MEASURING CUSTOMER SATISFACTION IN INDUSTRIAL MARKETS – NEW INSIGHTS INTO AGGREGATING INDIVIDUAL SATISFACTION JUDGMENTS

Competitive paper

SPECIAL TRACK ON THE METHODOLOGICAL APPROACH OF IMP

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ABSTRACT

Purpose of the paper and literature addressed: The purpose of this paper is to analyze the relationship between the individual customer satisfaction judgments of the members of a buying center and their conjoint buying center satisfaction in order to measure customer satisfaction precisely as well as to derive useful implications for practitioners on how to increase buying center satisfaction. We therefore address the literature on customer satisfaction in business-to-business markets; in this context, we especially focus on the multi-person aspect of industrial customer satisfaction analysis.

Research method: Our research propositions are theoretically motivated by prospect theory and are in line with the literature on the relationship between attribute performance and overall satisfaction. The empirical analysis uses regression models and is based on 208 buyer-seller relationships in craft enterprises.

Research findings: Whereas prior research predominantly suggests a linear relationship between individual customer satisfaction judgments and conjoint buying center satisfaction, our results show that contingent on the structure of the individual satisfaction judgments of the single buying center members, this relationship might be better analyzed by a non-linear function. In this context further findings reveal higher impact of negative individual customer satisfaction judgments than of positive individual customer satisfaction judgments on conjoint buying center satisfaction.

Main contribution: The paper highlights that, for the aggregation of individual satisfaction judgments, the averaging approach (linear relationship between individual and overall satisfaction) is not appropriate in any one case. Due to the possible non-linear relationship between individual customer satisfaction judgments and conjoint buying center satisfaction, it is recommendable for sellers to satisfy all buying center members to an equal extent.

Keywords: customer satisfaction, buying center, aggregation, business-to-business relationship

INTRODUCTION

Customer satisfaction is assumed to be a significant determinant of repeat purchases, cross-selling opportunities, positive word-of-mouth, less price elasticity, and customer loyalty in business-to-business markets (e.g., Bearden and Teel, 1983; Dick and Basu, 1994; Fornell et al., 1996). Therefore, customer satisfaction is regarded as a cornerstone of business-to-business marketing (Geyskens et al., 1999; Tikkanen and Alajoutsijarvi, 2002; Abdul-Muhmin, 2005).

In this context, however, it should be taken into consideration that in organizations – due to the often significant investments, complex product solutions, and high risks involved in many business-to-business transactions – purchase decisions are often made by a group of individuals referred to as a buying center (Robinson et al., 1967; Venkatesh et al., 1995). Since a committee's individual members may assess customer satisfaction differently (Baucells and Sarin, 2003), sellers may well ask how the conjoint buying center satisfaction may be determined. From a methodological point of view, the problem can be formulated as follows: How can all these individual satisfaction views be aggregated to a conjoint buying center satisfaction?

To date, existing research on customer satisfaction in the business-to-business field has tried to capture the complexity of multi-person customer satisfaction measurement by having either a key informant report on the conjoint buying center satisfaction (e.g., Withey, 1988; Rossomme, 2003; Abdul-Muhmin, 2005; Rodriguez et al. 2006; Paulessen and Birk, 2007) or by consulting all the members of the buying center and averaging their satisfaction judgments (e.g., Qualls and Rosa, 1995; Schellhase et al., 2000; Homburg and Rudolph, 2001; Chakraborty et al., 2007). Both approaches have certain constraints: key informants' data can be biased, since a single member might not be fully informed of the extent to which the other members' (often different) preferences have been satisfied; consequently, their statements are only valid if the key informant is the most influential person in the buying center. On the other hand, the averaging of individual satisfaction judgments should only be applied if all the buying center members are more or less equally influential, as is the case in flat hierarchies (Ryan and Holbrook, 1982). Furthermore, the averaging approach should only be used if the single buying center members' satisfaction judgments are homogeneous (i.e. if the range of the individual satisfaction judgments is rather small). The reason for this is that, in the case of heterogeneous individual satisfaction judgments, the averaging approach compensates for single buying center members' highly positive and highly negative judgments by assuming a linear function. However, existing studies linking attribute-level satisfaction to overall satisfaction suggest that positive and negative individual satisfaction judgments could have different weights on the overall satisfaction judgment (e.g., Anderson and Sullivan, 1993; Olivia et al., 1995; Mittal et al., 1998; Backhaus and Bauer, 2000). This effect is mainly explained by the findings of prospect theory, which roughly posits that individuals regard weight losses higher than weight gains (Kahneman and Tversky, 1979).

