
2. Have you ever heard the term buying centre? Do you know what is meant with this expression?		
	☐	I have heard the term and know the meaning behind it.
	☐	I have heard the term but do not know really what is meant with it.
	☐	I have never heard this term.
3. Are you familiar with the three "focus areas", which are used in saleforce.com to distinguish between people on the customer side? (These "focus areas" are also described in the book, Major Account Sales Strategy, written by Neil Rackham, which is the base for salesforce.com)		
(Hint: focus of receptivity, focus of dissatisfaction and focus of power)		
	☐	I have heard about the focus areas and I have a detailed understanding of them.
	☐	I have heard about the focus areas but I do not know what is meant with it.
	☐	I have never heard about the focus areas.
4. Can you remember sales theory you have heard about?		

Please enter the name or the founder of the theory you have in mind. (Multiple answers possible)									
5. How often do you apply sales theory in practice?									
always	☐	often	☐	sometimes	☐	seldom	☐	never	☐
6. Do you think that understanding sales theory could help you in your daily work?									
Yes	☐	No	☐	I'm not sure	☐				

Short Info: The Buying Centre

The term "buying centre"(BC) is used in literature to describe the group of people, who are anyhow involved in the purchasing decision on customer side. In general, the BC exists of employees of several organisational units of the customer. In addition, external consultants can be part of the BC, too (Sieck & Goldmann, 2007).

Understanding the structure of the BC, and the interaction of the people inside, is the target of many studies in the area of sales.

The Theory of BC distinguishes between different roles which can be allocated to people on client side. Depending on the literature, different wordings are used to describe several roles. However, the most common roles names which are used in the majority of the books are briefly described in the following:

User – This person directly uses the product for his daily work. He/She is the applicator and has therefore special interests in the usability of the product.

Buyer – He/She is the one who will be responsible for sales procedure after the decision is made. For small standard sales, he may have the power to make decisions on his own.

Influencer – The group of people has a major impact on the sales although they cannot decide on their own. They may have a specific knowledge which influences the decision or a special relationship to the decision maker.

Decider – He/She has the final say about the sale and the power to decide about a budget.

Gate Keeper – These are people who may open the door to decision makers or not. They can be seen as a kind of filter which you have to pass to get to the right person.

7. After reading the definition of the "buying centre", do you use a different wording for the term "buying centre" in your area?			
	☐	No	
	☐	Yes, please fill in the term:	
8. Do you use a different wording for the term "Buying Centre" in your area?			
	☐	No	

	☐	Yes, write down the expression you use:	

9. How well do you know the following roles of a buying centre?

Please rate the following roles types according to your personal knowledge.

	I know this role type of the buying centre and have a detailed understanding of it.	I have heard about the role type and have a basic understanding of it.	I have not heard this role type before.
Gatekeeper	☐	☐	☐
Influencer	☐	☐	☐
Decision Maker	☐	☐	☐
Specifier	☐	☐	☐
Buyer	☐	☐	☐
User	☐	☐	☐
Ratifier	☐	☐	☐
Initator	☐	☐	☐

10. Please write down what comes to your mind when you think about the focus areas of Salesforce.com (or Neil Rackham). Can you remember what idea stands behind the three areas?

Please use keywords for a short description or leave the box empty if you have no idea.

The three focus areas - Getting where it counts

According to Neil Rackham's account entering strategy, it can be distinguished between three different focus areas where you can find sponsors for your product. Sometimes one individual may act in more than one of these areas. Please read through the short explanation for each area.

The focus of receptivity: People of this area in an account are prepared to listen and show general interest of your product. They are not dissatisfied and do not have decision power.

The focus of dissatisfaction: Potential future users of your product which are dissatisfied because of specific problems with the present system. Your product is able to solve the problems of these people.

The focus of power: The elusive point in an account where people are able to make decisions.

Chapter 3 – Analysing the customer's purchasing structure

1. Before I go to the first meeting with a potential customer…

Please read through the following possible endings of the sentences and rate each of them according to your personal behaviour.

	Always True	Often True	Sometimes True	Seldom True	Never True
...I inform myself in detail about who will be my interview partner(s) on customer side.	☐	☐	☐	☐	☐
...I try to figure out the formal position of my interview partner(s). (E.g. the actual position in the organisation)	☐	☐	☐	☐	☐
...I think about what information, concerning the IC products, may be important and interesting for the different stakeholders (interest groups) on customer side.	☐	☐	☐	☐	☐
... I talk to colleagues of mine about their experiences with the customer. (In this case the customer is a new customer for IC products but has a history with other AVL products)	☐	☐	☐	☐	☐
...I look up the account in salesforce.com to inform myself about the account's history with AVL.	☐	☐	☐	☐	☐
...I prepare different presentations in order to be prepared for all scenarios on customer side.(E.g. a general product presentation for the management and a very detailed presentation for the potential users)	☐	☐	☐	☐	☐
...other important things. Please write down:					
...other important things. Please write down:					

2. With the beginning of the first (face-to-face) customer contact…

Please read through the following possible endings of the sentences and rate each of them according to your personal behaviour.

	Always True	Often True	Sometimes True	Seldom True	Never True
...I start to search intensively for individuals on customer side which may affect the purchasing decision.	☐	☐	☐	☐	☐

...I try to find a sponsor of my products as fast as possible. The sponsor helps me to understand the customer and opens the door to key people.	☐	☐	☐	☐	☐
...I start to rate people according to their negative or positive attitude to my product. I start to differ between "potential sponsors" and "enemies" (e.g. people who prefer the solution of a competitor).	☐	☐	☐	☐	☐
...I try to get in personal contact with as many people as possible to get a broad overview about individual opinions. Speaking with a lot of different people helps me to understand the relationship between the key people, the so-called informal structure.	☐	☐	☐	☐	☐
...other actions you do, please fill in					

3. Which of the following target groups are you facing at the first customer meeting?

Please rate the frequency for each of the following target group.

