

TECHNISCHE UNIVERSITÄT MÜNCHEN

Lehrstuhl für Dienstleistungs- und Technologiemarketing

Business Solutions

Sellers' and Buyers' Perspectives

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English Summary

B2B solutions have received increasing attention from academic marketing research during the last 15 years. Much is expected from solutions: On the one hand, they are intended to provide customers a higher benefit than they could obtain through the purchase of individual components. On the other hand, solutions should create competitive advantage for sellers, for example, by higher margins and stronger customer relationships. As a result of this alleged superiority of business solutions over other sales strategies, the majority of research in this field is either conceptual-normative or qualitative-descriptive with a focus on successful transformations of large manufacturing companies towards solution providers. There is a lack of research that takes an unbiased, dispassionate attitude toward solutions. From this position, the baseline (prevalence) and dynamic (incidence) of this phenomenon should be examined first, before then positive and negative outcomes move into the spotlight.

Study I of this dissertation aims at filling this gap. First, a typology for complex B2B offerings is developed based on an established and widely accepted, but never quantitatively and empirically verified theoretical framework, which defines business solutions as a sequence of relational processes. This typology is tested on a sample comprising 527 German B2B firms using configural methods. The results confirm the typology for the most part and thus the underlying theory. Around 40% of the firms can be assigned to the ideal type of the solution provider; hence, the prevalence is high. The incidence, however, is low: Over a period of ten years, to which the participants refer their assessment of their company's strategic choices, the supposed trend toward solution selling is not observable. This also applies to the postulated transformation pathways: Although established concepts can be identified, they play only a minor role in practice due to their low probability of occurrence. Furthermore, there are reverse transformations – that is, away from the position of the solution provider – which have not been discussed in the literature so far. Companies abandon this position for two reasons: Either they fail in offering the *solution benefit*, or they try to standardize the originally individual solutions to reach greater market

segments. The latter strategy is questionable: it can be shown that solutions only have their full positive effects for providers, if they are implemented entirely, that is, in form of a coherent *gestalt strategy*.

Study II of this thesis focuses on the customers' perspective on business solutions. Data was collected in the medical technology industry (in-vitro diagnostics), where a sample of 140 users and decision makers was drawn. As assumed in the literature but never empirically examined, processes that are vital to the seller – namely customization and integration – are of minor relevance to the customer. A successful implementation is crucial for the users' satisfaction with the solution and the assessment of the perceived usefulness. On the contrary, decision makers consider the seller's proactive post-purchase activities to be important. Users focus on efficacy aspects, decision makers stress the efficiency of a solution. Furthermore, solution-oriented behavior of service and sales employees has a mediating effect of the seller's perception as a solution provider from the customers' point of view.

This dissertation helps to understand under which conditions business solutions might be a viable strategic choice for vendors. A managerial framework helps sellers in assessing their current and desired positions and provides detailed and empirically supported guidelines if these vendors decide to become solution providers.

This thesis also contributes to theory on business solutions: As a *middle-range theory*, the empirically validated typology for complex B2B offerings serves as a bridge between *general theories* and contextual research, particularly case study research. For instance, the results imply that service-based solutions, which have been largely ignored by research so far, do not significantly differ from product-based solutions.

Finally, this thesis also makes a methodological contribution. A new approach for empirically testing typologies is presented, which combines scenario techniques, procedures that were originally developed to detect syndromes in medical research, and latent class methods. This new approach also allows pseudo-longitudinal statements.

Deutsche Zusammenfassung

Kundenlösungen auf B2B-Märkten haben in den letzten 15 Jahren verstärkt Aufmerksamkeit von Seiten der akademischen Marketingforschung erhalten. An Lösungen werden hohe Erwartungen geknüpft: Zum einen sollen sie Kunden einen höheren Nutzen liefern als diese durch den Bezug von einzelnen Komponenten erhalten könnten. Zum anderen sollen Lösungen Wettbewerbsvorteile für Anbieter schaffen, beispielsweise durch höhere Margen oder engere Kundenbeziehungen. Gerade diese vermeintliche Überlegenheit von Lösungen gegenüber anderen Verkaufsstrategien hat aber dazu geführt, dass der Großteil der Forschung auf diesem Gebiet entweder konzeptionell-normativ ist oder qualitativ-deskriptiv mit dem Schwerpunkt auf erfolgreiche Transformationen von Großunternehmen aus dem produzierenden Sektor hin zum Lösungsanbieter. Es fehlt an Forschung, die eine nüchterne und neutrale Haltung gegenüber Kundenlösungen einnimmt und aus dieser Position zunächst einmal die Verbreitung (Prävalenz) und die Dynamik (Inzidenz) dieses Phänomens untersucht, bevor dann die positiven und negativen Effekte überprüft werden.