As the literature analyzing industrial customer satisfaction measurement has not yet investigated the impact of heterogeneous and homogeneous individual satisfaction judgments on conjoint buying center satisfaction, the primary objective of this article is to analyze if (1) buying centers' customer satisfaction is a linear (averaging is acceptable) or a non-linear (averaging is

not acceptable) function of single buying center members' satisfaction judgments. Moreover, we investigate whether (2) positive or negative individual satisfaction judgments carry more weight on conjoint buying center satisfaction.

The contributions of our study are especially relevant for marketing practice. To derive recommendations about what to do in order to increase the conjoint buying center satisfaction, it is imperative for sellers to know how customer satisfaction is formed in the multi-person buying center.

In the following section, we begin by reviewing the relevant literature on industrial customer satisfaction measurement. Next, we derive our hypotheses concerning the impact of both homogenous and heterogeneous individual satisfaction judgments based on the findings of prospect theory. We undertake empirical investigations of industrial firms using both a qualitative and a quantitative study approach. With these in mind, we discuss our empirical survey, data analysis, and results. Finally, we provide concrete implications for both research and practice.

APPROACHES TO MEASURE CUSTOMER SATISFACTION IN INDUSTRIAL MARKETS

Since the work of Håkansson (1982), research in business-to-business marketing has emphasized the importance of buyer-seller relationships (Dwyer et al., 1987). Thus, customer satisfaction in business-to-business markets should be understood as a relationship-specific rather than a transaction-specific construct. In a similar vein, Fornell et al. (1996) posit that – by measuring not only customer satisfaction, but also its antecedents (for example past, current, and future customer expectations, perceived levels of current performance, and value received) – one captures a cumulative evaluation of a supplier over time, as opposed to a buyer's evaluation of a specific transaction. This is important because, "… while transaction-specific satisfaction measures may provide specific diagnostic information about a particular product or service encounter, overall customer satisfaction is a more fundamental indicator of the firm's past, current, and future performances" (p. 8). Therefore, in this study, customer satisfaction is conceptualized as the buying center's evaluation of a seller's cumulative performance over time on a variety of product/service attributes (Tanner, 1996; Lewin, 2009).

Owing to the increasing competition in many business-to-business markets, developing and maintaining high customer satisfaction becomes even more important, since customer satisfaction offers opportunities for firms to create competitive advantages and achieve superior results (Anderson et al., 1994; Slater and Narver, 1994; Jap, 1999; Panayides, 2002; Sanzo et al., 2003; Ulaga, 2003). Consequently, industrial suppliers should have a deep knowledge of how their customers' satisfaction is formed. This is all the more true because customer satisfaction of business-to-business markets, as noted, is a multi-person issue.

Against this background, it does not come as a surprise that there is a large body of studies examining customer satisfaction in buyer-seller relationships. These studies mainly cover

three areas: analyzing the link between satisfaction and loyalty (e.g., Fornell, 1992; Zeithaml, 2000; Ĉater and Ĉater, 2009), analyzing the determinants of satisfaction (e.g., Trawick and Swan, 1981; Sanzo et al., 2003) or identifying and measuring dimensions of customer satisfaction in business-to-business markets (e.g., Backhaus and Bauer, 2000; Homburg and Rudolph, 2001; Sarstedt et al., 2009). The multi-person issue is hereby accounted for in two ways: By either asking a key informant to report on the conjoint buying center satisfaction (e.g., Withey, 1988; Rossomme, 2003; Abdul-Muhmin, 2005; Rodriguez et al. 2006; Paulessen and Birk, 2007) or by consulting all the buying center members and averaging their satisfaction (e.g., Qualls and Rosa, 1995; Schellhase et al., 2000; Homburg and Rudolph, 2001; Chakraborty et al., 2007).