	Always the case	Often the case	Sometimes the case	Seldom the case	Never the case
Employees of the purchasing department	☐	☐	☐	☐	☐
End Users (e.g. calibration engineers or test bed staff)	☐	☐	☐	☐	☐
Managers (e.g. test facility managers)	☐	☐	☐	☐	☐
Innovators or Methodologists (e.g. employees of the R&D department)	☐	☐	☐	☐	☐
other category of people, please fill in if this is the case:					

4. Which of the following doings are typical subject matters of the first customer meeting?

	Always the case	Often the case	Sometimes the case	Seldom the case	Never the case
Presenting the product and its features, functions and application examples.	☐	☐	☐	☐	☐
Speaking with people of the customer in detail about their view of the problems.	☐	☐	☐	☐	☐

Presenting best practice examples of other users (story telling).	☐	☐	☐	☐	☐
Presenting IC offers: free trainings, implementation projects, test licenses etc…	☐	☐	☐	☐	☐
...other actions, please write down:					
5. The effort I put in understanding the customers purchasing structure and analysing the people who are involved depends on…					
Please read through the possible endings of this statement and rate each of them according to your personal behaviour.					
	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
...the potential sales size I see in an account.	☐	☐	☐	☐	☐
...the strategic value of the account (e.g. the customer of a current competitor).	☐	☐	☐	☐	☐
...the product im facing to sell.	☐	☐	☐	☐	☐
...another cause, please write down:					
6. After I have an understanding of the people on customer side that are involved in the customer decision process,..					
Please read through the following endings of the sentence and rate each of them according to your personal behaviour.					
	Always True	Often True	Sometimes True	Seldom True	Never True
...I think about setting up a sales team to make sure that everybody on customer's side has a contact partner which is able to answer their specific questions in a professional way.	☐	☐	☐	☐	☐
...I do not stop to analyse the customer's structure until I have a detailed understanding about the power deviation between the roles. I want to understand the informal structure.	☐	☐	☐	☐	☐
...I concentrate my actions on the most powerful person; I have identified (e.g. the decision maker)..	☐	☐	☐	☐	☐
...I try to get in personal contact with each of the identified target people to persuade them about the product I'm selling	☐	☐	☐	☐	☐
...others actions I perform. Please finish the sentence:					

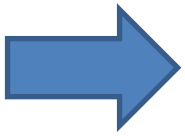
7. **All in all I would say that I'm always act in the same manner when facing a new customer contact!**						
Please rate this statement according to the following possibilities.						
I totally agree. I have often the same approach when entering and analysing a new account.	☐	☐	☐	☐	☐	**I do not agree**. My personal approach / strategy of entering and analysing a new account strongly depend on the situation and on the account.

8. **Can you give a rough explanation of your personal "standard" approach when entering a new account?**
Please mention the major steps you perform and explain them with a few keywords.

9. **Can you give a rough explanation of the steps you do when entering a new account?**
Please mention the major steps you perform and explain them with a few keywords.

Chapter 4 – Specialities of IC customer's and their buying centre

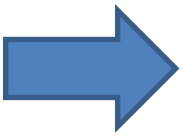
1. **In my opinion the "Buying Centre" for the following IC products differs from the typical "Buying Centre" of ITS hardware products.**						
Please rate the statement for each of the IC products according to the possible categories.						
	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	I have no experience
CRETA	☐	☐	☐	☐	☐	☐
CAMEO	☐	☐	☐	☐	☐	☐
fOX	☐	☐	☐	☐	☐	☐

2. **What is your general experience of the power deviation between different people on client side?**		
Please rank the following people according to their influence power on the decision process. Sort the following items from high influence to low influence (High is on top) by drag and drop the answer from the left to the right box.		
Test Facility Manager		Rank 1
Calibration Engineer		Rank 2
Test bed staff (besides calibration engineers)		Rank 3

Employees of the purchasing department		Rank 4
Innovators and Methodologists		Rank 5

3. When you think about power sources in the buying centre for IC products, how would you rank the following power sources according to their potential impact on the decision process?

Please sort the following items from high influence to low influence (high is on top) by drag and drop the items from the left to the right box.

hierarchical power (power because of hierarchical position)		Rank 1
expert knowledge (power because of good arguments and detailed knowledge about the topic)		Rank 2
informational power (power because of the access to special information which is used as arguments for individual preferences)		Rank 3
department power (power because of the belonging to a powerful department)		Rank 4

4. When you think about the sales stages which AVL is using, in which stage does the sale of IC products normally start?

Please select the stage for each products based on your experience of selling IC products.

	Stage 1: Recognition of needs	Stage 2: Evaluation of Options	Stage 3: Resolution of Concerns	I have no idea
CRETA	☐	☐	☐	☐
CAMEO	☐	☐	☐	☐
fOX	☐	☐	☐	☐

5. What is your personal strategy for each of following sales stages, when selling IC products?

Please describe your personal approach for each stage with a few keywords.

Recognition of Needs	
Evaluation of Options	
Resolution of Concerns	

6. How often do you use the following actions to create a "cold" or first customer contact?

(cold or first means that the customer has not bought any IC product yet.)

	Always	Often	Sometimes	Seldom	Never
Cold Calling	☐	☐	☐	☒	☐
Cold Mailing	☐	☐	☐	☐	☐
Direct customer acquisition on exhibitions or conferences	☐	☐	☐	☐	☐

I'm using the existing sales channel from AVL test bed hardware	☐	☐	☐	☐	☐
others:					
others:					

Chapter 5– Personal opinion and the attitude to sales theory of IC Sales people

1. Please rate the following statements according to your personal experience in selling IC products.

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
The final sales decision is a result of a group preference. Several people are involved in the development of the group opinion.	☐	☐	☐	☐	☐
Often there is a strong imbalance in the power deviation between different group members.	☐	☐	☐	☐	☐
The constellation of the buying centre strongly differs from account to account.	☐	☐	☐	☐	☐
The final sales result is based on rational decisions. Individual emotions are not influencing the group decision.	☐	☐	☐	☐	☐
The buying centre is no formal group of the customer's organisation. It can be seen as an ad-hoc (improvised and temporary) team, which is only set up for deciding about the purchase of IC products.	☐	☐	☐	☐	☐
Especially for IC products, the understanding of "Getting where it counts", which means in other words analysing the buying centre, is the base for long-term sales success.	☐	☐	☐	☐	☐
For me, finding a powerful sponsor is more important than understanding the customer's purchasing structure.	☐	☐	☐	☐	☐

2. What is your opinion concerning the direct connection between sales success and sales theory?

Please rate according to your personal experience.

Sales Theory is the key to sales success.	☐	☐	☐	☐	☐	I do not need sales theory for successful selling IC products.

3. Imagine yourself in a customer discussion with a customer: If you get a question you cannot answer - e.g. a question concerning the mathematical background of the methodology - how do you react?

Note: multiple Answers are possible	
I apologise for not being a technical specialist in this area and promise to come back with answers as soon as possible.	☐
I try to overcome the question by answering it in a very general way.	☐
I apologise for not being a technical specialist in this area and directly refer to an expert.	☐
I act in a different way:	☐

4. In your point of view, what is the major challenge in selling IC products?

Please share your opinion in a view words.