In diese Forschungslücke stößt Studie I dieser Dissertation. Basierend auf einem in der Literatur weitgehend akzeptierten, aber noch niemals quantitativ-empirisch untersuchtem theoretischen Rahmenkonzept, welches Lösungen als eine Sequenz von Interaktionsprozessen mit dem Kunden definiert, wird eine Typologie für die Vermarktung komplexer B2B-Angebote entwickelt. Diese Typologie wird mittels konfiguraler Methoden an einer zu diesem Zweck erhobenen Stichprobe von 527 deutschen B2B Unternehmen getestet. Die Ergebnisse bestätigen die Typologie weitgehend und damit auch die dahinter stehende Theorie. Dem Typus des Lösungsanbieters können rund 40% der Firmen zugeordnet werden, die Prävalenz ist also relativ hoch. Niedrig ist hingegen die Inzidenz: Über einen Zeitraum von zehn Jahren, auf den sich die Einschätzungen der Untersuchungsteilnehmer hinsichtlich der Strategiewahl ihres Unternehmens beziehen, ist der in der Literatur behauptete Trend zum Lösungsanbieter nicht zu erkennen. Das gilt weitgehend auch für die postulierten Transformationspfade: gängige Konzepte können zwar identifiziert werden, spielen aber in der Praxis aufgrund der niedrigen

Auftrittswahrscheinlichkeiten keine Rolle. Bislang in der Forschung so gut wie nicht thematisiert, zeigen sich auch rückwärtsgerichtete Transformationen, also weg vom reinen Lösungsanbieter. Firmen geben diese Position aus zwei Gründen auf: Entweder sie können dem Kunden keinen *Lösungsvorteil* bieten, oder sie versuchen, die ursprünglich individuellen Lösungen zu standardisieren, um größere Marktsegmente zu erreichen. Letztere Strategie ist fragwürdig: es kann gezeigt werden, dass Lösungen tendenziell ihre positiven Effekte für Anbieter nur dann entfalten, wenn sie vollständig implementiert werden, also in Form einer kohärenten *Gestaltstrategie*.

In Studie II wird die Sicht des Kunden auf Lösungen untersucht. Dazu wurde eine Stichprobe von 140 Nutzern und Entscheidern in der Medizintechnikbranche (in-vitro-Diagnostik) erhoben. Wie bisher in der Literatur vermutet, spielen die Prozesse, anhand derer Anbieter üblicherweise Lösungen definieren – nämlich Anpassung und Integration – bei Kunden keine oder nur eine geringe Rolle. Für Anwender ist die erfolgreiche Implementierung maßgeblich verantwortlich für die Zufriedenheit mit der Lösung und der Einschätzung des Nutzens, den sie stiftet. Für Entscheider steht hingegen der After-Sales Support im Mittelpunkt. Nutzer betonen somit die Effektivität einer Lösung, während für Entscheider die Effizienz entscheidend ist. Eine wichtige Rolle spielt auch lösungsorientiertes Verhalten von Vertriebs- und Servicemitarbeiter; es wird gezeigt, dass sie als Schnittstellen einen vermittelnden Effekt in diesen Wirkzusammenhängen ausüben.

Diese Dissertation trägt zum Verständnis bei, unter welchen Bedingungen Lösungen eine geeignete Strategiewahl für Anbieter sein können. Für Manager wurde ein Leitfaden entwickelt, mittels dessen sie die Ist- und Soll-Position ihres Unternehmens ermitteln können und aus dem sich die notwendigen Aktionen ableiten lassen.

Die vorliegende Arbeit trägt auch auf verschiedenen Ebenen zur weiteren Forschung bei. Als eine so genannte *Theorie mittlerer Reichweite* nimmt die erarbeitete und empirisch unterstützte Typologie eine vermittelnde Rolle zwischen den Allgemeinen Theorien und der im B2B Marketing weit verbreiteten Fallstudienforschung ein. So wird beispielsweise gezeigt, dass sich Service-Lösungen, die bisher von der

Forschung weitgehend ignoriert wurden, nicht wesentlich von produkt-basierten Lösungen unterscheiden.

Schließlich leistet die Dissertation auch einen methodischen Beitrag. Ein neuartiger Ansatz zur empirischen Überprüfung von Typologien wird präsentiert, der Szenariotechniken, Methoden zur Entdeckungen von medizinischen Syndromen und latente-Klassen-Verfahren kombiniert und auch pseudo-longitudinale Aussagen ermöglicht.