THE KEY INFORMANT APPROACH

Since traditional customer satisfaction measurement is rooted in consumer behavior, most business-to-business research to date has focused on the use of a key informant. By using the key informant approach, one informant from each group is chosen to provide statements reflecting the opinion of the group as a whole. In this industrial buying context, a high-level manager of the buying center is usually chosen to give statements reflecting the opinion of the buying center (Philips, 1981). There are some facts supporting the key informant approach: An advantage of the key informant design, as pointed out by Kohli (1989), is that it enables respondents to remain anonymous and does not require of them to disclose the names of other buying center members, thus encouraging candid responses. Further, there are pragmatic reasons for using the key informant approach. As Conant et al. (1990) point out, "in the face of time and resource constraints, the single informant approach allows for a large number of organizations to be surveyed" (p. 371). This is an important consideration because tracking multiple informants over several months is extremely difficult and increases non-response rate due to mortality effects (e.g., respondent changing functions within the company, leaving the company altogether, or becoming too busy to participate further).

On the other hand, the key informant approach also has certain shortcomings: First, it is doubtful whether one person is really capable of evaluating the conjoint buying center satisfaction, since the individual buying center members might have different preferences, which are also satisfied to different degrees. Second, in the case that there is one person who does have the capability to evaluate the conjoint buying center satisfaction, it is difficult to identify this person, from a practical as well as a theoretical perspective (Rossomme, 2003). However, choosing the right informants is crucial as empirical studies show that inadequate informants lead to unreliable proxies (Philips, 1981; Silk and Kalwani, 1982). Finally, using key informants' data may be accompanied by a bias in favor of the key informant's judgment due to self-expression or self-protection motives. One can therefore conclude that key informant statements are especially recommendable if the key informant is the most influential person in the buying center (Rossomme, 2003).

THE MULTI-INFORMANT APPROACH

Not least due to the above-mentioned shortcomings of the key informant approach, a smaller body of research measures the customer satisfaction of the buying center by consulting all the members of a buying center (e.g., Qualls and Rosa, 1995; Schellhase et al., 2000; Homburg and Rudolph, 2001; Chakraborty et al., 2007). In this context, the respondents are identified through role concepts (Webster and Wind, 1972) as, for example, in the studies of Schellhase et al. (2000) as well as Homburg and Rudolph (2001). Other studies (e.g., Qualls and Rosa, 1995; Chakraborty et al., 2007) characterize the buying center in terms of functional groups (Johnston and Bonoma, 1978).

Although these studies suggest that the multiple informant-based approach yields response data of superior quality (Hill, 1982; Hogarth, 1978; Seidler, 1974; Van Bruggen et al., 2002), it is questionable whether the multi-informant approach always yields valid results. This is first of all due to the fact that studies applying the multi-informant approach predominantly use regression analysis or the more general structural equation modeling to analyze the numerical data collected. This implies that each individual satisfaction judgment has the same weight on the conjoint buying center satisfaction, as the individual satisfaction judgments are simply averaged. Consequently, advantages of the multi-informant approach – as applied so far – take effect only in buying centers with equally influential members. Only in this context does it seems reasonable that individual satisfaction judgments impact conjoint buying center satisfaction with equal weights.

Furthermore, the validity of the multi-informant approach could be questioned when looking at the underlying structure of the individual satisfaction judgments. This is due to the fact that both homogeneous (the range of the individual satisfaction judgments is rather small) and heterogeneous (the range of the individual satisfaction judgments is rather large) individual satisfaction judgments' averaging – assuming a linear aggregation function – leads to the same conjoint buying center satisfaction. In our view, such identical treatment of both homogeneous and heterogeneous individual satisfaction judgments could lead to a distortion of the 'true' conjoint buying center satisfaction. Indications of this are provided by researchers who have analyzed the link between attribute-level performances to overall satisfaction (e.g., Anderson and Sullivan, 1993; Olivia et al., 1995; Mittal et al., 1998; Backhaus and Bauer, 2000). Oliver (1993), for example, discovered that attribute-level satisfaction and dissatisfaction significantly affect overall satisfaction with a product (automobile) as well as a service (an undergraduate course offering) and that attribute dissatisfaction has a larger weight than attribute satisfaction. If these findings are transferred to the context of industrial satisfaction measurement, the assumption arises that – in the case of heterogeneous individual satisfaction judgments – the averaging approach might not be appropriate. To illustrate:

> *There is a supplier who is in a relationship with buyer A. The buying center of buyer A consists of two equally influential members: member A1 and member A2. They evaluate their customer satisfaction with the relationship to the seller on a 5-point scale, where a "1" stands for completely dissatisfied and a "5" means completely satisfied. Let's say that both members A1 and A2 assess satisfaction with "3" points. Concerning another*

buyer B, the buying center also consists of two equally influential members, B1 and B2. Here, member B1 judges satisfaction with relationship to the supplier with "1", while member B2 indicates a "5". Although the averaging approach would yield a conjoint buying center satisfaction of "3" in both cases, the members of the buying center B jointly indicate significantly less satisfaction with the given supplier (conjoint buying center satisfaction judged by all members together).