5. Can you remember a sales case where only one person represented all three focus areas?

No.	
Yes. Please write down which product was sold in this case:	

Chapter 6 – Documentation and Supporting Tools

1. How often do you document the information you have gathered in an customer meeting?

always	☐	often	☐	sometimes	☐	seldom	☐	never	☐

2. Which media do you use for documenting information about a specific account?

Please write your answer in the box below.

3. How often do you use the following supporting tools during the identification of the customers purchasing structure?

	Always	Often	Sometimes	Seldom	Never
maps, charts, sketches to illustrate structures and relationships	☐	☐	☐	☐	☐
written guidelines which guide me through the process of understanding the customers purchasing structure	☐	☐	☐	☐	☐
question list help me to ask the right questions to the right people	☐	☐	☐	☐	☐
social media platforms give me personal Information about different people.	☐	☐	☐	☐	☐

Salesforce.com	☐	☐	☐	☐	☐
I use other tools:					

A7 Untouched results of the international sales survey

Chapter 1 – Personal Information and Sales Experience

1. How long have you been working in the area of sales?

less than 1 year	5
between 1 and 2 years	4
between 3 and 5 years	2
between 6 and 9 years	3
more than 10 years	5
Basis	19

2. Since when do you sell IC products?

less than 1 year	6
between 1 and 2 years	4
between 3 and 5 years	4
between 6 and 9 years	2
more than 10 years	3
Basis	19

3. In which geographical region did you gain your sales experience?

Europe (9); Japan (1); China (2); India (1)

4. What is the name of your actual position inside AVL?

Sales Engineer	2	
Affiliate Business Manager (ABM)	4	
Key Account Manager (KAM)	2	
Technical Sales Support (TSS)	8	
Regional Business Manager (RBM)	1	
Global Account Manager (GAM)	1	
Other job name. Please type in the name:	1	Application service
Basis	19	

5. How would you describe your practical experience with the products?

CRETA	
I come from the technical area. Therefore I have experience in working with the product in a practical way.	3
My practical experience with the product does not go beyond the product trainings for sales personnel.	10
I have no practical experience with the product.	6
Basis	19
CAMEO	
I come from the technical area. Therefore I have experience in working with the product in a practical way.	8
My practical experience with the product does not go beyond the product trainings for	6

sales personnel.	
I have no practical experience with the product.	5
Basis	19
fOX	
I come from the technical area. Therefore I have experience in working with the product in a practical way.	3
My practical experience with the product does not go beyond the product trainings for sales personnel.	10
I have no practical experience with the product.	6
Basis	19

6. How would you describe your practical experience with the products?

CRETA	
I have a detailed knowledge of the methodology, the functionalities and features of the product.	4
I have a detailed knowledge about the features and the functionalities of the product.	2
I have a basic knowledge about the product and its basic functionalities.	13
I have almost none knowledge of the product.	0
Basis	19
CAMEO	
I have a detailed knowledge of the methodology, the functionalities and features of the product.	6
I have a detailed knowledge about the features and the functionalities of the product.	2
I have a basic knowledge about the product and its basic functionalities.	11
I have almost none knowledge of the product.	0
Basis	19
fOX	
I have a detailed knowledge of the methodology, the functionalities and features of the product.	2
I have a detailed knowledge about the features and the functionalities of the product.	3
I have a basic knowledge about the product and its basic functionalities.	11
I have almost none knowledge of the product.	3
Basis	19
competing product of CRETA	
I have a detailed knowledge of the methodology, the functionalities and features of the product.	0
I have a detailed knowledge about the features and the functionalities of the product.	1
I have a basic knowledge about the product and its basic functionalities.	10
I have almost none knowledge of the product.	4
Basis	15
competing product of CAMEO	
I have a detailed knowledge of the methodology, the functionalities and features of the product.	0
I have a detailed knowledge about the features and the functionalities of the product.	2
I have a basic knowledge about the product and its basic functionalities.	9
I have almost none knowledge of the product.	4
Basis	15
competing product of fOX	

I have a detailed knowledge of the methodology, the functionalities and features of the product.	0
I have a detailed knowledge about the features and the functionalities of the product.	0
I have a basic knowledge about the product and its basic functionalities.	5
I have almost none knowledge of the product.	8
Basis	13

Chapter 2 – Sales Theory and the term "Buying Centre"

1. Have you ever studied sales theory?

Yes, I have learned about sales theory during my studies.	8
Yes, I have learned about sales theory on my own.	10
No, I have not been in contact with sales theory yet.	2
Basis	19

2. Have you ever heard the term buying centre? Do you know what is meant with this expression?

I have heard the term and know the meaning behind it.	16
I have heard the term but do not know really what is meant with it.	3
I have never heard this term.	0
Basis	19

3. Are you familiar with the three "focus areas", which are used in saleforce.com to distinguish between people on the customer side? (These "focus areas" are also described in the book, Major Account Sales Strategy, written by Neil Rackham, which is the base for salesforce.com)

I have heard about the focus areas and I have a detailed understanding of them.	14
I have heard about the focus areas but I do not know what is meant with it.	4
I have never heard about the focus areas.	1
Basis	19

4. Can you remember sales theory you have heard about?

Rackham (11); Books of KAM (2); Books of CRM (1); other theories, Kotler, Infoteam, Nice Model (3); not in contact with theory yet (1)

5. How often do you apply sales theory in practice?

always	3
often	7
sometimes	5
seldom	0
never	0
Basis	15

6. Do you think that understanding sales theory could help you in your daily work?

Yes	3
No	0
I'm not sure	1
Basis	4

7. After reading the definition of the "Buying Centre", do you use a different wording for the term "Buying Centre" in your area?

No	3
Yes. Please fill in the term you use instead in the following box:	0
Basis	3

8. Do you use a different wording for the term "Buying Centre" in your area?

No.	16
Yes. Please write down the expression you use:	0
Basis	16

9. How well do you know the following roles of a buying centre?

	I know this role type of the buying centre and have a detailed understanding of it.	I have heard about the role type and have a basic understanding of it.	I have not heard this role type before.	Base
Gatekeeper	9	4	3	16
Influencer	13	3	0	16
Decision Maker	14	2	0	16
Specifier	8	2	6	16
Buyer	13	2	0	15
User	15	1	0	16
Ratifier	6	1	9	16
Initator	8	2	6	16

10. Please write down what comes to your mind when you think about the focus areas of Salesforce.com (or Neil Rackham). Can you remember what idea stands behind the three areas?