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Abbreviations

-2LLD	- two times loglikelihood difference
AIC	Akaike information criterion
ANOVA	Analysis of variances
AT	Agency theory
AVE	Average variance extracted
AWE	Average weight of evidence
B2B	Business to Business
B2C	Business to Customer
BIC	Bayesian information criterion
BLRT	Bootstrapped likelihood ratio test
BPO	Business Process Outsourcing
C vs. S (approach)	Component / conventional versus solution (approach)
CA	Cronbach α
cf.	confere (compare)
CFA / (f)CFA	(functional) Configural Frequency Analysis
CMP	Contemporary marketing practice
CR	Composite reliability
CSR	Case study research
df	Degrees of freedom
DV	Dependent variable
e.g.	exempli gratia (for example)
EM	Expectation-maximization
ERP	Enterprise resource planning
et al.	et alii
et seq.	et sequens (and the following)
etc.	et cetera
FP	Fundamental premise
GMM	Growth mixture modeling
GOF	Goodness of fit
GT	General or grand theory
HRM	Human Resources Management
i.e.	id est (that is)
ibid.	ibida (in the same place)
IDV	Independent variable
IE	Information economics
IR	Item response
IS / IT	Information systems / information technology
K-S (test)	Kolmogorov-Smirnov test

LCA / LCM	Latent class analysis / latent class model
LE	Large enterprises
LGA	Latent growth analysis
LL	Log-likelihood
LPA / LPM	Latent profile analysis / latent profile model
LRT	Likelihood ratio test
LTA / LTM	Latent transition analysis / latent transition model
md	Median
ML	Maximum-likelihood
MRT	Middle-range theory
n.s.	not significant
NIE	New institutional economics
NPS	Net promoter score
p	Probability
p.	Page
PBC	Performance-based contracting
PDA	Profile deviation analysis
PLS	Partial least squares
PRT	Property rights theory
PSS	Product-Service-System
QCA (fsQCA)	(fuzzy set) Qualitative Comparative Analysis
RA	Regression analysis
RBV	Resource-based view
RM	Relationship marketing
ROI	Return on investment
s.d.	Standard deviation
s.e.	Standard error
SBU	Strategic business unit
SCP	Structure-Conduct-Performance
SDL	Service-Dominant Logic
SEM	Structural equation modeling
sig.	significant
SLA	Service level agreement
SME	Small and medium-sized enterprises
SOCO	Selling orientation – customer orientation
SPC (SPCM)	Solution Process Chain (Model)
SSC	Services supporting the customer
SSP	Services supporting the product
tba	To be announced
TCO	Total costs of ownership

TCT	Transaction cost theory
TVE	Total variance explained
VAF	Variance accounted for
VIF	Variance inflation factor
VL	(Stephen) Vargo and (Robert) Lusch
vs.	versus (against)
WOM	Word of mouth
WTP	Willingness to pay

James Bond: In my business you prepare for the unexpected.

Villain: And what business is that?

James Bond: I help people with problems.

Villain: Problem solver?

James Bond: More of a problem eliminator.

James Bond

British Secret Agent (1920 -)

From the movie *License to Kill*

1 Introduction

1.1 Research Motivation

Solutions - this word must sound seductive to the ears of stress-ridden industrial purchasing or top managers. Because what, if not solving complex problems is their daily business? The persuasive power of this *one-word marketing promise* has also been recognized by the supplier side, which awards its offerings the label “solution” quite generously. However, a mere re-labeling of products (and services) is not enough to be considered as a solution provider. Cases such as IBM – almost a *business paradigm* for the transformation process towards solutions – showed the necessary changes in strategy and culture already in the early 1990ties. With this first rise of solutions, a third player – after vendors and customers – came onto the field (Cova and Salle 2007): top management consultants promoted solution selling heavily and created a considerable buzz about solutions in the business press. Marketing academia picked up the idea of business solutions relatively late, at about the turn of the millennium. Was theory lagging behind practice? Both the basic idea of solutions and central theory elements can be found in the early B2B marketing literature, but encapsulated in temporally, locally, and theoretically separated schools, and in ramified research streams, for instance *systems selling*, *bundling*, and *servitization*. These conceptual differences still exist today (see chapter 2.4) and also touch other issues such as methodology. Nevertheless, the academic B2B marketing community considers the trend of manufactures transforming into solution providers as one of its major research challenges (Belz, Backhaus, and Lilien 2013; Cova and Salle 2007; Evanschitzky, v. Wangenheim, and Woisetschläger 2011; Jacob and Ulaga 2008). Indeed, there was a substantial amount of conceptual and qualitative empirical research in recent years, but two implicit assumptions were rarely questioned: Any company should become solution provider and any customer wants a solution. The first assumption might be a result of the hype that solution selling created and that was nurtured by simple-sounding strategy recommendations in practitioner journals. According to these recommendations, firms should develop towards the *right end* or *upper right corner towards a solution provider* (depending

on the number of dimensions within these concepts). However, intermediate positions offer a wide range of strategic options: be it as a temporary stage for the transition, be it as the optimal position for a diversified customer portfolio, be it as an avenue for business development, or be it just the degree of *solution-ness* that the customer expects from the company and its offerings (Evanschitzky et al. 2011). It is not unlikely, that a company has customers who want a full solution, whereas others are perfectly satisfied with single components or need some kind of “enhanced” product.