What does this mean? The validity of the averaging approach – because of its compensation of positive and negative individual satisfaction judgments – depends on the underlying individual satisfaction judgment structure. Whereas a linear aggregation function might be appropriate in the case of homogeneous individual satisfaction judgments, it could provide suppliers with invalid information in the case of heterogeneous individual satisfaction judgments. In the following section, we will provide a theoretical motivation for the assumed disparity between the impacts of individual satisfaction judgments for the case of equally distributed influence among buying center members.

THE THEORETICAL LOGIC AND THE PROPOSITIONS

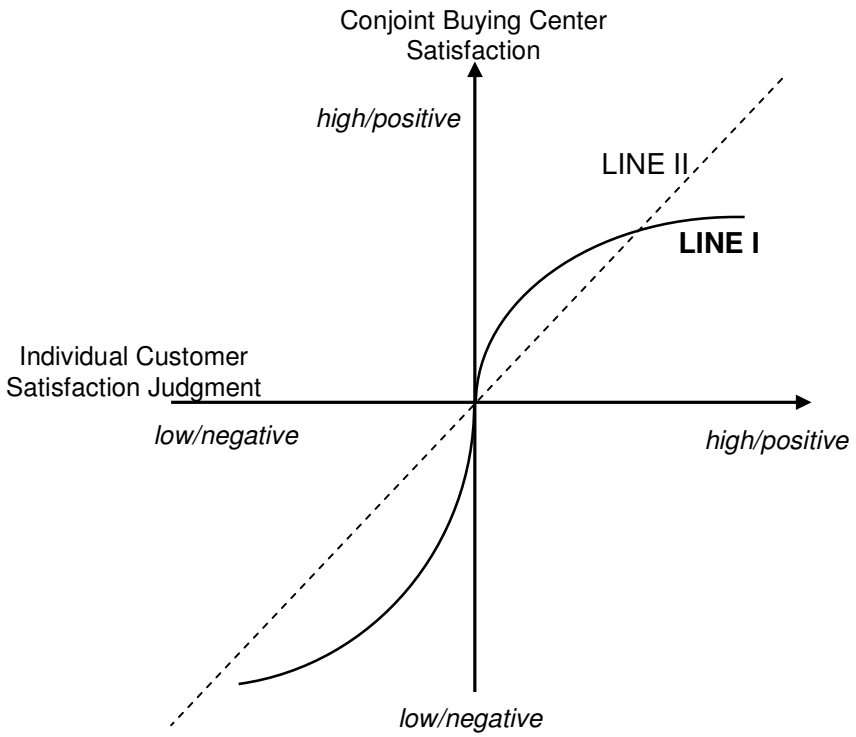
A theoretical foundation for the observed can be drawn from the prospect theory (Kahneman and Tversky, 1979). It builds on the principle that human perception tends to be related to changes or differences among certain conditions instead of their absolute magnitude (diminishing sensitivity); it also assumes that people regard given outcomes either as losses or as gains to a certain reference point (reference dependence) (Qualls and Puto, 1989). Finally, as key element of prospect theory the loss aversion bias is considered. It assumes that people tend to be more sensitive to changes they perceive as losses than to equally strong changes they interpret as gains (loss aversion) (Ho et al., 2006, Thaler, 1980). Altogether these properties lead to an S-shaped value function, which states that reductions in value, relative to the current reference point, are weighted more heavily than gains in value. Therefore the function is steeper in the lower than in the higher domain. Moreover the value function is concave in the domain of gains and convex in the domain of losses making it consistent with the notion of diminishing positive returns to marginal gains and diminishing negative returns to marginal losses.

Transferring this idea to the aggregation of individual satisfaction judgments one might assume that single judgments may have different impacts on the joint buying center satisfaction. More concretely one might assume that individual satisfaction judgments (x-axis) affect conjoint buying center satisfaction (y-axis) non-linearly and asymmetrically (Figure I, Line I). In this context – owing to the loss aversion bias – a negative individual judgment would carry more weight to the conjoint buying center satisfaction than a positive individual judgment.