- Marketing Sales Service
- Knowing the decision maker, deal with competition, understand buyer psychology, and service the customer
- sales reporting, knowledge database, in future: forecasting tool
- too complex to use every day
- recognition of need evaluation of options resolution of concerns
- poor usability of website poor data quality on Salesforce.com variation in usage of salesforce.com by different affiliates and individuals
- CRM; Sales Process;
- RON (Recognition of need) is the entrance for us to promote our products.in EoO stage, we need investigate the competitor if it exist.
- Collaboration
- Decision Criteria
- information platform for whole sales process, detailed customer information about needs/opportunities, buying center, actual setup, history, etc., information about AVL contacts/meetings (topics, people)

- FoD = Tells about how much the person out of the Buying Centre is dissatisfied with the current solution FoP = Tells about how much the person out of the Buying Centre has power to decide for the best solution FoR = Tells about how much the person out of the Buying Centre is open for reception

Chapter 3 – Analysing the customer's purchasing structure

1. Before I go to the first meeting with a potential customer,…

	Always True	Often True	Sometimes True	Seldom True	Never True	Base
...I inform myself in detail about who will be my interview partner(s) on customer side.	12	6	0	0	0	18
...I try to figure out the formal position of my interview partner(s). (E.g. the actual position in the organisation)	11	5	2	0	0	18
...I think about what information, concerning the IC products, may be important and interesting for the different stakeholders (interest groups) on customer side.	13	5	0	0	0	18
... I talk to colleagues of mine about their experiences with the customer. (In this case the customer is a new customer for IC products but has a history with other AVL products)	7	9	1	1	0	18
...I look up the account in salesforce.com to inform myself about the account's history with AVL.	6	4	4	3	1	18
...I prepare different presentations in order to be prepared for all scenarios on customer side.(E.g. a general product presentation for the management and a very detailed presentation for the potential users)	4	6	6	2	0	18

...other important things. Please write down:

- Current status of projects
- get information on customer's product portfolio - what is important to them? e.g. quality or price, etc...
- I try to get the information what the customer suffer from regarding calibration methodology.
- Who are we competing against
- understand customer needs first

- check internet for information about company and/or persons
- ... I hear as much as possible what customers wants to achieve and also check what their headquarter is using in terms os similar possible solution.
- Service situation (open issues)
- Current Calibartion Process

2. With the beginning of the first (face-to-face) customer contact,…

	Always True	Often True	Sometimes True	Seldom True	Never True	Base
...I start to search intensively for individuals on customer side which may affect the purchasing decision.	6	8	3	1	0	18
...I try to find a sponsor of my products as fast as possible. The sponsor helps me to understand the customer and opens the door to key people.	5	8	5	0	0	18
...I start to rate people according to their negative or positive attitude to my product. I start to differ between "potential sponsors" and "enemies" (e.g. people who prefer the solution of a competitor).	6	8	4	0	0	18
...I try to get in personal contact with as many people as possible to get a broad overview about individual opinions. Speaking with a lot of different people helps me to understand the relationship between the key people, the so-called informal structure.	4	11	3	0	0	18

...other actions you do, please fill in:

- Get in contact with other customer or area who may know about
- I try to withdraw the needs or concern for their task.
- making contacts for the new face to my coaches

3. Which of the following target groups are you facing at the first customer meeting?

	Always the case	Often the case	Sometimes the case	Seldom the case	Never the case	Base
Employees of the purchasing department	0	1	5	5	7	18
End Users (e.g. calibration engineers	9	5	4	0	0	18

or test bed staff)						
Managers (e.g. test facility managers)	6	6	6	0	0	18
Innovators or Methodologists (e.g. employees of the R&D department)	3	8	5	1	1	18
other category of people, please fill in if this is the case:	decision maker IT administrators					

4. Which of the following doings are typical subject matters of the first customer meeting?

	Always the case	Often the case	Sometimes the case	Seldom the case	Never the case	Base
Presenting the product and its features, functions and application examples.	10	4	3	0	0	17
Speaking with people of the customer in detail about their view of the problems.	10	7	1	0	0	18
Presenting best practice examples of other users (story telling).	3	7	7	1	0	18
Presenting IC offers: free trainings, implementation projects, test licenses etc…	4	2	4	6	1	17
...other actions, please write down:						
• For Customer visit I always try to have a TSS for IP with me						

5. The effort I put in understanding the customers purchasing structure and analysing the people who are involved depends on…

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	Base
...the potential sales size I see in an account.	3	10	3	1	0	17
...the strategic value of the account (e.g. the customer of a current competitor).	13	3	1	1	0	18
...the product I'm facing to sell.	3	8	5	1	0	17
...another cause, please write down:	How much the customer suffers from inefficiency in their current calibration process, or methodology.					

6. After I have an understanding of the people on customer side that are involved in the customer decision process...

	Always True	Often True	Sometimes True	Seldom True	Never True	Base
...I think about setting up a sales team to make sure that everybody on customer's side has a contact partner, which is able to answer their specific questions in a professional way.	5	9	3	1	0	18
...I do not stop to analyse the customer's structure until I have a detailed understanding about the power deviation between the roles. I want to understand the informal structure.	5	9	2	2	0	18
...I concentrate my actions on the most powerful person; I have identified (e.g. the decision maker)..	4	8	4	1	0	17
...I try to get in personal contact with each of the identified target people to persuade them about the product I'm selling	2	5	6	5	0	18
...others actions I perform. Please finish the sentence:	No Answer					

7. All in all I would say that I'm always act in the same manner when facing a new customer contact!

I totally agree. I have often the same approach when entering and analysing a new account.	1	6	0	6	5	**I do not agree**. My personal approach / strategy of entering and analysing a new account strongly depend on the situation and on the account.
Base: 18						

8. Can you give a rough explanation of your personal "standard" approach when entering and analysing a new account?

- collecting online-Information (SFDC, Google,...); collecting internal Information (across PTE/ITS/AST); - summarize collected Information on product Status of customer (HD(LD...), future plans (Investments, etc.), installed base of Technology (AVL, competition), Organisation and structure incl. staffing; - Approach relevant Level at customer for certain product; - start with overview of AVL IC/MO performance and capabilities; - invite for Meeting at HQ to strengthen contacts and build-up trust; - close social contact inviting for dinner/lunch/Business Events (usually including social Events)
- Pipeline- standard presentation on product functions and advantage; get customer real needs; evaluation phase-provide the application case to fit customer requirement; decision phase-response customer ASAP to respect them. And gather information on customer feedback

about our IC product.

