

**Towards an Improved Understanding of  
Industrial Services: Quality Dimensions and  
Their Impact on Buyer-Seller Relationships.**

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**ABSTRACT**

The rapidly growing field of services marketing has had a strong focus on consumer services. This article deals with industrial services, i.e., services provided by a manufacturing company to organizational customers. The authors suggest a triangular model of industrial service quality involving a distinction between structural, process-related, and outcome-related aspects. These three quality dimensions are shown to have strong impacts on the customer's trust, satisfaction, and commitment. The authors discuss theoretical and managerial implications of their findings.

# **Towards an Improved Understanding of Industrial Services: Quality Dimensions and Their Impact on Buyer-Seller Relationships**

## **INTRODUCTION**

There is ample evidence in business practice that customer service is gaining increasing importance as a competitive parameter in manufacturing industries. As an example, the authors of Japan's MITI'S White Book predicted in 1986 that after sales and delivery services would play an increasingly crucial role in the success of manufacturing firms (Mathe and Shapiro 1993, p. 5). A survey conducted among manufacturing firms in Germany revealed that services are predicted to be equally important as products as sources of future competitive advantage (Simon 1992). A possible explanation for this phenomenon is that it is becoming increasingly difficult to create sustainable competitive advantage on the basis of superior products (Anderson and Narus 1995; McMurrian and Wilson 1996; Simon 1992). Additional evidence for the increasing importance of services is provided by Singh (1990), who suggested that markets tend to evolve through different stages with shifting dominant sources of competitive advantage. According to this model, the sequence of sources of competitive advantage is technology, costs, quality, and services.

On the other hand, many marketers in industrial companies seem to lack familiarity with services. For example, Kyj (1987, p. 226) notes:

"Unlike price, promotion, product design, or distribution strategy, customer service is an emerging option with which many industrial marketing decision makers have little familiarity as a strategic tool ... . Indeed, many firms simply viewed customer service as a necessary evil that increased the cost of doing business."

Similar findings are reported by Simon (1992). Thus, there is considerable evidence that the potential of industrial services is not yet fully exploited in business practice.

Industrial services also represent a neglected area in academic research. While research in services marketing has made significant progress in the last decade, the vast majority of this literature deals with consumer services (Cooper and Jackson 1988). According to Bowen,

Siehl, and Schneider (1989, p. 75) "academic literature has not elaborated the role service plays in a manufacturing context". According to these authors the literature focus at the manufacturing/services interface is primarily on the application of manufacturing orientations to service organizations (sometimes referred to as the industrialization of service, Levitt 1976) rather than considering the role of services in manufacturing companies. It is also interesting to note that leading textbooks in industrial or business-to-business marketing (Bingham and Raffield 1990; Haas 1989; Hutt and Speh 1990) typically devote limited space to industrial services. Also, reviews of contributions from journals specialized in the area reveal a very limited emphasis on industrial services (LaPlaca 1997; Lichtenthal, Wilson, and Long 1997). Mathe and Shapiro (1993) argue that this research gap may partly be attributed to an overemphasis on the manufacturing / service dichotomy. This criticism can be traced back to earlier reasoning by Levitt (1981) stating that:

"Distinguishing between companies according to whether they market services or goods has only limited utility ... Everybody sells intangibles in the market place, no matter what is produced in the factory" (p. 94).

The purpose of this article is to improve the understanding of the role of services in an industrial marketing context. We will analyze the effect of industrial services on key characteristics of the buyer-seller relationship including the customer's trust, satisfaction, and commitment. As a considerable body of literature in the area of business-to-business marketing has highlighted the importance of long term relationships (e.g., Hakansson 1982), relating industrial services to relationship characteristics seems to be a very promising field of research. More specifically, we will argue that, similar to consumer services marketing, quality is a key issue when considering industrial services. The statement by Zeithaml, Berry, and Parasuraman (1996, p. 31), that

„(d)elivering quality service is considered an essential strategy for success and survival in today's competitive environment“

is by no means restricted to the field of consumer services. We will suggest and empirically validate a conceptualization of service quality in an industrial marketing setting. Based on this conceptualization we will analyze how different dimensions of industrial service quality affect the customer's trust, satisfaction, and commitment, respectively.

The organization of the paper is as follows. We will first describe the background of our study. This includes among other things a definition of the concept of industrial services and a review of the related literature. After this, we will describe field interviews conducted prior to a large-scale survey. These field interviews together with the literature review lead to the development of a research framework and hypotheses which are discussed in the subsequent section. After that the research methodology will be described. This is followed by a section related to our findings and a discussion.

## **BACKGROUND**

As the term *industrial services* is not frequently used in the academic marketing literature, we will start with a definition of the concept. Based upon this, we will provide a review of the related literature. Finally, as quality is hypothesized to be a very important construct in studying industrial services, we will adapt a model of service quality taken from the literature to the area of industrial services.

### *Industrial Services Defined*

Different terms for services provided by one company to another company have been applied in the literature. They include, among others, business-to-business services (Brensinger and Lambert 1990; Gordon, Calatone, and di Benedetto 1993; Szmigin 1993), business services (Bingham and Raffield 1990; Yoon, Guffey, and Kijewski 1993), professional services (Brown and Swartz 1989; Crane 1993), and industrial services (Cooper and Jackson 1988; Simon 1992; de Brentani 1995). To the best of our knowledge a clear conceptualization of the different types of services is lacking in the literature. Against this

background we will suggest a typology of different services, thus clarifying the domain of industrial services.

A first important distinction is whether the service is delivered to an individual (or a group of individuals) or to an organization (see Figure 1). The first category is referred to as consumer services. Services typically delivered to an organization are referred to as business services. Within this category an additional distinction can be made between services delivered by a service company (e.g., a management consulting firm) and services delivered by a manufacturing firm (e.g., a machinery company). The first category may be referred to as professional services (Lynn 1986, 1987; Day and Barksdale 1992). The second area is subsequently referred to as industrial services. We may thus define industrial services as services provided by a manufacturing company to organizational customers.

[Please insert Figure 1 about here]

The suggested taxonomy of services is shown in Figure 1. It is worth emphasizing that the purpose of this taxonomy is to properly define and outline the domain of industrial services. The taxonomy is therefore limited in depth concerning consumer services<sup>1</sup>. Many typologies of services focusing on different types of consumer services have been suggested in the literature (e.g. Lovelock 1983, 1991; Murphy and Enis 1986).