Admittedly, one could argue that prospect theory was developed to explain individual decision processes and thus is not appropriate for the analysis of group decision processes. However, as we are primarily interested in the aggregation of individual judgments and do not

want to analyze group behavior processes it seems rather reasonable to adapt principles of aggregation from prospect theory.

FIGURE I: Functions of Satisfaction Formation



From this, we conclude that if the individual satisfaction judgments are heterogeneous (i.e. the range of the individual satisfaction judgments is large), conjoint buying center satisfaction may be a non-linear function of the individual customer satisfaction judgments, as this effect has already been mentioned in the context of family decision-making and satisfaction (Rogers et al., 1992; Peyton et al., 2004). Consequently, we form our first proposition:

> *Proposition 1*: In the case of equal influence among buying center members and heterogeneous individual customer satisfaction judgments, the relationship between individual customer satisfaction judgments and conjoint buying center customer satisfaction is non-linear.

The loss aversion built into prospect theory suggests that losses loom larger than gains (Einhorn and Hogarth, 1981). Psychologically, a one-unit loss carries more weight than an equal amount of gain. In a satisfaction context, negative individual satisfaction judgments should carry more weight in the conjoint buying center satisfaction than equal amounts of positive individual

satisfaction judgments. Thus, negative judgments will loom larger. In addition the negativity effect, which elicits stronger effects of negative information than of positive information, can be applied to satisfaction analysis (Andreson and Sullivan, 1993; Mittal et. al, 1998; Backhaus and Bauer, 2000). The negativity effect is derived from memory-psychological assumptions. On the one hand, negative information has a stronger impact than positive information; on the other hand, negative information remains stored for a longer period (Taylor, 1982; Derbaix and Pham, 1991). The latter aspect is important when we keep in mind that customer satisfaction in buyer-seller relationships is conceptualized as an overall judgment based on several transactions (so-called cumulative satisfaction (Bitner and Hubbert, 1994)). Consequently, combined negative individual customer satisfaction judgments (or the judgments that cause low satisfaction) should have a greater impact on conjoint buying center satisfaction. The considerations lead us to our second proposition:

> *Proposition 2*: In the case of equal influence among buying center members, negative individual customer satisfaction judgments have a greater impact on conjoint buying center satisfaction than positive individual customer satisfaction judgments.

Finally, we return to the classical linearity assumption for the link between individual customer satisfaction judgments and conjoint buying center satisfaction. The linearity assumption implies that an increase of individual customer satisfaction judgment on a high conjoint buying center satisfaction level should lead to the same increase in conjoint buying center satisfaction as a similar increase of individual satisfaction from a low conjoint buying center satisfaction level – as depicted in Figure I, Line II. This might be accurate if the individual satisfaction judgments are homogenous (i.e. the range of the individual satisfaction judgments is rather small). In this case, no distortions may occur in the formation of the conjoint buying center satisfaction and, therefore, the relationship between individual and conjoint customer satisfaction is assumed to be linear. This leads us to our third proposition:

> *Proposition 3*: In the case of equal influence among buying center members and homogenous individual customer satisfaction judgments, the relationship between individual customer satisfaction judgments and conjoint buying center satisfaction is linear.

THE EMPRICAL STUDY

THE DATA COLLECTION AND MEASURES

The data were collected from 208 craft enterprises (> 10 employees) in Germany during December 2009 and January 2010. We chose craft enterprises because previous explorative expert interviews revealed that, in this area (craft enterprises > 10 employees), major purchase decisions are predominantly made in dyadic groups. As our aim is to study multi-person customer satisfaction, dyadic groups are the minimum requirement. Moreover, these small groups allow us to ask the respondents to answer questions conjointly.

Before collecting data, craft enterprises (which were randomly chosen from the yellow pages) were contacted by telephone and asked how many employees they had and whether they were interested in participating in the survey. A total of 338 craft enterprises indicated their participation. This accounts for about 25% of the whole population of craft enterprises in Germany with more than 10 employees. Data collection was performed using an electronic web-based questionnaire. A total of 208 buying teams completed the questionnaire. We checked for non-response bias by following the procedure by Armstrong and Overton (1977) and found no bias ($p<0.05$). Respondents reported on one relationship with a supplier of their choice. The only restriction was that the firm should have been in this supplier relationship for at least one year. As the survey shows, on average, the relationship with the supplier began 4 to 5 years ago.