- First I try to get as much information about the company and persons, from AVL departments, KAM's, Salesforce, private contacts (calibration Mafia), analyse situation on customer side (tasks, AVL tools, competitor tools, manpower, etc.), define personnel strategies

9. Can you give a rough explanation of the steps you do when entering and analysing a new account?

- Hat der Kunde bereits Produkte von uns? Wie ist die Historie? Wurde bereits eines meiner Produkte in der Vergangenheit vorgestellt? Haben wir eventuell AVLer beim Kunden vor Ort arbeiten? Wer ist der richtige Ansprechpartner für mich beim Kunden?
- Uncover dissatisfaction Find a solution Address the right people
- As KAM I have only one account, so most times my partners at customer are known and not new
- Understand the customer's product portfolio and overall product strategy - try to identify any need for our products prior to the meeting 2. Check salesforce.com and/or speak to ITS staff who are familiar with the account to gain additional information (e.g. do they have any money this financial year, what is their rough R&D spend each year, how much is going to AVL, etc...) 3. Find out whether the customer is familiar with our products, or if presentations have been made before... etc.
- Meet & Greet - introduction - Listening to customer
- Do not neglect after-service for heavy user of IC products, and they introduce us other potential customer. Cooperate with sales colleague. They have contacts in the customer with wide range in AVL products.
- Understand the calibration process of the customer. Identifying Team structure. Identifying Power centres.
- Meet customer and discover their problem, tell story and create the needs. arrange professional support to show them AVL solution, convince them this solution is ideal tool for customer development
- I try to understand how the first contact was initiated, if it was not me for that, - I try to understand what they do and what they want to do with AVL; - I investigate the buying centre; Set-up a campaign (what includes sales team according to buying centre, real successful examples) and always a DEMO project.

Chapter 4 – Specialities of IC customer's and their Buying Centre

1. In my opinion the "Buying Centre" for the following IC products differs from the typical "Buying Centre" of ITS hardware products.

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	I have no experience	Base
CRETA	6	5	2	1	2	2	18
CAMEO	5	5	2	3	2	1	18
fOX	7	4	1	1	2	3	18

2. What is your general experience of the power deviation between different

people on client side?

	Rank1	Rank2	Rank3	Rank4	Rank5	Rank6	Base
Test Facility Manager	5	7	3	2	1	0	18
Calibration Engineer	5	5	6	1	0	1	18
Test bed staff	1	1	2	2	8	4	18
Employees of the purchasing department	1	0	1	3	4	9	18
Innovators and Methodologists	4	4	3	6	0	1	18
Employees of the R&D department	2	1	3	4	5	0	18

3. When you think about power sources in the buying centre for IC products, how would you rank the following power sources according to their potential impact on the decision process?

	Rank 1	Rank 2	Rank 3	Rank 4	Base
hierarchical power	4	5	6	3	18
expert knowledge	9	5	3	1	18
informational power	2	5	4	7	18
department power	3	3	5	7	18

4. When you think about the sales stages which AVL is using, in which stage does the sale of IC products normally start?

	Stage 1: Recognition of needs	Stage 2: Evaluation of Options	Stage 3: Resolution of Concerns	I have no idea	Base
CRETA	13	3	1	0	17
CAMEO	10	5	2	0	17
fOX	10	1	2	4	17

5. What is your personal strategy for each of following sales stages, when selling IC products?

Recognition of Needs:

- Information on how the product can solve customer needs
- evaluation of application at customer and cross-check with product-portfolio AVL offers
- try to find out problems and needs of customer
- time and cost savings during calibration process
- listening
- present advanced methodology behind IC products

- get know of customer business; new technical info and government legislation
- Meeting
- listen to customer and find their pain
- getting information before first contact, meeting potential users
- check how things are done and how they can be improved

Evaluation of Options

- Information on how the product fits better customer needs
- evaluation of competitive offers (performance, price,...)
- try to find out more info's about actual used products and possible competitors
- demonstrate how IC products work (not presentation).
- provide useful case and good people to support customer get better known of IC product
- Asking for Demo Installation
- tell story and demo
- meetings, workshops, demos
- product comparison based on AVL experts / examples of success given to the customer

Resolution of Concerns

- Find ways to counteract concerns
- negotiation with customer starts here
- find out ranking of customer depending to competition
- Detailed discussion on face-to-face meeting.
- Demo project, walking with customers, no disappear in customer site
- WebEx Workshop with Experts
- demo & support
- regular contacts, discussions, provide additional specific information
- demo project

6. How often do you use the following actions to create a "cold" or first customer contact?

	Always	Often	Sometimes	Seldom	Never	Base
Cold Calling	2	2	6	4	4	18
Cold Mailing	1	4	8	3	2	18
Direct customer acquisition on exhibitions or conferences	2	10	5	1	0	18
I'm using the existing sales channel from AVL test bed hardware	6	10	2	0	0	18

others:

- My customer mostly contact me for needs
- through links developed by AVL calibration department (PTE)
- contact with help of other customers
- colleague presentation
- LinkedIn

Chapter 5– Personal opinion and the attitude to sales theory of IC Sales people

1. Please rate the following statements according to your personal experience in selling IC products.

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree	Base
The final sales decision is a result of a group preference. Several people are involved in the development of the group opinion.	7	8	1	0	0	16
Often there is a strong imbalance in the power deviation between different group members.	4	7	3	2	0	16
The constellation of the Buying Centre strongly differs from account to account.	4	6	4	2	0	16
The final sales result is based on rational decisions. Individual emotions are not influencing the group decision.	2	6	4	2	2	16
The buying centre is no formal group of the customer's organisation. It can be seen as an ad-hoc (improvised and temporary) team which is only set up for deciding about the purchase of IC products.	1	7	4	4	0	16
Especially for IC products, the understanding of "Getting where it counts", which means in other words analysing the buying centre, is the base for long-term sales success.	3	9	3	1	0	16
For me, finding a powerful sponsor is more important than understanding the customer's purchasing structure.	2	7	1	6	0	16

2. What is your opinion concerning the direct connection between sales success and sales theory?

Sales Theory is the key to sales success.	0	6	8	1	1	I do not need sales theory for successful selling IC products.
Base: 16						

3. Imagine yourself in a customer discussion with a customer: If you get a question you cannot answer - e.g. a question concerning the mathematical background of the methodology - how do you react?