### *Literature Review*

Previous research related to industrial services (or, more generally, to services delivered by manufacturing companies) has essentially emphasized five different areas. First, industrial services have been studied from an industrial buying perspective, analyzing for example the extent to which buyers perceive significant differences in the task of buying industrial services as compared to industrial products. Second, a limited body of research has analyzed industrial services from a marketing strategy perspective. Third, a larger body of literature has focused on managerial issues which manufacturing firms face when moving into

the service business. Evaluating and training interpersonal skills of customer contact personnel is, for example, an important issue in this area. Fourth, there has been research exploring determinants of the performance of newly developed business services. Finally, a fifth stream of research has focused on studying quality issues typically using conceptualizations known from the consumer services literature.

We will briefly review each of the five areas. It is worth mentioning that our literature review is not restricted to studies on industrial services. Studies focusing on professional services are included in the review to the extent that we feel they are relevant for our research. This relevance comes essentially from the fact that in both cases the customer is an organization rather than an individual (see Figure 1). To some extent we also include literature related to services provided by manufacturing companies, regardless of whether they are delivered to consumers or organizations. This literature is relevant for industrial services to the extent that it deals with general problems that manufacturing organizations face when offering services in addition to their products.

Literature looking at industrial services from an industrial buying perspective has provided evidence of the increasing importance attributed by industrial buyers to the services provided by their suppliers (Lambert and Harrington 1989; Simon 1992). Other studies have investigated the importance of different performance dimensions to organizational customers when evaluating services. Typically, these studies have focused on specific industries like the pump and valve industry (Banting 1984) or specific types of services such as telecommunication services (Gordon, Calantone, and di Benedetto 1993). On a more general level, a cross-sectional study by Jackson, Neidell, and Lunsford (1995) identified differences and similarities between goods and services as perceived by organizational buyers. These authors found out, for example, that determination of quality is considered to be more difficult with services than with goods and that the degree of collaboration required is higher for

services than for goods. A study by Cooper, Dröge, and Daugherty (1991) identified differences between buyers and operations personnel in their approaches used to evaluate industrial services. McMurrian and Wilson (1996) analyzed how important specific types of value-added services are for industrial customers in different buying situations.

A second research stream has analyzed industrial services from a strategic perspective. As an example, Bolar (1992) examined the role played by services in influencing industry and firm performance. His analysis is based on PIMS data and the concept of strategic groups. The basic theoretical hypothesis is that the importance of service to customers should alter industry structure to positively impact profitability and negatively impact average firm market share (i.e., increase industry fragmentation). Both hypotheses however, based on theoretical economic considerations, are not supported in his empirical study. Another contribution in this perspective has been made by Vandebosch and Weinberg (1994). These authors focus on situations where firms have to make a decision whether to emphasize product features or service. They develop an analytical model based on the optimal product positioning literature for the resolution of the strategic question of whether to invest in product or service improvements.

A third perspective has focused on specific managerial issues that become relevant when manufacturing companies increasingly offer services to their customers. The range of issues dealt with in this research stream is very broad. It includes among other things the creation of a service-oriented culture, the evaluation and training of interpersonal skills of customer contact personnel (Bowen, Siehl, and Schneider 1989), taking into account interpersonal skills when hiring personnel (Cooper and Jackson 1988), implementing the service task in the company's organization structure (Simon 1992), and having an organizational customer service policy (Kyj 1987). The most comprehensive conceptual work in this area has been provided by Bowen, Siehl, and Schneider (1989) and Mathe and Shapiro

(1993), respectively. Empirical research in this area has revealed significant deficits in the way manufacturing firms manage their services (Donaldson 1995). Also, performance implications of the quality of managing industrial services have been hypothesized and confirmed empirically (Morris and Davis 1992).

The fourth perspective has focused on determinants of the performance of new business services. This research stream is essentially an extension of the comprehensive work by Cooper related to determinants of new product success. Research in this area has been provided by de Brentani (1995) and Wright (1988).

A significant amount of research has been devoted to the field of service quality in connection with industrial or professional services. The focus of this research has typically been on the quality of professional services (e.g., Grönroos 1984; Babakus, Pedrick, and Richardson 1995; Brensinger and Lambert 1990). The typical approach within this research stream has been to apply the SERVQUAL scale (Parasuraman, Zeithaml, and Berry 1988) to professional services (e.g., Babakus, Pedrick, and Richardson 1995; Brensinger and Lambert 1990). It is worth emphasizing that attempts to apply the SERVQUAL instrument in the context of business services have not been very successful. As an example, in the study of Babakus, Pedrick, and Richardson (1995) the wording of many SERVQUAL items had to be altered significantly to fit into a business services context.

### **A MODEL OF INDUSTRIAL SERVICE QUALITY**

Our literature review has revealed essentially two things with respect to service quality in the context of industrial services. First, to the best of our knowledge, there is no research explicitly modeling the quality of industrial services.<sup>2</sup> Second, there has been a variety of moderately successful attempts to adapt the SERVQUAL scale to professional services.<sup>3</sup> Against this background, rather than using the SERVQUAL instrument for assessing industrial services' quality, we suggest a different conceptualization of quality in the context

of industrial services. This conceptualization has been adapted from Donabedian (1980) who applied it in the area of health care services. In accordance with the work by Donabedian we suggest that there are three dimensions to be considered when studying the quality of industrial services. These include structure, process and outcome.

According to Donabedian (1980), structural quality refers to the relatively stable characteristics of the providers of services, of the tools and resources they have at their disposal, and of the physical and organizational settings in which they work. Thus, the concept of structural quality includes the human, physical, and financial resources that are needed to provide industrial services. Donabedian (1980, p. 81) emphasizes that this term embraces the number, distribution, and qualifications of professional personnel, as well as the number, size, equipment and geographical disposition of service facilities. Thus, in the context of industrial services structural quality is, for example, related to the technical qualification of the service technicians as well as their availability.

It is interesting to note that this dimension of service quality is touched upon but not made explicit in the SERVQUAL literature. As an example, when discussing the third gap in their service quality model, Parasuraman, Zeithaml, and Berry (1985, p. 45) mention “variability in employee performance” as a potential source of problems. Such variability may, among other things, be caused by interpersonal differences in the levels of skills. Also, the “tangibles” dimension of the SERVQUAL instrument (Parasuraman, Zeithaml, and Berry 1988) is related to the structural component of service quality but covers only part of its scope.