All scales employed in the study were adapted from existing scales. We measured cumulative customer satisfaction for each individual buying center member (INSAT = individual customer satisfaction judgment) and for all the buying center members as a group (CONSAT = conjoint buying center satisfaction). In doing so, cumulative customer satisfaction can be defined as "consumers' satisfaction with the [supplier] organization based on all encounters and experiences" (Bitner and Hubbert, 1994, p. 77). We measured cumulative customer satisfaction with the supplier using a single-item scale (e.g., Bolton and Lemon, 1999; Garbarino and Johnson, 1999; Guenzi and Pelloni, 2004; Madaleno et al., 2007) adapted from Bolton and Lemon (1999). We used a 5-point Likert scale, ranging from completely satisfied to completely dissatisfied. To determine whether there is an equal or unequal distribution of influence among the buying center members, we established the relative influence of every member. Similar to Tanner (1996), we measured relative influence by asking each individual to rate his or her influence on a scale of 1 to 5, with 1 indicating a great deal of influence. Self-reporting on influence has been criticized for containing upward bias (Gronhaug, 1978). However, we simply want to characterize buying centers along their influence distribution and are not interested in the value of influence, which overcomes the bias problem.

To handle the challenge of questioning a committee, we structured the questionnaire into two parts. In the first part, the buying center members were asked to answer questions conjointly. They had to select a supplier, provide some information about the supplier, and identify who is involved in decisions regarding the selected supplier. Subsequently, all involved buying center members had to conjointly rate their customer satisfaction with the supplier. In the next section of the questionnaire, each respondent of the buying center had to answer some questions individually.

THE ANALYSIS AND THE RESULTS

In order to test our research propositions, we divided our data sets (n=208) into subgroups. Since our propositions deal with the case of equally influential buying center members, we selected the cases (n=108) where buying center members were equally influential. Furthermore, we distinguished between homogeneous and heterogeneous individual satisfaction judgments, and separated the data set with equally influential buying center members in a second

step upon homogeneous and heterogeneous individual satisfaction judgments. Table I provides an overview of the subgroups.

TABLE I: Separated Data Set

		Individual satisfaction judgments		
		homogenous	heterogeneous	total
Influence of the buying center members	equal	69	39	108
	unequal	44	56	100
	total	113	95	208

Our first proposition considers the case of equal influence among buying center members and heterogeneous individual customer satisfaction judgments. This proposition states that the relationship between individual customer satisfaction judgments and conjoint buying center customer satisfaction is non-linear. Contrary to a linear relationship, as proposed by linear regression and casual analysis, we argue that a non-linear function might explain the relationship between individual customer satisfaction and conjoint buying center satisfaction more comprehensively. Therefore, we want to examine if satisfaction formation can be modeled by a linear function (Model 1). Moreover we test if it is more effectively to model satisfaction formation with a non-linear function (S-shaped function – Model 2). We then compare the explained overall variation (R^2) for both functions (e.g., Backhaus and Bauer, 2000). The following functions are tested:

Model 1: $CONSAT = b_0 + \sum_{i=1}^{n} b_n * INSAT_n$

Model 2: $CONSAT = e^{b_0 - \sum_{i=1}^{n} b_n / INSAT_n}$

Here, CONSAT represents the conjoint buying center satisfaction as a dependent variable and INSAT constitutes the individual customer's satisfaction judgment for each buying center member n as an independent variable.

Regression models were calculated for the buying centers, which show heterogeneity in individual satisfaction judgments. For the linear relationship, we obtain a $R^2 = 47.3$ % ($p<0.001$) and for the non-linear relationship we obtain $R^2 = 49.7$ % ($p<0.001$). Hence, as the higher coefficient of determination shows, the non-linear model is able to explain greater variability. Although the coefficient of determination may only explain about half of the variance, the difference of $R^2 = 2.4\%$ ($p<0.05$) shows – at least in tendencies – that the formation of the conjoint buying center satisfaction is better explained by a non-linear formation. Our first proposition is thus supported: in case of heterogeneous individual customer satisfaction judgments the relationship between individual customer satisfaction judgments and conjoint buying center customer satisfaction is non-linear.

The second proposition states that negative individual customer satisfaction judgments have a greater impact on conjoint buying center satisfaction than positive individual customer satisfaction in the case of equal influence among buying center members and heterogeneous individual customer satisfaction judgments.