The primary objective of this thesis is to question the two quasi-axioms – any vendor should offer solutions and any customer wants solutions – and to put the phenomenon business solutions on a solid theoretical foundation, which is then subjected to empirical testing. For this purpose, a new measurement and testing approach is developed that combines established methods from strategy research and analysis techniques new to business research.

1.2 Research Gaps and Problem Definition

“If I were given one hour to save the planet, I would spend 59 minutes defining the problem and one minute resolving it.”

Albert Einstein

German Physicist (1879-1955)

Research on business solutions and other complex offerings has steadily increased: First papers date back in the early seventies; a significant growth in the number of publications is noticeable from 2000 onwards (Boehm and Thomas 2013). Recent literature reviews identify more than 250 relevant publications (Beuren, Gomes Ferreira, and Cauchick Miguel 2013; Boehm and Thomas 2013). Despite the high research output and a for business sciences comparatively long research tradition, the current state of research has deficits in four areas:

- Only one out ten publications on complex offerings in the field of business and management is based on quantitative research (Boehm and Thomas 2013; Velamuri, Neyer, and Möslein 2011). However, this fact alone does not

justify the call for more quantitative studies. Rather, it lacks a certain kind of knowledge: we know little about findings that go beyond a particular company or industry and hence little about general relationships as consequence of this **epistemological and methodological gap**.

- Many publications carry terms such as “transforming”, “moving from...” in their title (Brown 2000; Paiola et al. 2013; Storbacka et al. 2013). But in order to assess the impact of such research, we need to know which and how many companies have to be transformed in any way at all. Is solution selling just a marginal phenomenon or is it already common practice? To find out, we **need baseline studies**.
- According to most definitions, services are an integral part of business solutions. These definitions, however, consider services just as add-ons to products. Due to this **inherent focus on products**, complex offerings consisting solely of services are underrepresented in current research.
- It is remarkable that, to date, no research has questioned the rampant enthusiasm for solution selling (with the exception of Adamson, Dixon, and Toman 2012); and if so, the criticism usually refers to the conceptualization or definitional elements. Rather, a general trend towards solution selling seems to be common sense. Therefore, the question whether a company should offer solutions at all might be under-represented in research because it stands up to this trend and its underlying quasi-axioms.

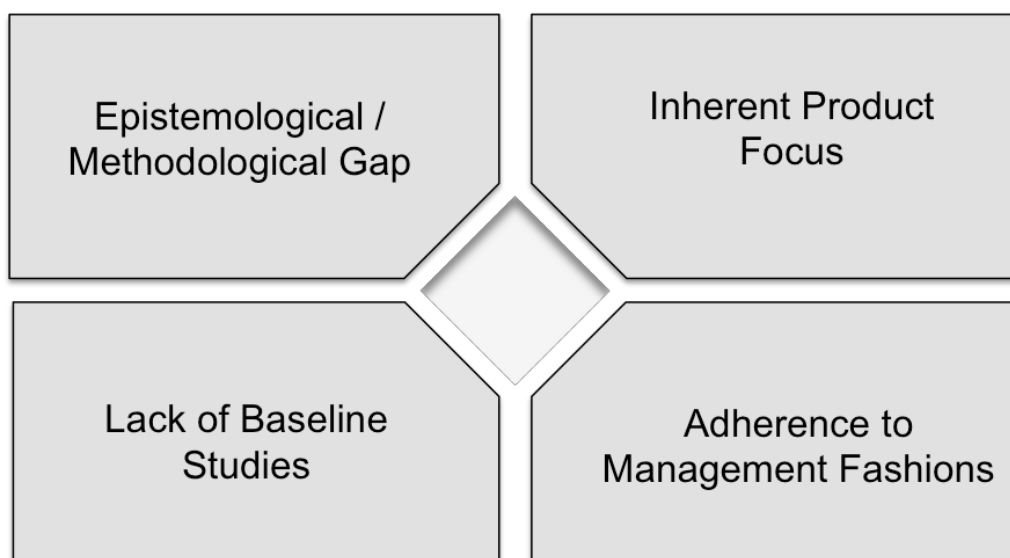


Figure 1: Gaps in research on complex B2B offerings

1.2.1 The Methodological and Epistemological Gap: Qualitative versus Quantitative Research in B2B Marketing

Any empirical social science including academic marketing research categorizes its research strategies into two broad clusters. The classification into qualitative and quantitative research is certainly the most common. The dichotomy goes beyond the methodological discussion in most disciplines and also includes abstract scientific goals (Bryman 1984) and – at the epistemological level – fundamentally opposed beliefs (positivism vs. interpretivism (= anti-positivism)). Therefore, the two approaches differ considerably in terms of their knowledge objectives (Bahari 2012; Bryman 2004; Siegle 2013):

Qualitative research aims at understanding (*verstehen*¹). It is primarily inductive, theories and hypotheses stand at the end. Qualitative research learns from cases. It considers the research object and its context as a single unit (casuistry and idiosyncrasy). It is pluralist and *equifinal*, i.e. several paths can lead to the goal of knowledge (Fiss 2007). Complexity is allowed, even desired. Reality is constructed and needs to be interpreted.