I apologise for not being a technical specialist in this area and promise to come back with answers as soon as possible.	8
I try to overcome the question by answering it in a very general way.	1

I apologise for not being a technical specialist in this area and directly refer to an expert.	5
I act in a different way:	3
I usually try to call an expert right away to (a) answer the question and (b) agree on another meeting including the expert I try to have a follow up meeting with the expert I try to answer in general and then ask them to wait for the detailed answer.	
Base: 16	

4. In your point of view, what is the major challenge in selling IC products?

- SERVICE!
- Challenging the current methodology. Many departments are involved, it's a big risk for the customer, so he has to be 100% convinced.
- Market saturation
- besides all mentioned before the added value of our products cannot be delivered in a simple way, in other words: why should one customer change from his "properly working" in-house tool or Excel or Matlab to AVL Solutions > conservative buying behaviour and internal politics at customer side;
- find the right decision maker into the company
- compete to existing products inside a customer
- to have the technical depth the customer need for discussions 2. My customers are regional (Tier 2 or Universities) Only very less of this are involved in efficient optimisation methods
- IC products are not as good as they can be. A good product sells itself...
- Perfectly understand the customer problems/needs and find the best technical solution through our tools to solve them.
- Recognition of customer's needs. many of the customers does not still recognise the needs to overcome inefficiency in their own calibration method. or they prefer to go in their own method.
- application discussion in real case, many specific questions challenged to our product; less resources in application support, only in product level, not deeper on methodology with real calibration development
- Amount of Calibration activities is low
- build in AVL tools to customer existing process
- new customer: show usage in customer environment to convince, get chance for real evaluations - IC user (customer already bought): satisfaction, roll-out, care to keep/improve relationship over a long period of time
- Sometimes Product complexity and the moment of the market.

5. Can you remember a sales case where only one person represented all three focus areas?

No.		16
Yes. Please write down which product was sold in this case:	CRETA	1
Base:		17

Chapter 6 – Documentation and Supporting Tools

1. How often do you document the information you have gathered in an customer meeting?

always	4	often	8	sometimes	3	seldom	1	never	0
Base: 16									

2. Which media do you use for documenting information about a specific account?

- Office
- Excel, sharepoint
- eMail - SalesForce
- Memo
- SFDC
- MoM in Word
- salesforce
- SFDC ,e-mail, sharepoint
- salesforce, outlook, my personal notes
- SFDC
- e-mail
- MS office
- One Note and Salesforce and Mails
- Vedio, presentation
- eMail
- local server, sharepoint, email and SFDC

3. How often do you use the following supporting tools during the identification of the customers purchasing structure?

	Always	Often	Sometimes	Seldom	Never	Base
maps, charts, sketches to illustrate structures and relationships	2	5	4	5	0	16
written guidelines which guide me through the process of understanding the customers purchasing structure	0	3	6	6	1	16
question list help me to ask the right questions to the right people	1	7	5	2	1	16
social media platforms give me personal information about different people.	0	7	1	5	3	16
Salesforce.com	5	6	3	2	0	16
I use other tools:	MS Office					3

A8 Typical test cell configuration

The following picture shows the typical test cell configuration of an engine test bed.

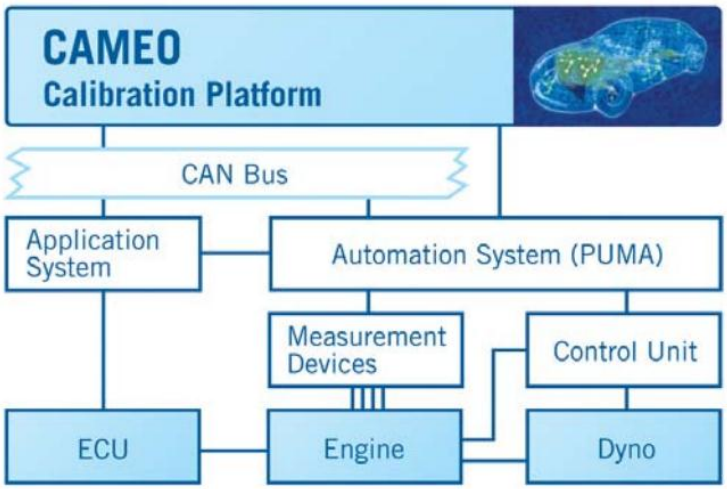


Figure 71: Typical Test Cell Configuration (AVL List GmbH, 2009, p. 2)(AVL List GmbH, 2009, p. 2)

A9 Mathematical background of the calculation of the part-worth utilities and relative importance with SPSS CONJOINT

According to Klein (2002), the procedure CONJOINT of SPSS 21 is using a simple OLS-Regression algorithm to estimate the part-worth utilities of the attribute levels of the target product group (p. 27)(p. 27). Next, as Hillig (2006) describes, the starting equation for the OLS- Regression can be derived from the basic '*preference structure model*' (see chapter 2.3.4.3.1) of the conjoint analysis (p. 49)(p. 49). As the programmed procedure CONJOINT only uses the DISCRETE model which correlates with the attribute-specific evaluation function called '*model of separate part-worth utilities*' (see point 2 in chapter 2.3.4.3.3), the parameterised preference structure can be described with Equation 5.

$$U_{kn} = \sum_{j=1}^{J} \sum_{m=1}^{M_j} \beta_{jnm} x_{jkm}$$

With:

U_{kn} = overall utility of stimulus k, assessed by test subject n

β_{jnm} = part-worth utility for attribute-level m of attribute j for the test subject n

x_{jkm} = dummy variable $\begin{cases} 1, \text{if stimulus k has a attribute j with an attribute level m} \\ 0, \text{ otherwise} \end{cases}$

M_j = amount of possible manifestations of attributes (number of possible attribute-levels)

J = amount of all attributes

Equation 5: Parameterised preference structure model (in adaption of Klein, 2002, p.25)

Based on Equation 5, the initial equation of the OLS-Regression can be derived as illustrated in Equation 6 (Hillig, 2006, p. 49) (Hillig, 2006, p. 49).

$$\dot{U}_{kn} = \widehat{\mu_n} + \sum_{j=1}^{J} \sum_{m=1}^{M_j} \hat{\beta}_{jnm} x_{jkm}$$

With:

$\dot{U}_{kn}$= estimated overall utility of stimulus k, assessed by test subject n

$\widehat{\mu_n}$ = estimated basic utility

$\hat{\beta}_{jnm}$= estimated part-worth utility for attribute-level m of attribute j for the test subject n

x_{jkm} = dummy variable $\begin{cases} 1, \text{if stimulus k has a attribute j with an attribute level m} \\ 0, \text{otherwise} \end{cases}$

M_j= amount of possible manifestations of attributes (number of possible attribute-levels)

Equation 6: Initial equation of the OLS-Regression (in adaption of Hillig, 2006, p.49)

Finally, the target criterion according of the ordinary leas squares estimation, which demands to minimise the sum of the quadratic differences between the estimated and empirical measured overall utility values, is formulated in Equation 7 (Hillig, 2006, p. 49)(Hillig, 2006, p. 49).