Process-related quality refers to the activities that go on between the provider of service and the customer. Donabedian (1980, p. 80) emphasizes that this quality dimension encompasses a technological as well as an interpersonal component. While the first subdimension is related to such things as the use of information technology during the service delivery process, the second subdimension contains for example the friendliness of the

personnel providing industrial services. This dimension of service quality has previously been identified by Grönroos (1984) who referred to it as “functional” quality. He furthermore emphasizes that this quality dimension captures all aspects related to the question how the service is delivered to the customer.

Outcome-related quality refers to the result of the service delivery. Results may be technical (e. g., a machine working properly again) or attitudinal (e.g., a customer which is highly satisfied with the result of the service). This quality dimension essentially matches the “technical quality” component of the model suggested by Grönroos (1984). According to Grönroos (1984, p. 38), this dimension captures “what the consumer receives as a result of his interaction with a service firm”.

In summary, the suggested triangular model is an extension of the model suggested by Grönroos (1984). It also makes a distinction between the outcome-related and the process-related facet of service quality. Additionally, it identifies a third quality dimension, i.e. structural quality. The three quality dimensions are shown in Figure 2.

[Please insert Figure 2 about here]

## **FIELD INTERVIEWS**

We conducted face-to-face interviews within 20 industrial companies prior to the survey. The interviews took from one hour to almost three hours and were semi-structured. Interviews were audiotaped unless the interviewee requested otherwise. The respondents were purchasing managers responsible for the purchase of industrial services. While some of the respondents had a responsibility exclusively for industrial services (e.g., selecting providers of technical maintenance services) other respondents were responsible for purchasing certain product categories and the corresponding services.

The main objective of the interviews was to get a better understanding of the quality construct in the context of industrial services. More specifically, our purpose was to compare

the suggested conceptualization of service quality (see Figure 2) with other possible conceptualizations in order to find out which one reflected best the way managers think about the quality of industrial services. Additionally, we had the objective of generating items for measuring industrial service quality. Finally, we also wanted to find out whether managers consider quality to be a critical issue in the area of industrial services.

The first part of the interviews was devoted to the relevance of quality in the area under consideration. Respondents were asked to name the three most significant categories of problems they typically face in working with providers of industrial services. No answering categories were suggested by the interviewer. The second part of the interviews consisted of an open discussion of the notion of industrial service quality. Respondents were asked to brainstorm on items that in their view were representative of industrial service quality. In the third part we confronted the interviewees with three different conceptualizations of service quality. They included the SERVQUAL conceptualization, the model described in the previous paragraph, and a two-dimensional model suggested by Grönroos (1984, 1991) involving a distinction between technical and functional quality. Based on the available literature, the different conceptualizations were explained to the managers. Respondents were then asked which of the different conceptualizations seemed most appropriate to them in the context of industrial services.<sup>4</sup> After they had identified the model which best reflected their way of thinking about industrial service quality the items generated in the second phase of the interview were assigned to the different dimensions of the chosen model. Also, respondents were asked to identify additional items of the different quality dimensions which had not been identified during the brainstorming. Thus, each of the interviews led to a set of factors including corresponding items.

The importance of quality in studying industrial services was clearly supported by our interviews. Quality-related issues were among the three most important problem categories for

19 out of 20 respondents. Quality thus represented the most important problem area. As an example, the purchasing director of a major German chemical company stated:

"The suppliers we are working with are used to marketing products. Their understanding of quality is essentially a technical one. They try to operationalize quality in terms of technical product features and are essentially unable to deal with the many soft factors of service quality. As a result, our satisfaction with their services is significantly lower than our satisfaction with their products."

Another important result from the interviews was that 18 out of the 20 respondents indicated that the model developed in the foregoing section based on the work by Donabedian (1980) was most appropriate for the quality of industrial services. It seems obvious therefore that this approach is a useful conceptualization of industrial service quality.

A large number of different items for the three quality dimensions was suggested. Regarding the structural quality dimension, a significant portion of the respondents indicated that the service personnels' knowledge about competitors' products is an important item to consider. As an example, the purchasing director of a large machinery company stated:

"When I bring in a supplier's service team I really like to see that their knowledge is not restricted to their own products. I want them to be able, to some extent at least, to deal with their most important competitors' products as well."

Concerning the process-related quality dimension it became evident that respondents also assign the work of a supplier's sales people to this area. As an example a majority of the respondents stated that objective technical information and advice provided by sales people is an important item related to process quality.

In summary, the interviews clearly confirmed the importance of quality in the context under consideration as well as the adequacy of our model of industrial service quality. Additionally, we identified a large number of possible items which were used as a basis for measure development.

## HYPOTHESES

Our hypotheses relate the three independent variables (i.e., the quality dimensions previously defined) to the customer's trust, satisfaction, and commitment, respectively. We will organize hypotheses development by the three dependent variables beginning with trust.

### *Trust*

Trust may be defined as "the firm's belief that another company will perform actions that will result in positive outcomes for the firm, as well as not take unexpected actions that would result in negative outcomes for the firm" (Anderson and Narus 1986, p. 326). In accordance with research on interpersonal relationships, trust has been emphasized as a vital concept in business relationships (Anderson and Narus 1986; Frazier and Summers 1986; Dwyer, Schurr, and Oh 1987; Andaleeb 1992).

Research in relationship marketing emphasizes the importance of communication for building trust (Anderson and Narus 1990; Anderson and Weitz 1989; Doney and Cannon 1997; Morgan and Hunt 1994). Since a high level of service quality requires intensive communication between buyers and suppliers, it is reasonable to expect a positive link between the quality of industrial services and the customer's trust in the supplier. This proposition is also consistent with research by Anderson and Weitz (1989) who found a positive effect of the quality of support provided to a customer on the customer's trust.

Together, this leads us to the following three hypotheses:

- H<sub>1</sub>: The customer's trust in the supplier is positively affected by the structural quality of industrial services.
- H<sub>2</sub>: The customer's trust in the supplier is positively affected by the process-related quality of industrial services.
- H<sub>3</sub>: The customer's trust in the supplier is positively affected by the outcome-related quality of industrial services.