Quantitative research strives for explanation (*erklären*). Mainly deductive, it starts with theory and hypotheses, which are empirically tested and either strengthen the theory or give reason to reformulate the theory. Quantitative research tries to generalize beyond the case and its context and thus reduces complexity. Regression-based analytics searches for the single best way (*unifinality*), deviation will be interpreted as error. Quantitative research is variable-centered. It tries to identify variable net-effects, which are additive and (mostly) linear. Reality exists separate from our perception and can be measured.

Academic B2B marketing is closely linked to the qualitative approach, and case study research is the method of choice (Beverland and Lindgreen 2010; Borghini, Carù, and Cova 2010). This has mainly two reasons. First, in the late 1970ies and early 1980, two schools of thought (Egan 2008), the Industrial Marketing and Purchasing (IMP) Group (Håkansson 1982) and the Nordic School of Services

¹ The German verbs *verstehen* and *erklären* are – in this context – also common in the English language. The distinction can be traced back to early sociologists, e.g. Max Weber.

(Gummesson and Grönroos 2012), heavily influenced B2B marketing research. Both share a rigorous *Verständnis*-orientated research approach and stress the importance of relationships and networks as objects for in-deep studies (Cantù et al. 2013). Accumulation of knowledge follows the qualitative approach: Instead of focusing on the largest possible number of entities (firms, customers) in one single study and then generalizing, each case study – ideally – contributes to the big picture. The second reason for the dominance of qualitative research in B2B marketing research might be the difficult accessibility of respondents for large-*n* survey research. This is especially true for smaller nations with a smaller number of companies, such as the Scandinavian countries. The research output of these countries is relatively high in the field of B2B marketing research (Backhaus, Lügger, and Koch 2011) and contributes to the dominance of qualitative research.

One of the biggest challenges for qualitative research and case study research in particular is the transferability of the findings beyond the study context and aggregation to a theory (Dubois and Gadde 2002; Eisenhardt 1989b). Qualitative research presumes the inseparability of *object* and *context* of the study: the researcher can adequately describe an object and interpret its behavior only within its context. Isolating the object from its context and the generalization of this knowledge is therefore not appropriate. If this should be explicitly required, the study must be designed from the beginning as a multiple case study (Yin 2003), which happens to an increasing extent in academic B2B marketing research (Beverland and Lindgreen 2010). Quite often, the issue of generalization is thereby shifted only one level up: The ultimate goal of this type of research, which follows an inductive logic, is the aggregation of empirical findings to a theory. But right here, so the recent criticism (Hoon 2013; Woodside 2010), fail many case-study-based research activities, resulting in a large amount of (undoubted high quality) individual case findings with rich content that do not lead to a common theory. Qualitative research, so Bryman (2004) often neglects its theory-generating objectives:

However [...], this characterization of the inductive strategy as associated with qualitative research is not entirely straightforward: not only does much qualitative research *not* generate theory, but also theory is often used at the very least as a background to qualitative investigations. (Bryman 2004, p. 11)

In the field of business solutions, we find exactly this situation. As mentioned, 90% of all empirical studies on complex offerings in management research are based on case studies (Boehm and Thomas 2013; Velamuri et al. 2011). Without a doubt, the research objective of accuracy (in the sense of giving consideration to the complexity of an individual case) is maintained in doing so. However, no theory emerges, least of all an expandable *middle range theory*, which permits a generalization². If case study research refers to existing theory, then to *general theories* such as the Service Dominant Logic (SDL, Vargo and Lusch 2004) – with only a limited potential for theory testing – or to definitions, which are essentially non-theoretic. If we consider theory to be more than a loose enumeration of findings³, then prior research on complex offerings that is covered by CSR appears to be surprisingly poor in theory.

One research gap therefore exists – albeit neither exclusively nor primarily – in the lack of quantitative, generalizing studies. More important is the resulting *epistemological gap*: Prior research on complex business solutions and other complex offerings lacks studies, which develop theoretical frameworks that are suitable for deduction and studies that actually do deductive research. Instead of looking deeply into individual cases or aiming too broadly at general theories, the degree of abstraction should be at an intermediate level: the findings should be transferable beyond the individual case but also be specific enough for the underlying theory to provide testable hypotheses.

1.2.2 Lack of Baseline Studies

One of the key questions in the context of selling solutions (and other forms of complex offerings) are their *prevalence* and *incidence*: How many solution sellers are out there? Is solution selling a fringe phenomenon or already common practice? Is there really a trend towards solution, as especially the transformation literature (see chapter 5.2) suggests?

² The most influential paper - in terms of number of citations - is the one by Tuli et al. (2007, 430 Google Scholar entries in August 2013). However, the original framework lacks elements that make it a testable middle-range theory (see section 2.5.6).