This time, the strategy employed for testing the proposed different impacts was to calculate separate estimates for positive and negative individual judgments and comparing the absolute magnitudes of positive and negative estimates (e.g., Mittal et al., 1998). We compare the absolute magnitude because negative individual customer satisfaction judgments should be related negatively to the conjoint buying center satisfaction and positive individual customer satisfaction judgments should be related positively to the conjoint buying center satisfaction. Therefore, to achieve a proper comparison, algebraic signs are ignored. Against this background, a dummy-variable regression was conducted using two dummy-variables expressing the existence of either a positive or a negative individual satisfaction judgment as an independent variable and buying center satisfaction as a dependent variable. The existence of one or more positive individual judgments is indicated either by **1** for INSATPOS, or **0**; likewise for negative individual judgments and INSATNEG.

(1) $CONSAT = b_0 + b_1 * INSATPOS + b_2 * INSATNEG$

The dummy-variable regression was calculated again for the buying centers, which show heterogeneity in individual satisfaction judgments. The results are shown in Table II.

TABLE II: The Impact of Positive and Negative Judgments

Dummy-variable regression	Coefficient_INSATPOS	Coefficient_INSATNEG
	0.651*	-0.990***
R^2= 0.498; p<0.001		

*** p<0.001; ** p<0.01; * p<0.1

The impact of negative individual customer satisfaction judgments is around 1.5 times higher than that of positive individual customer satisfaction judgments. Since this difference is significant (p<0.001), negative individual customer satisfaction judgments have a significantly greater impact on conjoint buying center satisfaction. Our second proposition is thus supported. With an R^2 of 50%, the overall variation explained in the model appears to be low. However, as our aim is to explain the asymmetric impact of positive and negative individual customer satisfaction judgments and not the variation of conjoint buying center satisfaction, we argue that this does not constitute a problem. This is all the more true as the result could be caused by the dichotomous nature of the independent variables.

Our third proposition states that, in the case of homogeneous individual customer satisfaction judgments and equal influence among buying center members, the relationship between individual customer satisfaction judgments and conjoint buying center satisfaction is linear. We again compared the explained overall variation (R^2) for the linear and non-linear

model (see above, Model 1 and Model 2). Furthermore, we compared the conjoint buying center satisfaction (as jointly indicated by the respondents) with the arithmetic average of the individual satisfaction judgments (calculated from the individually provided answers).

This time, regression models were calculated for the cases with homogeneity in individual satisfaction judgments and equal influence among buying center members. For the linear relationship, we obtain a $R^2 = 98.6$ % ($p<0.001$), and for the non-linear relationship we obtain $R^2 = 0.1$ %. Therefore, it is clear that the linear model is able to explain almost all the variability. Moreover, the linear model is reasonable to explain the link between individual satisfaction judgments and conjoint buying center satisfaction, when buying center members have equal influence and individual satisfaction judgments are homogenous. Furthermore, we found no significant difference ($p<0.05$) between the quoted conjoint buying center satisfaction and the calculated arithmetic average of customer satisfaction. Consequently, for the case of homogenous individual customer satisfaction, the averaging approach is suitable to describe the formation of conjoint buying center satisfaction.

DISCUSSION

The analysis of customer satisfaction is a key element in industrial marketing research (Chakraborty et al., 2007). In this context, it is imperative for sellers to know how conjoint buying center satisfaction is formed. This is due to the fact that industrial customer satisfaction is a multi-person issue and that the individual buying center members might display different satisfaction judgments. Whereas prior research to date suggested a linear relationship between individual customer satisfaction judgments and conjoint buying center satisfaction, our study proposed that this relationship might also be a non-linear one. More concretely, we assumed that, in the case of heterogeneous individual satisfaction judgments, the averaging approach (i.e. linear function) yields invalid results. For this case, we further proposed that negative individual satisfaction judgments have a greater impact on buying center satisfaction than positive individual satisfaction judgments.

Overall, our findings provide first empirical evidence for the research propositions. In line with the findings of prospect theory as well as findings on the relationship between attribute-level performance and overall customer satisfaction (e.g., Anderson and Sullivan, 1993; Olivia et al., 1995; Mittal et al., 1998; Backhaus and Bauer, 2000), we discovered that conjoint buying center satisfaction is a non-linear function in the case of equally influential buying center members and heterogeneous individual satisfaction judgments. In addition, we could confirm that negative individual customer satisfaction judgments have a greater impact on conjoint buying center satisfaction than positive individual customer satisfaction judgments.