$$\sum_{k=1}^{K} (U_{kn} - \dot{U}_{kn})^2 = \sum_{k=1}^{K} (U_{kn} - [\widehat{\mu_n} + \sum_{j=1}^{J} \sum_{m=1}^{M_j} \hat{\beta}_{jnm} x_{jkm}])^2 \rightarrow \min_{\hat{\beta}_{jnm}} !$$

With:

U_{kn}= overall utility of stimulus k, assessed by test subject n

β_{jnm} = part-worth utility for attribute-level m of attribute j for the test subject n

x_{jkm} = dummy variable $\begin{cases} 1, \text{if stimulus k has a attribute j with an attribute level m} \\ 0, \text{otherwise} \end{cases}$

M_j= amount of possible manifestations of attributes (number of possible attribute-levels)

$\dot{U}_{kn}$= estimated overall utility of stimulus k, assessed by test subject n

$\widehat{\mu_n}$ = estimated basic utility

$\hat{\beta}_{jnm}$= estimated part-worth utility for attribute-level m of attribute j for the test subject n

x_{jkm} = dummy variable $\begin{cases} 1, \text{if stimulus k has a attribute j with an attribute level m} \\ 0, \text{otherwise} \end{cases}$

M_j= amount of possible manifestations of attributes (number of possible attribute-levels)

K = Total amount of stimuli

Equation 7: The OLS-Regression equation with target criterion

According to Klein (2002), the part-worth utilities calculated with the SPSS are interval-scaled data, which are measured on a standardised scale for each individual (BC member). Therefore the static-methodical pre-conditions for the calculation of the relative attribute importance on an intra-individual level are given. Finally, the relative attribute importance,

which can interpreted as quantitative measurement of the relative contribution of an part-worth utility to the overall utility, can be calculated as illustrated in Equation 8 (Klein, 2002, pp. 26-29) (Klein, 2002, pp. 26-29).

$$i_{jn} = \frac{\max_m(\hat{\beta}_{jnm}) - \min_m(\hat{\beta}_{jnm})}{\sum_{j=1}^{J}[\max_m(\hat{\beta}_{jnm}) - \min_m(\hat{\beta}_{jnm})]}$$

With:

i_{jn} = relative importance of attribute j for the preference change of test subject n

$\max_m(\hat{\beta}_{jnm})$ = maximal part-worth utility of attribute j for test subject n

$\min_m(\hat{\beta}_{jnm})$ = maximal part-worth utility of attribute j for test subject n

Equation 8: Calculation of the relative importance of a product attribute (in adaption of Klein, 2002, p. 29)

A10 Calculation of the transformed overall utility value on individual level

The following tables will present the calculation of the group-related overall utility value for the three products, [redacted], Competitor and In-house. In this case the group is represented by the BC for the software product [redacted] of the customer [redacted]. The first four tables represent the

BC Member [redacted]				
		Part-worth utilities of the products:		
Attributes	Attribute-levels	[redacted]	Competitor	In-house
DC	Reporting			
	Monitoring		0.667	0.667
	Notifying	0.500		
C	1 Month			1.833
	3 Month	-0.333		
	5 Month		-1.500	
AoD	World-wide	-0.333		
	Company-wide		0.833	
	Department-wide			-0.500
ME	Reference Value			
	Reference Value +20%		0.167	0.167
	Reference Value -20%	0.500		
U	Easy	5.833		
	Moderate			-0.667
	Demanding		-5.167	
ROI	18 Month	-0.833	-0.833	
	13,5 Month			0.500
	22,5 Month			
Constant Value (μ_n)		9.5		
Overall Utility Value (U_{kn})		**14.833**	**3.667**	**11.500**
Consideration of the limit card				
limit card after Rank		12		
Transformed overall utility value (U_{kn}^{L})		**8.333**	**-2.833**	**5.000**

BC Member [redacted]				
Attributes	Attribute-Levels	[redacted]	Competitor	In-house
DC	Reporting			
	Monitoring		-0.833	-0.833
	Notifying	5.667		
C	1 Month			0.333
	3 Month	-0.833		
	5 Month		0.500	
AoD	World-wide	-1.333		
	Company-wide		1.000	
	Department-wide			0.333
ME	Reference Value			
	Reference Value +20%		-1.500	-1.500
	Reference Value -20%	1.667		
U	Easy	2.167		
	Moderate			-1.000
	Demanding		-1.167	
ROI	18 Month	1.333	1.333	
	13,5 Month			0.000
	22,5 Month			
Constant Value (μ_n)		9.5		
Overall Utility Value (U_{kn})		**18.167**	**8.833**	**6.833**
Consideration of the limit card				
limit card after Rank		10		
Transformed overall utility value (U_{kn}^{L})		**9.667**	**0.333**	**-1.667**

BC Member [redacted]				
Attributes	Attribute-Levels	[redacted]	Competitor	In-house
DC	Reporting			
	Monitoring		-0.333	-0.333
	Notifying	0.333		
C	1 Month			0.000
	3 Month	0.167		
	5 Month		-0.167	
AoD	World-wide	4.000		
	Company-wide		2.000	
	Department-wide			-6.000
ME	Reference Value			
	Reference Value +20%		-3.333	-3.333
	Reference Value -20%	3.333		
U	Easy	0.167		
	Moderate			-0.167
	Demanding		0.000	
ROI	18 Month	-0.333	-0.333	
	13,5 Month			0.833
	22,5 Month			
Constant Value (μ_n)		9.5		
Overall Utility Value (U_{kn})		**17.167**	**7.333**	**0.500**
Consideration of the limit card				
limit card after Rank		14		
Transformed overall utility value (U^{L}_{kn})		**12.667**	**2.833**	**-4.000**

BC Member Employee of [redacted]				
Attributes	Attribute-Levels	[redacted]	Competitor	In-house
DC	Reporting			
	Monitoring		0.167	0.167
	Notifying	0.000		
C	1 Month			0.000
	3 Month	0.500		
	5 Month		-0.500	
AoD	World-wide	0.667		
	Company-wide		0.000	
	Department-wide			-0.667
ME	Reference Value			
	Reference Value +20%		-4.667	-4.667
	Reference Value -20%	4.000		
U	Easy	0.500		
	Moderate			-0.333
	Demanding		-0.167	
ROI	18 Month	0.667	0.667	
	13,5 Month			4.000
	22,5 Month			
Constant Value (μ_n)		9.5		
Overall Utility Value (U_{kn})		**15.833**	**5.000**	**-1.500**
Consideration of the limit card				
limit card after Rank		17		
Transformed overall utility value (U_{kn}^{L})		**14.333**	**3. 500**	**6.500**

A11 Calculation of the relative attribute importance on group level

	relative attribute importance on individual level (%)				Relative attribute importance on group level (%)
Attributes	TR	MCT	IT	PE	
DC	9.2	45.0	3.4	1.6	19.8
C	16.7	5.7	1.7	4.8	7.8
AoD	6.7	10.0	51.7	6.4	16.0
ME	5.8	13.6	34.5	41.6	20.4
U	55.0	14.3	1.7	4	21.3
ROI	6.7	11.4	6.9	41.6	14.8
Relative Influence of BC members (weighting factor)	0.273	0.364	0.182	0.182	

The calculation of the relative attribute importance on group level is done by multiplying the relative attribute importance on individual level (adapted from appendix A3) with the relative influence of the BC members (adapted from appendix A3) and finally adding up the calculated values. The following table shows an example of the calculation.