³ This is rather a positivist position, an advocate of interpretativism would reply that the attention to the individual case leads to deeper knowledge than the abstraction across different contexts.

At least the business world has willingly embraced solutions in their communication practice: 63 percent of the Fortune 100 companies *claim* that they offer solutions (Sharma, Lucier, and Molloy 2002). Hannaford (1976) reports that 70 percent of 500 companies in his 1974 study describe themselves as “involved in systems selling”. Although one might come to believe that solutions are on the rise, up-to-date, sound empirical evidence is rare, especially when looking for a thorough theoretical foundation.

While a number of publications on servitization and performance based contracting (PBC) baselines exist (Dachs et al. 2014; Lay 2003; Lay et al. 2010; Raddats and Kowalkowski 2014), they are limited to service extensions (or the prevalence of PBC). To the best of the author’s knowledge, a German publication in *Wirtschaftsinformatik* (Sturm and Bading 2008) constitutes the only quantitative baseline study⁴ on solutions. Sturm and Bading surveyed 85 German manufacturers with a focus on development of solutions and combinations of products and services. However, they do not use a specific theoretical foundation that allows a classification of firms. Instead, they ask for a self-assessment (“Do you see yourself as a solution provider?”) on a four-point rating scale: 30% fully agree with the statement, and 49% partially agree; 18% consider themselves rather not as solution provider, another three percent absolutely not. Most items in the survey are unipolar questions to the perceived relevance (e.g. “How important do you think is the development of services along with products?”), which might be prone to acquiescence. Since the companies were not categorized, possible differences in the provision of complex offerings were not analyzed as a function of self-assessment as a solution provider.

1.2.3 Inherent Product Focus

Despite of the strong resonance of the Service-Dominant Logic in marketing academia – and in B2B marketing in particular – research on complex offerings is largely product-oriented. There are three reasons:

⁴ There are, however, a number of publications on servitization and PBC baselines (e.g. Dachs et al. 2014, Lay 2003; Raddats and Kowalkowski 2014). These are limited to service extensions or the prevalence of PBC.

- B2B marketing has traditionally focused on capital-intensive, tangible products as the original name *industrial marketing* suggests. Services might have a longer tradition in B2B marketing than in other disciplines (Vargo and Lusch 2011) but services have been predominantly perceived as a means for differentiation or to financially support the product business (Kyj 1987; Wagner 1987).
- Servitization (Vandermerwe and Rada 1988), a concept that cannot be detached from research on business solutions and other complex offerings, sets both the research agenda (what to look at: manufacturers) and the basic assumption (manufacturers increasingly turn into service providers). Only a few authors have questioned this quasi-paradigm for research on B2B services, e.g. via *reversed servitization* (Finne, Brax, and Holmström 2013; Turunen 2011).
- Countries with a strong emphasis on the manufacturing industry (e.g. Germany, Finland, Sweden) set up comprehensive research funding programs during the 1990s and 2000s. An explicit goal was finding ways to diversify the portfolio of manufacturing companies to reduce the dependence on this sector. As a consequence, many young scientists were brought up with a focus on how to transform manufactures into solution providers.

As a result, there is extensive research on firms' move towards solutions by adding services, but relatively little research on the situation of firms that have already transformed into service-based solution providers or always have been. Publications on pure service solutions, e.g. as a strategy of providers of professional B2B services (consulting, engineering or financing services, etc.) is almost non-existent. Notable exceptions are Finne, Tanskanen, and Brax (2012) who describes the case of a financial solutions provider, and Chae (2012) who suggests innovation processes toward solutions for knowledge-intensive business services (KIBS).

A lacking focus on pure service offers is not only true for solutions but also for other topics. The B2C services literature knows *service bundling* as strategic option (e.g. Carman and Langeard 1980); several publications focus on service bundling in connection with pricing (Berman and Dunn 1987; Gultinan 1987). However, research on bundling for industrial or professional services is scarce, only a very few

papers address B2B service bundles *explicitly*⁵ (Bennett and Robson 2001; Boyt and Harvey 1997).

A possible link between pure service and “traditional” solutions is offered by the literature on performance-based contracting, which acknowledges performance contractors as providers of service-based solutions. In most cases these firms are described as former manufacturers that have undergone a successful transition (Helander and Möller 2009; Oliva and Kallenberg 2003; Renault, Frédéric, and Ulaga 2010; Ulaga and Reinartz 2011).