## *Satisfaction*

With respect to interorganizational relationships, satisfaction may be defined as "a positive affective state resulting from the appraisal of all aspects of a firm's working relationship with another firm" (Anderson and Narus 1984, p. 66). We will argue that the quality of industrial services has a positive impact on customer satisfaction. This theoretical reasoning is supported by the work of Anderson and Narus (1984). These authors found a positive relationship between the outcomes (compared to a certain comparison level; Thibaut and Kelley 1959) of a relationship and satisfaction (see Wilson and Mummalaneni for a similar finding). The outcome a customer gets out of a relationship depends not only on the quality of the products he buys but also on the quality of the services delivered within the relationship. This fact becomes particularly evident in the work of Anderson, Jain, and Chintagunta (1993) who include in their definition of value in business markets "the set of economic, technical, *service*, and social benefits received by a customer firm in exchange (p. 5, emphasis added). As an example, high quality technical maintenance of machines leads to reduced downtime and thus to a better outcome for the customer. In summary, the quality of industrial services will have a positive effect on the customer's satisfaction through their impact on the customer's outcome from the relationship.

This proposition is also supported by work in the services marketing literature suggesting a positive relationship between service quality and customer satisfaction (e.g., Cronin and Taylor 1992; Crosby and Stephens 1987). It is also supported by research of Patterson, Johnson, and Spreng (1997) who found that performance in delivering professional services has a direct positive impact on customer satisfaction. The following hypotheses will be tested:

H<sub>4</sub>: The customer's satisfaction in a supplier is positively affected by the structural quality of industrial services.

H<sub>5</sub>: The customer's satisfaction in a supplier is positively affected by the process-related quality of industrial services.

H<sub>6</sub>: The customer's satisfaction in a supplier is positively affected by the outcome-related quality of industrial services.

### *Commitment*

This construct may be defined as a "desire to develop a stable relationship, a willingness to make short- term sacrifices to maintain the relationship, and a confidence in the stability of the relationship" (Anderson and Weitz 1992, p. 19). The definition suggests that commitment is enduring, and it reflects a positive valuation of a relationship (Moorman, Zaltman, and Desphandé 1992). Characteristics of commitment thus include stability, sacrifice, and loyalty (Gundlach and Murphy 1993; Gundlach, Achrol, and Mentzer 1995). Commitment indicates a willingness to accept bonding and restrictions in the possibility to switch counterparts.

Morgan and Hunt (1994) found a positive effect of relationship benefits on commitment to the relationship. As these authors put it:

"Because partners that deliver superior benefits will be highly valued, firms will commit themselves to establishing, developing, and maintaining relationships with such partners" (p. 24).

We have previously argued that the customer's relationship benefits are positively affected by the quality of industrial services. Thus, the proposition that industrial service quality will have a positive impact on the customer's commitment is straight forward. It is also supported by the general framework of behavioral consequences of service quality developed by Zeithaml, Berry, and Parasuraman (1996). One of their behavioral consequences positively affected by service quality is to remain loyal to a company which is closely linked to commitment.

However, we only hypothesize positive effects of process-related and outcome-related quality. Commitment is different from the constructs of trust and satisfaction. Unlike these two constructs which are attitudinal in nature, commitment represents a behavioral intention. While the structural quality component may be important enough to influence the attitudinal constructs of trust and satisfaction, we feel that the mere presence of human, physical, and financial resources on the part of the service supplier can't generate a behavioral intention as strong as commitment. In summary, this reasoning leads us to the following hypotheses:

H<sub>7</sub>: The customer's commitment is positively affected by the process-related quality of industrial services.

H<sub>8</sub>: The customer's commitment in a supplier is positively affected by the outcome-related quality of industrial services.

## **RESEARCH METHOD**

### *Data Collection and Sample*

Data for the study were collected in collaboration with the *German Association of Machinery Companies and Original Equipment Manufacturers (Verband Deutscher Maschinen- und Anlagenbauer eV)*<sup>5</sup>. A total of 1,600 persons in 1,300 firms were contacted initially. These respondents were identified by means of the association's address lists. Our goal was to reach respondents which were responsible for the purchasing of industrial services at a senior level. A vast majority of respondents held senior positions in purchasing (e.g., purchasing director or purchasing vice president). The sample also contained a limited percentage of operations managers and (especially for smaller companies) general managers and owners.

The respondents were asked to report on a specific supplier of industrial services. They were essentially free in selecting the supplier, for which they filled out the questionnaire. To create some variance on the quality of the relationship, however, we asked half of the

respondents to report on a relationship with a supplier with whom they were highly satisfied whereas the other half was asked to report on a relationship with a moderate level of satisfaction. Respondent competency was analyzed by means of two items at the end of the questionnaire, assessing respondents' confidence in their ability to respond to the questionnaire items and their level of involvement with the specific supplier. The responses were uniformly high as suggested by mean ratings of 6.38 (confidence) and 6.31 (involvement) on a 7-point scale. Eight respondents with low ratings on either of these two items were excluded from the sample. This led to a total of 177 usable responses for a response rate of 11.1% which seems acceptable given the experience of empirical studies in the German business-to-business sector.

To detect possible problems with non-response error, the data set was divided into thirds according to the number of days from initial mailing until receipt of the returned questionnaire (Armstrong and Overton, 1977). Tests indicated no statistically significant differences in the mean responses for the constructs used between the first and the last third. This result suggests that non-response bias was not a problem in our study.

#### *Measure Development and Assessment*

Multi-item scales were used for each of the constructs included in our analysis. We followed standard psychometric scale development procedures. Scales for the study consisted of newly generated items and of items that had been used previously. Where a new scale was developed, we were guided by the qualitative results from our field interviews and an extensive literature review. The individual items are shown in the appendix. In general, 7-point Likert-scales with "strongly agree" and "strongly disagree" as anchors were employed. The psychometric quality of the measures was assessed using procedures suggested in the measurement literature. These procedures included assessments of item and scale reliability,

as well as convergent and discriminant validity based on confirmatory factor analysis (Bagozzi and Phillips 1982; Baumgartner and Homburg 1996; Gerbing and Anderson 1988).

*Structural quality* was operationalized as the extent to which a selling firm holds on skilled capacity for the delivery of industrial services. It was assessed using five items related to the qualification of service people, their knowledge of competitors' products, and the availability, among other things.

For the operationalization of *process-related quality* we use 13 items. All items describe the work of service personnel and salespeople in their contact with the customer. Items tap different aspects of this quality dimension including, among other things, speed, reliability, friendliness, and openness in providing information. It is worth noting that part of the items measuring this dimension of industrial service quality are related to the supplier's salespeople. This approach was taken in response to the finding from the field interviews indicating that most of the salespeoples's interaction with customers was interpreted as a component of process-related service quality.