Relative attribute importance on group level for attribute DC:
9.2%*0.273+45.0%*0.364+3.4%*0.182+1.6%*0.182 = 19.8%

A12 Interview Guidelines

Interview 1	
Interview Name	Structure and Process of Sales and Marketing in department IC
Date/Location	16.03.2013/Graz
Interviewer	Markus Drescher
Interview Partner	Morgan Lee Cossec
Position description	Business Development Manager, since 2 years
Responsible for	Collecting and spreading updates of the 3 products to the affiliates, Monitoring the business strategy of the affiliates But has no power to force something at the affiliates
Documentation medium	Transcript

Questions:

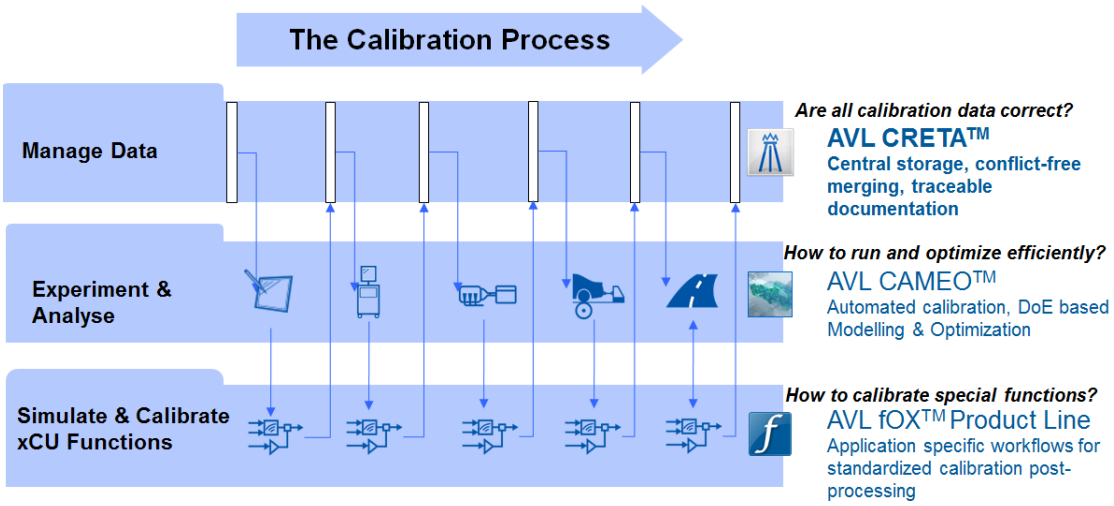
- How are Sales and Marketing organized in AVL and in department IC? Is there a separated Marketing division for CRETA, CAMEO and fOX? Is there a separation of Sales and Marketing?
- Can you give me information about the actual market situation concerning Calibration Software Tools?
- Where would you locate the three products in the Porters Generic Strategy Matrix?
- Who are the main competitors in this area? Benchmark?
- Where would you locate the different software products in innovation s-curve or the other life cycle curve (MBI) Script?
- What's the approach to acquire a total new customer? Sponsoring?
- Has a potential user access to detailed information about the features of the programs if he wants to inform himself online. Does DEMO videos exist? Are there DEMO licenses available? How long does it take? DEMO Project for free? Costs?
- Who are the users of the software products?
- Is there a transparent pricing for the programs and care packages? Are they visible for the public?
- After the sales decision: What are the main subjects of sales negotiations? Price, service contracts, others?
- How did previous customers notice AVL Calibrations Software Products? Are they all hardware customers too?
- Are the Users confident with the software? Do they give feedback? How? What are the responses? Are they in constant contact with AVL-support people?
- Sales development of the last years? Sales Statistics?
- What is the actual marketing approach? How is it organized? What marketing gadgets are using the sales guys? TSS?

- Sales people are concentrated on hardware sales? Why?
- Is Social Media already used?

Interview 2	
Interview Name	Explanation of the AVL Calibration Process
Date/Location	26.07.2013/Graz
Interviewer	Markus Drescher
Interview Partner	Eike Martini
Position description	Head of Department IC
Documentation medium:	Audio recorded with dictating machine

Questions

- How would you describe the following picture of the overall calibration process. What happens in the single phases?



- How would you describe the product fOX in general?
- What are the differences between fOX and fOXLAB?

Interview 3	
Interview Name	Info Hunting for quantitative BC Analysis
Date/Location	22.05.2013
Interviewer	Markus Drescher
Interview Partner	[redacted]
Position description	Department Manager ITS/ICD
Documentation medium:	Transcript

Questions

- Which Customer would fit best for the application of the BC analysis and fulfils the pre-condition for the BC analysis?
- For which product group will the BC Analysis be executed?
- How can the Purchasing Situation be described? General Information about the customer (Fill out Template T2)
- Characterisation of the BC members (Fill out BBCM)
- What attributes and attribute-levels can be found which the customer uses to describe the target product group? (What are the customers decision criteria)
- Do the attributes and attribute levels fulfil the requirements for the usage in the framework of conjoint analysis?

Interview 4	
Interview Name	Discussion about the results of conjoint analysis
Date/Location	03.09.2013
Interviewer	Markus Drescher
Interview Partner	[redacted]
Position description	Department Manager ITS/ICD
Documentation medium:	Transcript

Questions

- How would you assess the correctness of the calculated part-worth utilities and relative importance for the single BC members? Do the results fit to your experience? How would you asses the quality of the data?
- Did you hit on any problems in the ranking process? Was the size of the set of stimuli too big for a realistic evaluation?
- What is your feeling about the relative distance between the group-related overall utility values? Do you think the values reflect the real situation?
- Would you like to apply the analysis for other BC of other customers?
- According to your opinion, where is the application of a quantitative BC analysis meaningful?