1.2.4 Adherence to Management Fashions

As noted earlier, many marketing managers enthusiastically call their offering a *solution*. But that should make marketing academics cautious because they run the risk to succumb to a *management fashion*, which is a “relatively transitory collective [belief], disseminated by the discourse of management-knowledge entrepreneurs, that a management technique is at the forefront of rational management progress.” (Abrahamson and Fairchild 1999, p. 1). Eric Abrahamson (Abrahamson 1996, 1991; Abrahamson and Fairchild 1999) argues that these *management techniques*⁶ only have a limited lifespan and then need to be replaced by new and better ones. Management techniques are generated by fashion setters, such as business consultants, “management gurus”, business book and practitioner journal (e.g. Harvard Business Review) authors, and business school academics. There is also a marketplace where these management techniques are supplied to (e.g. through executive teaching) and where demand is created. If business scholars want to compete on that market of ideas, they have to adapt to this demand. The researcher’s Achilles heel is the access to empirical data, in particular primary qualitative or quantitative data that is collected in collaboration with a business partner. Quite often, access to data is granted only for topics that resonate with the business partner

⁵ Some authors, e.g. Stremersch, Wuyts, and Frambach (2001), do not differentiate between service and product components and therefore implicitly also address pure services bundles or solutions.

⁶ Abrahamson sees similarities between management approaches such as Total Quality Management and technology, e.g. with innovation and adoption processes. Therefore he calls these approaches *techniques*.

– like a phenomenon that buzzes through the business press. This self-perpetuating process can lead to an overestimation of management techniques.

There are a number of hints that *business solutions*⁷ are such a fashionable management technique:

- The concept has been heavily promoted by business consultants (as shown later, see the compilation of consultants' publications in Table 6). In return, these publications have been cited widely by marketing scientists; a fact which has received criticism in recent research (Jacob and Ulaga 2008; Nordin and Kowalkowski 2010).
- Companies have extensively adopted the word in their communication and claim that they offer solutions (Sturm and Bading 2008).
- Companies that have successfully transformed into solution providers are widely acknowledged as *management paradigms*, e.g. IBM, and promoted as case studies (Gerstner 2002).
- The first publications on the “end of solution sales” (Adamson et al. 2012) herald the end of the end of the techniques' life cycle and propagate a new one (“insight selling”; article was published in Harvard Business Review).

If business solutions are such a fashionable management technique, what are the potential consequences for research? First, scholars, who question the enthusiasm towards solutions, might have difficulties in gaining access to primary data in joint research projects with companies. This might result in a *selection bias* as only those companies are willing to grant access to managers or customers that want to become solution providers. Second, in the case of complex offerings, journal publications on unsuccessful transformations or other failure stories are difficult to find (e.g. Neu and Brown 2005). It is impossible to determine if the cause is the aforementioned selection bias or a *publication bias* because potential findings may contradict the mainstream and are therefore disregarded. Third, the general necessity to move towards complex offerings has never been questioned even if expectations were not met and failure rates of up to 75-80% were reported (Krishnamurthy, Johansson, and Schlissberg 2003; Roegner and Gobbi 2001), or offering total solutions might act as

⁷ This should also apply to other complex offerings but *solutions* is the catchiest word.

an affront to customers⁸. This *action bias* (Bar-Eli et al. 2007), that is, doing something is better than doing nothing, among managers, consultants, and – maybe – researchers could lead to an overestimation of the dynamics and the inevitability of such transformation processes.

1.2.5 Research Challenges: B2B Marketing – the Poor Cousin of B2C Marketing?

“Marketing had always had an uncomfortable relationship with those sectors which operated outside mainstream consumer goods” (Egan 2008, p. 10)

The four aforementioned gaps refer to research on complex offerings. However, in proportion to its economic importance, more or less the entire field of academic B2B marketing research could easily be called a research gap. In 2000, the B2B/B2C ratio of the gross national product was nearly balanced in the United States (50.16 / 49.84) (Frauendorf, Kähm, and Kleinaltenkamp 2007). In European national economies, we see a remarkable shift towards B2B, reaching from 71.42 / 28.58 in Germany, to 76.49 / 23.51 in France, or even 85.53 / 16.47 in Finland. This also applies to more recent economic developments: Grewal and Lilien point to the fact that B2B accounts for 91% of the US\$ value of all e-commerce transactions in the US in 2009 (Grewal and Lilien 2012).

Despite the economic weight, the number of B2B-related publications in marketing journals is strikingly low: A comprehensive analysis of 24 highly ranked *mainstream* marketing journals (not including pure B2B periodicals such as the Industrial Marketing Management Journal, which alone accounts for 46.5% of all articles ever published on B2B marketing topics) from 1936 until 2007 reveals that out of 17,853 papers only 1,204 (= 6.7%) deal with B2B matters (LaPlaca and Katrichis 2009). This unbalance is also reflected in the top marketing journals: Between 2005 and 2009, only 108 out of 1124 publications (9.61%) in the Journal of Marketing, the Journal of Marketing Research, Marketing Science and the Journal of the Academy

⁸ Nordin and Kowalkowski (2010) cite an Ericsson manager: „You say that you have total solutions, but I am afraid that we don't have any total problem“ (p. 444).

of Marketing Science⁹ cover B2B marketing topics (Kleinaltenkamp 2010). This mismatch between research coverage and economic relevance led LaPlaca and Katrichis to the conclusion (2009, p. 57) that “B2B scholarly activity is less than a 7% solution for at least a 50% issue.” Ironically, B2C marketing’s *poor cousin* was more than once ahead of its time when it comes to paradigmatic thinking: B2B has focused on buyer-seller relationships long before mainstream marketing discovered *relationship marketing* as a new approach at the beginning of the 1990ies. Likewise, many of the theoretical developments that were later summarized in the Service-Dominant Logic (SDL) have been standard in academic B2B marketing for years, e.g. the pivotal role of services, utilitarian value concepts or systems thinking (Vargo and Lusch 2011).