*Outcome-related quality* is measured with four items. As many respondents in the interviews recommended to relate this component of service quality to specific industrial services, we asked for an assessment of the outcome-related quality of a large number of industrial services. Respondents were asked to provide a judgement only if they had experience with the specific supplier concerning the type of service under consideration. Two items were computed out of these detailed assessments. They are related to the average perceived outcome-related quality of person-related services (including, e.g., information and training of operational personnel) and product-related services (including, e.g., the service of repairing a product), respectively.

For the operationalization of *trust* we drew primarily on the scales of Kumar, Scheer and Steenkamp (1995a, b) and Ganesan (1994). The scale consists of six items which essentially relate to altruism, honesty and the reliability of the supplier.

On the basis of relationship marketing and marketing channel literature (e.g., Ruekert and Churchill 1984; Han and Wilson 1992) *satisfaction* is measured with five items. They describe the global satisfaction with the supplier, possible disharmonies and the readiness to recommend the supplier.

The operationalization of *commitment* was based on the scale used by Anderson and Weitz (1992). The items tap the multiple facets of commitment incorporated in our definition, including a strong sense of loyalty, expectation of continuity in the relationship, willingness to invest in the relationship, and a willingness to make short-term sacrifices to realize long-term benefits.

The analysis of the measures employs confirmatory factor analysis using LISREL 8 (Jöreskog and Sörbom 1993). Two separate factor analyses were run for the independent (i.e., the service quality dimensions) and the dependent constructs (i.e., the customer's trust, satisfaction, and commitment) in our study. Table 1 reports the summary measurement information.

Composite reliabilities of at least .6 have been suggested by Bagozzi and Yi (1988), and coefficient alpha values of at least .7 have been suggested by Nunnally (1978). As can be seen in Table 1, these criteria are met suggesting that each of the constructs has a reasonable degree of internal consistency between the corresponding indicators. This conclusion is supported by the fact that all the factor loadings were significant ( $p < .001$ ), which has been suggested as a criterion for convergent validity by Bagozzi, Yi, and Phillips (1991).

[Please insert Table 1 about here]

Measures of overall fit evaluate how well the confirmatory factor analysis model reproduces the observed variables' covariance matrix. The most popular index for assessing the overall goodness of fit of a model has been the  $\chi^2$ -statistic, which tests the null hypotheses that the estimated covariance matrix deviates from the sample covariance matrix only because of sampling error. Both  $\chi^2$ -statistics associated with the confirmatory factor analysis models are significant ( $\chi^2 (206) = 347.66, p < .01$ ;  $\chi^2 (74) = 53.43, p < .05$ ). It has been argued however, that this test is subject to serious limitations (Baumgartner and Homburg 1996; Bentler 1990; Bentler and Bonett 1980). Rather than to strictly interpret  $\chi^2$  as a test statistic, the ratio of  $\chi^2$  over degrees of freedom therefore has been suggested as a descriptive measure of overall fit (Jöreskog and Sörbom 1993; Bagozzi and Baumgartner 1994). Carmines and McIver (1981) suggested that values of this ratio smaller than 2 indicate acceptable model fit. This criterion suggests acceptable fit for both measurement models.

GFI and AGFI are two descriptive overall fit measures (Jöreskog and Sörbom 1993) for which a minimum value of .9 usually is considered to be acceptable (Bagozzi and Yi 1988; Baumgartner and Homburg 1996). The same threshold value can be applied to CFI, an incremental fit index suggested by Bentler (1990). RMSEA is a fit measure based on the concept of noncentrality (Steiger 1990). Usually values up to .08 are considered to indicate reasonable model fit (Browne and Cudeck 1993). These criteria were all met in our measurement models. Specifically, we obtained values of GFI = .96, AGFI = .95, CFI = .98, and RMSEA = .07; for the measurement model related to the service quality dimensions and values of GFI = .99, AGFI = .99, CFI = 1.0, RMSEA = .00 for the measurement model related to the dependent constructs. In summary, these indices suggest that the overall fit of the two measurement models to the data is acceptable.

We tested discriminant validity by performing, one-at-a-time, chi-square difference tests between a model in which a factor correlation was fixed at 1.0 and the original

(unrestricted) model. As every restricted model had significantly poorer fit than the unrestricted model, we concluded that the degree of discrimination between the two factors was sufficient.

## **RESULTS AND DISCUSSION**

### *Hypotheses Testing*

Hypotheses testing was carried out via multiple regression analysis. We analyzed a regression model for each of the three dependent constructs. Values for the constructs were computed by averaging across the corresponding indicators<sup>6</sup>. The perceived quality of the products purchased from the supplier under consideration was introduced as a control variable in the regression analyses.

The results of the three regression analyses are reported in Table 2. On an overall basis there is strong support for our theoretical reasoning. Seven out of the eight hypotheses are confirmed at least at the .05 level.

More specifically, we observe strong effects of the different dimensions of industrial service quality on the customer's trust and satisfaction, respectively. Each of the hypotheses H1 through H6 is confirmed at least on the .05 level. It is also interesting to note that we obtain high levels of explanatory power (in terms of variance explained) for trust and satisfaction, respectively. All together, these findings provide clear evidence for the importance of delivering high quality service in industrial marketing.

On the other hand there is only limited support for our hypotheses concerning the customer's commitment. While H7, that process-related quality of industrial service will have a positive impact on the customer's commitment, is supported, we fail to find support for H8, which stated, that there is a positive impact of outcome-related service quality on the customer's commitment. Consistent with these findings, we observe a much lower  $r^2$  than for the constructs of trust and satisfaction. A possible explanation for this finding is that a

customer's readiness to commit into a relationship depends not only on what he gets out of the relationship but also on many other factors (Ganesan 1994). As an example, the availability of alternatives or the magnitude of switching costs may have a significant impact on the customer's commitment. Nevertheless, it is interesting to note that the interaction-related component of industrial service quality (process-oriented quality) has a stronger impact on the customer's commitment than the outcome-related quality component.

### *Theoretical Discussion*

It is generally accepted that it becomes increasingly difficult for industrial suppliers to establish competitive advantage by offering higher quality products (Anderson and Narus 1995; McMurrian and Wilson 1996; Simon 1992). Against this background, industrial services gain increasing importance in the competitive arena. Our literature review has revealed a lack of research on industrial services.