Consequently, our findings imply that simply applying the averaging approach may yield invalid results. Sellers rather have to be aware of the underlying satisfaction structure when analyzing the conjoint satisfaction of their buying centers. More precisely, sellers need to know if the range of individual customer satisfaction judgments is rather small or large (homogenous vs.

heterogeneous individual satisfaction judgments) in order to understand whether a linear or non-linear function of the formation of a conjoint buying center satisfaction is more probable.

To the best of our knowledge, this is the first study to account for the fact that the formation of conjoint buying center satisfaction is contingent on the structure of the underlying individual satisfaction judgments. Consequently, our research is the first to indicate that there is a need to develop customer satisfaction programs that properly account for the non-linear and asymmetric relationship between individual customer satisfaction judgments and conjoint buying center satisfaction. To illustrate: In the case of heterogeneous individual satisfaction judgments sellers should be aware – as previously mentioned – that conjoint buying center satisfaction is probably formed by a non-linear function and positive and negative individual customer satisfaction judgments do not compensate for one another. Owing to the greater impact of negative individual customer satisfaction judgments, sellers should try to identify the dissatisfied buying center members and eliminate or at least reduce their dissatisfaction– even though the individual satisfaction level of other members suffers from this. More concretely, this means that it is better to satisfy all buying center members equally but to a lesser extent, instead of concentrating on satisfying some of them to a greater extent. In this context it should be mentioned that even if we know that in the case of heterogeneous individual customer satisfaction judgments the relationship between individual customer satisfaction judgments and conjoint buying center customer satisfaction is non-linear, it would be interesting by means of larger sample if there are differences concerning the level of heterogeneity. Moreover it would be interesting to know, which could be an appropriate non-linear function of the formation of a conjoint buying center satisfaction.

Promising as they may be, our findings must be viewed with a certain amount of reservation. One of the limitations of our study is that we gathered data from one industry (craft enterprises) only and with rather small buying centers. Although we detect empirical evidence for our propositions, further studies should check whether these findings are applicable to other industries and larger buying centers (e.g., Homburg and Rudolph, 2001; Ĉater and Ĉater, 2009). In addition, we applied a single-item scale in order to measure the conjoint buying center satisfaction with a long-term buyer-seller relationship. This procedure often elicits respondents' tendency to regress the mean of the scale (Qualls and Rosa, 1995). Therefore, and as several other research findings suggest (e.g., Homburg and Rudolph, 2001; Sarstedt et al., 2009), it is recommendable to measure conjoint buying center satisfaction using a multi-item or even multi-dimensional scale in further research. To the best of our knowledge our study is the first to analyze whether conjoint buying center satisfaction is a linear or a non-linear function of individual buying center members' satisfaction judgments. While our findings offer initial insights, they should be verified under different contextual and situational determinants, such as the buyclass or the decision importance, for example. This is due to the fact that these determinants in general exert a significant influence on organizational buying behavior (e.g., Kohli, 1989; Samaniego and Cillán, 2004). Consequently, it can be assumed that they also impact the formation of conjoint buying center satisfaction. Furthermore, prospect theory suggests that conjoint buying center satisfaction displays diminishing sensitivity towards individual customer satisfaction judgments. That is, on a high [low] level of conjoint buying center satisfaction, one more positive [negative] individual judgment does not dramatically

change conjoint buying center satisfaction. In this context it would be interesting for suppliers to know if there is a kind of 'saturation' of satisfaction that can possibly optimize their strategies to satisfy the buying center. Finally, the consistency of our findings should be analyzed over a period of time. In this context it would be particularly interesting to analyze if the impact of negative satisfaction judgments of single buying center members decreases or increases over time. Van Doorn (2008), for example, found out, that even if the halo effect in the business-to-business context is weaker than in business-to-consumer settings, favorable satisfaction judgments have a greater propensity to carry over to the next period than less favorable ones. Such insights could help sellers deciding upon the importance of reducing dissatisfaction of individual buying center members, because the diminishing impact of negative individual judgments in the long term.

Overall, our study implies that industrial customer satisfaction measurement is a complex issue. In this context the multi-person aspect merits particular attention. This is due to the fact that the averaging approach that has been applied to date might result in invalid satisfaction measurements, contingent on the structure of the individual satisfaction judgments. As the development and maintenance of long-term and satisfied customers is crucial to industrial marketers, we would strongly argue for and motivate further research in this interesting field.

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