We argued that, like in the field of consumer services (see, e.g., Crosby and Stephens 1987), quality is a key issue in understanding how services influence the relationship with a customer. Based on this reasoning, we developed a three-dimensional model of industrial service quality including structural, process-related, and outcome-related quality. Subsequently, we analyzed the effects of these three quality dimensions on the customer's trust, satisfaction, and commitment. In general, we find strong effects of the quality of industrial services on these constructs. More specifically, process related quality has particularly strong effects on the three constructs describing the relationship.

While these findings emphasize the importance of industrial service quality as antecedent of the customer's trust, satisfaction, and commitment, they also suggest additional issues to be researched. Of particular interest is the question whether the observed impact is direct or indirect in nature. One might argue, for example, that communication is an important mediator in the relationship between the dimensions of industrial service quality and the

outcomes considered in this paper. Partly, our rationale for developing the hypotheses is based on this assumption. An explicit test of this mediator hypothesis through the use of causal modeling is clearly an interesting area for future research.

Another implication of our study is the interconnectedness of the delivery of services and salespeople's interaction with customers. It became very evident in our qualitative and quantitative research that a lot of salespeople's activities are attributed to the dimension of process related quality by industrial buyers. Thus, looking at the sales force from a services rather than a sales management perspective should be a fruitful avenue for future research. More of the type of research initiated by Saxe and Weitz (1982) who developed a scale measuring customer orientation versus selling orientation of salespeople is needed.

Another important contribution of our research relates to the conceptualization of industrial service quality used in this paper. We drew marketing researchers' attention to the model suggested by Donabedian (1980) for the analysis of health care services. This model distinguishes between structural quality, process related quality, and outcome related quality. We developed items for these three dimensions in the context of industrial services and submitted these to a sound validation procedure. We feel that this conceptualization of service quality should receive more attention in marketing research. Of course, this model is much less specific than the SERVQUAL instrument, since it does not suggest specific items. However, this lack of detailed elaboration of the three dimensions leads to a high level of generalizability. As an example, findings by Babakus and Boller (1992) based on the SERVQUAL scale indicate that the dimensionality of service quality may depend on the type of service. In other words, this would mean that the five dimensions of SERVQUAL might be too specific to be generalizable across a broad range of service. While we do not wish to enter into a discussion of SERVQUAL's adequacy for measuring service quality, we do suggest that the three dimensions suggested by Donabedian (1980) and used in this paper may be general

enough to apply to all categories of services. This, of course, remains speculation for now. Further empirical research is needed on this issue. In short, researchers in the field of consumer services, might benefit from using Donabedian's (1980) conceptualization of service quality. Specific items still need to be developed. Researchers focusing on industrial services can use the scale developed and validated in our study.

On a more general level, our study calls for additional research into the field of industrial services. Industrial services present a significant research challenge for at least four fields of the marketing discipline. They include relationship marketing, services marketing, industrial marketing, and marketing strategy. As far as the emerging field of relationship marketing is concerned, it is evident that service-related constructs should be used to a greater extent in explaining and describing interorganizational business relationships. While some of the studies in that area touch specific features of the services provided by a supplier to the customer, in general, industrial services are a neglected area in the field of relationship marketing.

Research in services marketing has typically focused on consumer services and to a limited extent on professional services (i.e., services delivered by service companies to organizational customers). It is important to realize, that services play a very important role in manufacturing contexts as well. We suggest that scholars in the field of services marketing should apply their skills also to the field of industrial services.

Also, the discipline of industrial marketing (see recent reviews by LaPlaca 1997 and Lichtenthal, Wilson, and Long 1997) has largely neglected industrial services. This is evident from both, the fact that there is only a limited body of highly fragmented literature and that leading text books in the field mostly tend to devote a limited number of pages to services. Thus, our study has clear implications for future research in industrial marketing as well.

Finally, research in the field of marketing strategy should explicitly include industrial services. As an example, it might be interesting to analyze to which extent the conceptual model and research propositions developed by Bharadwaj, Varadarajan, and Fahy (1993) for studying sustainable competitive advantage in service industries can also be applied or extended to the area of industrial services. Also, it would be interesting to link industrial services to the comparative advantage theory of competition that has recently been suggested by Hunt and Morgan (1995). The key question arising is to which extent the ability to deliver superior industrial services can constitute a comparative advantage for industrial firms leading to superior financial performance.

From a methodological point of view our study illustrates the use of advanced measurement approaches in industrial marketing research. Unlike a lot of research in consumer behavior, empirical work in industrial marketing has frequently used rather simple measurement procedures and largely neglected validity issues.

### *Managerial Implications*

Our study also has a number of important implications for industrial marketing managers. The first and probably most important implication is that investing into high quality industrial services is likely to pay off. The quality of industrial services has been shown to be an important determinant of such constructs as the customer's trust and satisfaction and (to a lesser extent) the customer's commitment to the relationship. Given that competitors products become more and more equivalent, industrial services create an opportunity for developing stable customer relationships and avoiding extreme price competition with equivalent products across competitors.

It is important for managers to realize that offering industrial services accompanying products, while creating significant chances, also may create specific problems. Indeed, results from our interviews indicate that industrial firms still have many problems in managing their

service offering. One of the most frequently mentioned issues was a quality understanding which is too much focused on technical specifications and not adequate for managing service quality. This product mindedness may be one of the most significant obstacles industrial companies have to overcome in order to be successful with industrial services. On a more general level, Bowen, Siehl and Schneider (1989) and Mathe and Shapiro (1993) have given a comprehensive overview of the managerial tasks that are associated with offering services in addition to products. Implementing a service oriented strategy has implications for planning and information systems, for the company organization and for the companies' auditing system (Mathe and Shapiro 1993). Thus, it is very clear that the decision to compete on industrial services rather than merely on products is a strategic decision which must be made carefully and in recognition of the necessary requirements on the organization. Human resources management and management of the company's culture may be the two most significant challenges (Bowen, Siehl and Schneider 1989). Our findings indicate that if properly managed, industrial services have the potential to contribute to stable customer relationships. On the other hand, given the high importance of industrial service quality, delivering pure services can have highly negative consequences on customer relationships and possibly destroy a good product image.

Another implication relates to a quality model developed in our study. The list of items can readily be applied to self-assessment procedures with respect to service quality. Also, it can be used to survey customers concerning perceived quality.

A final implication for managers relates to our observation of the interconnectedness between industrial services and salespeople's interaction with customers. It is important that salespeople realize that partly they are perceived as service providers by the customers. This has also implications for sales force management. As an example, salespeople compensated with a strong emphasis on short term order volume are not very likely to be good service

providers. In addition, many firms have recently founded separate business units for their service activities. Our research highlights that there is a risk associated with such types of organizational structures. Although decisions on organizational structure can not be based on customer perceptions exclusively, our findings suggest that organizational forms grouping sales and service resources together may be beneficial.

### **CONCLUSION**

As different competitor's products become more and more technically equivalent in many markets industrial services can become an important source of competitive differentiation. We have argued that industrial services are an underresearched area so far. Based on our study which has highlighted strong effects on industrial service quality on the customer satisfaction, trust, and commitment, we hope that future research in different areas of the marketing discipline will place a stronger emphasis on industrial services in the future.

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Table 1: Summary Statistics for Measurement Scales

Scale Name composite reliability	number of items	mean	coefficient alpha	
structural quality of industrial services	5	4.02	.77	.79
process-related quality of industrial services	13	4.99	.93	.93
outcome-related quality of industrial variables	4	4.82	.83	.82
customer's trust	6	5.27	.94	.95
customer's satisfaction	5	5.41	.92	.94
customer's commitment	3	3.80	.85	.89

Table 2: Results of Regression Analyses

Independent variables	Dependent variables		
	customer's trust	customer's satisfaction	customer's
commitment			
structural quality of industrial services	.36*** (H <sub>1</sub> )	.24** (H <sub>4</sub> )	/
process-related quality of industrial services	.72*** (H <sub>2</sub> )	.64*** (H <sub>5</sub> )	(H <sub>7</sub> )
outcome-related quality of industrial services	.29*** (H <sub>3</sub> )	.33*** (H <sub>6</sub> )	(H <sub>8</sub> )
R-Square	.64***	.59***	

Standardized regression coefficients reported

- \*: p < .10
- \*\* : p < .05
- \*\*\*: p < .01

Figure 2

A Triangular Model of Industrial Service Quality

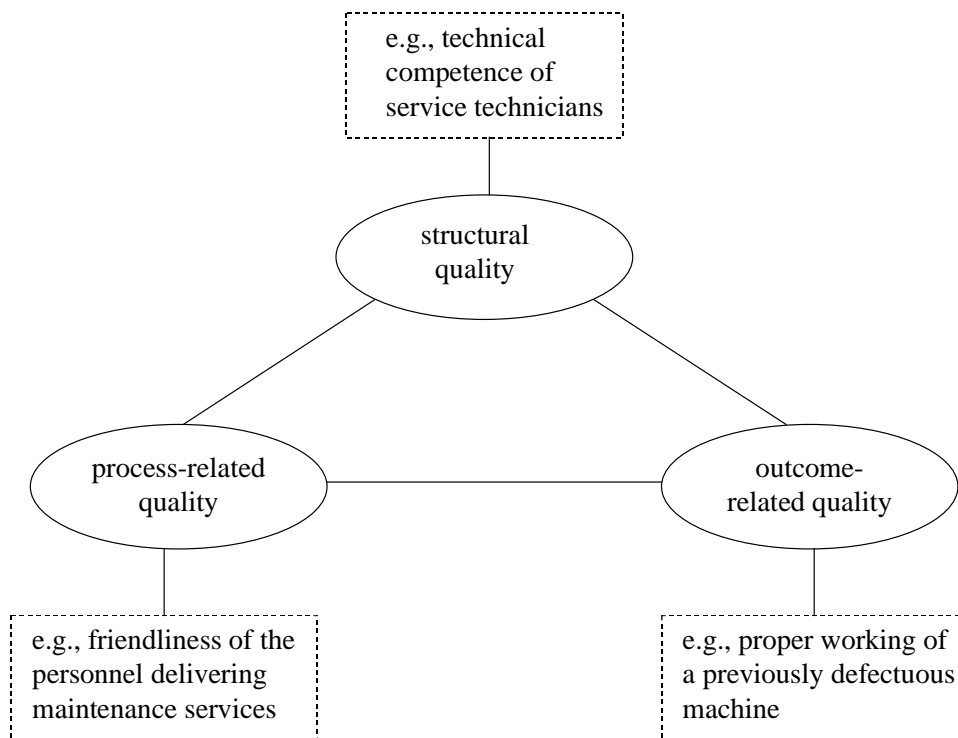
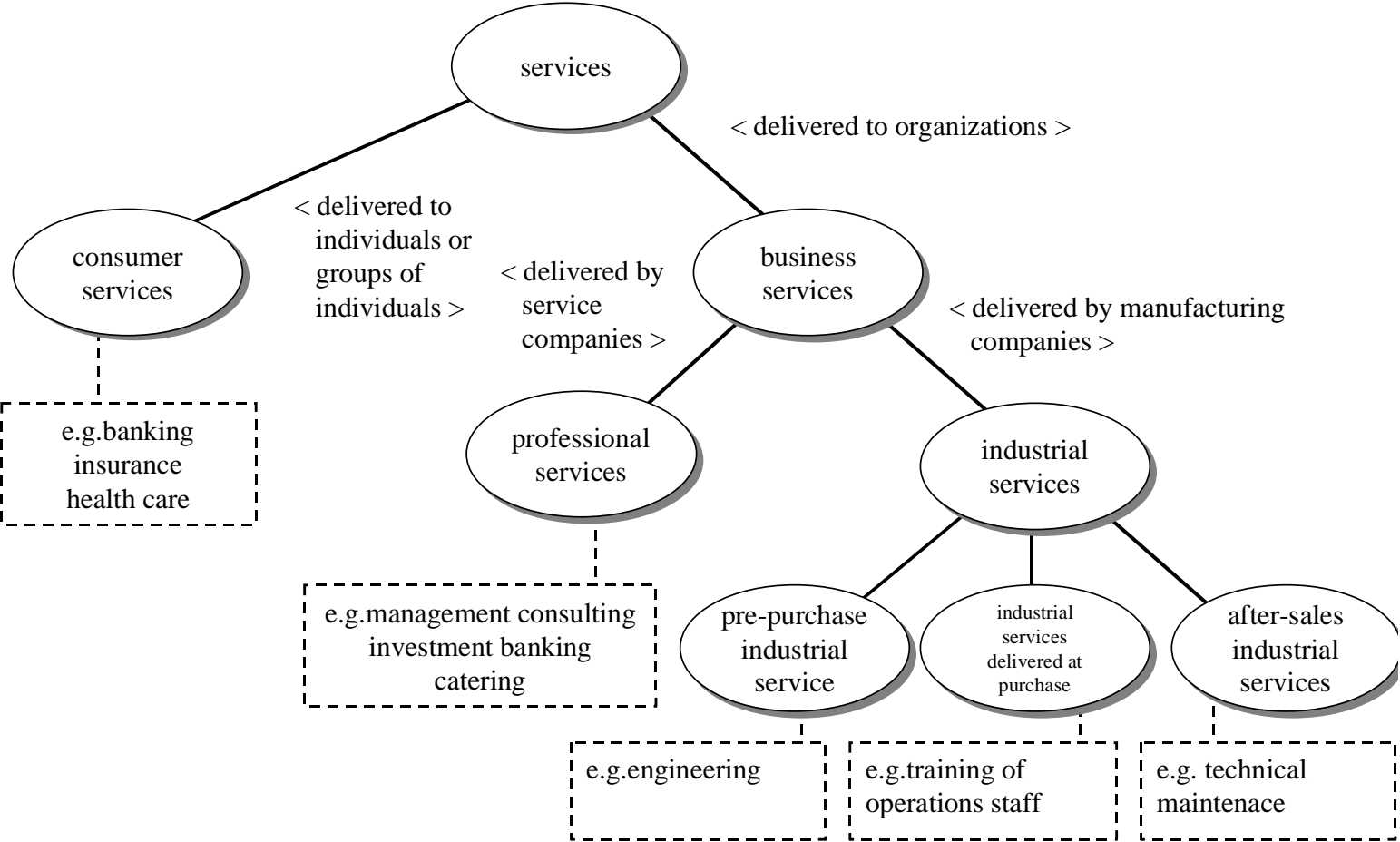


Figure 1  
Taxonomy of Services



## FOOTNOTES

- 1 It is worth noting, for example, that a distinction between services delivered by service companies and by manufacturing companies, respectively, makes sense also in the area of consumer services. We can for example distinguish between pure services such as insurance, banking, and health care and services provided to the buyer of a computer.
- 2 It is worth mentioning, though, that a specialized stream of research in the field of logistics management has addressed issues such as the assessment of customer expectations (Harding 1998), quality management approaches (Gustin, Daugherty, and Stank 1995; Wisner and Lewis 1997), and quality control issues (Novack 1989) with respect to logistic services. This research, however, is of limited generalizability since it is largely focused on the specific features of logistic processes.
- 3 We would like to emphasize that, in addition to reviewing the relevant academic literature, we also checked leading textbooks in the fields of industrial marketing and services marketing, respectively. We specifically looked for conceptualizations of service quality in an industrial services context but were not able to find any. This observation as well as the limited usefulness of SERVQUAL in this context (Babakus, Pedrick, and Richardson 1995) led us to the conclusion that there is a need for a model of industrial service quality.
- 4 The text guiding this part of the interviews was as follows: “After having discussed many specific aspects of industrial service quality, we would like to focus on the general facets of industrial service quality. You should interpret these as “headings” summarizing a number of related specific aspects. In the following, we would like to introduce you to three alternative models suggesting different facets of industrial service quality. We would like to know which of these three models best reflects the way you think about industrial service quality.” In describing the different conceptualizations, we drew on the definitions of the different dimensions suggested in the literature. However, we did not reproduce them literally to the interviewees. Rather, we replaced terminology which seemed highly academic in nature by simpler terms which were easier to understand for managers.
- 5 The choice of a German sample seemed adequate to us because of the following considerations. Since German suppliers of industrial goods have come under a lot of price pressure since the opening of the „iron curtain“ (i.e. the formerly closed borders to Eastern European countries) many of them focus on offering services on top of their products in order to avoid pure price competition in the product domain. On the other hand, German customer companies, because of the strong cost pressure produced by high labor costs, tend to source out many activities that were previously handled internally. Thus, within the German business environment, there seems to be a lot of both offer and demand of industrial services.

- 6 Another possibility would have been to use causal modeling techniques for hypotheses testing. This approach would have led to a model with more than eighty parameters to be estimated. As causal modeling is based on asymptotic statistical theory, large samples are needed for this method. There is general agreement in the literature (see, e.g., Baumgartner and Homburg 1996) that the adequate sample size depends on the number of parameters to be estimated. Bentler and Chou (1987) provide the rule of thumb that the ratio of sample size to number of free parameters should be at least 5:1 to get trustworthy parameter estimates, and they further suggest that these ratios should be higher (at least 10:1, say) to obtain appropriate significance tests. Thus, given the sample size in our study, we decided not to use causal analysis for hypotheses testing.

## **Appendix** ***Scale Items***

### *Structural Quality*

- The service personnel has a high qualification
- The service personnel also knows the competitors' products
- In an urgent case the service has the capacity to react rapidly
- The service is available around the clock
- The salespeople are always available

### *Process-related Quality*

- The service personnel works quickly
- The service personnel is reliable
- The service personnel works efficiently
- The service personnel is friendly
- The sales people are interested in our problems
- The sales people are interested in how we use their products
- The sales people provide objective technical information
- The sales people provide objective technical advice
- The sales people also identify the limitations of their products
- The sales people are friendly
- The sales people have a reasonable level of decision authority
- The sales people keep their promises
- The sales people inform us about existing problems

### *Outcome-related Quality*

- Perceived outcome-related quality of person-related industrial services (average across up to seven specific industrial services)
- Perceived outcome-related quality of product-related industrial services (average across up to 13 specific industrial services)
- In terms of the services leading to the desired result, this supplier compares favorably with its competitors
- The services provided by this supplier typically lead to the desired result

### *Trust*

- Promises of the supplier are reliable
- We believe that the supplier is fair and frank to us
- We believe that the supplier tells us about occurring problems
- We believe that the supplier does his best to solve occurring problems
- We believe that things we cannot control by ourselves will be done correctly by the supplier
- We believe that the supplier will support us if problems occur

### *Commitment*

- Our intention is to stay in the relationship as long as possible
- We do our best not to damage the relationship
- We are willing to invest significantly into the relationship to make it successful

### *Satisfaction*

- We are satisfied with the supplier
- There are often disharmonies with the supplier (reverse-scored item)
- We want to stay with the supplier
- If we had to make the decision again we would choose this supplier again
- We can recommend the supplier without any reservation