Grewal and Lilien (2012, p. 6-7) identify four structural challenges that B2B research – and ultimately this thesis too – has to face:

- *Complexity and heterogeneity*: most complex situations in B2C encompass a couple of individuals in a household buying an at most modest complex product or service. In B2B, the number of persons involved in a purchase ranges from one (in SME’s) to several hundred in large enterprises. The underlying offering is in most cases highly complex (e.g. special machinery).
- *Lack of domain knowledge*: For research in most B2B settings, comprehensive industry-specific knowledge is essential; a technical or engineering background is helpful.
- *Lack of data availability*: Both primary and secondary data are harder to collect than in the B2C world. In most cases, the researcher is dependent on cooperation with companies. Student or other convenience samples – a controversial yet common practice in B2C research – are not appropriate in B2B marketing research.
- *Diffuse focus*: Similar to marketing in general, B2B marketing comprises several sub-disciplines, each with its own theoretical foundations. There is

⁹ The number of B2B papers in a fifth top journal, the Journal of Consumer Research (JCR), was even zero, yet the authors did not include this journal because of its positioning. Including JCR, the percentage would be 7.37.

also disagreement on the unit of analysis, be it persons (e.g. in the sales literature), buyer-seller-relationships, companies, or networks.

These hurdles do not only shed light on the question why B2B research is underrepresented in scholarly marketing, they also explain why B2B marketing research today is mainly qualitative and in-depth, leaving room for studies that address the *bigger picture*. As outlined earlier, the deficiency of broader, quantitative research is not a research gap *per se* – but B2B marketing in general and the research on business solutions and other complex offerings in particular lack quantitative studies in order 1) to assess how generalizable findings are and 2) to *anchor* a phenomenon in reality, i.e. to evaluate its relevance.

Summary

So far, research on business solutions and other complex offerings has been mainly conceptual or qualitative. Even though case study research has generated many in-deep findings, it lacks a theoretical framework that is capable to incorporate all these findings and that allows to derive hypotheses for quantitative testing. Research usually takes place in a quasi-paradigmatic setting in which the necessity of strategic moves towards complex offerings and the inclusion of services is rarely questioned *in toto*. Since no information about the prevalence and incidence of selling complex offerings is available, the importance of this phenomenon is hard to assess. Although anchored in a service logic, research has been focusing on manufacturing companies and has neglected pure service solutions.

1.3 Research Questions

The present thesis directly addresses the four aforementioned research gaps: It combines positivistic (quantitative, hypotheses testing) and interpretative research strategies by using a configurative approach. Therefore, a process-based theoretical conceptualization of business solutions is extended to a testable middle range theory. For empirical testing, measurement techniques from strategy research are combined with analysis methods that were originally developed to detect *syndromes* in medical and psychopathological research and have never been applied in marketing research before. Data was collected through online access panels without being dependent from partner companies. This thesis treats product and services offerings equally and avoids any preference for a certain strategic decision (i.e. component vs. solution selling) during data collection and interpretation of the results.

In particular, **study Ia** answers the following questions: What types of complex offerings and underlying strategies can be identified? More precisely: can the six theoretically based, *a priori* defined configurations *Component Seller*, *Mass Customizer*, *Resource Integrator*, *Remote Connector*, *Systems Seller* and *Solution Provider* be separated from other configurations in an objective way? What is the prevalence (base rate) of these configurations and – following from this – how common is solution selling? How do these types differ with respect to desired outcomes (perceived differentiability, functional value, price markup, etc.)? Finally, do service-based complex offerings differ from their product-based counterparts? For this purpose, a sample of German B2B vendors across various industries was surveyed and analyzed by means of pattern / case-oriented methods (Configuration Frequency Analysis).

Study Ib relies on the same sample but shifts the focus on perceived changes in the vendors' way to sell their core offering. It answers the questions: Is there a trend towards solutions? What are typical transition patterns? What are drivers for these change processes? To address these questions, fluctuations in the configurations are examined using exploratory latent transition analysis. This gives insights into the *incidence* of business solutions and other forms of complex offerings.

Study II shifts the perspective from the provider to the customer and spotlights the people aspects of solutions. It particularly examines the role of service and sales employees as “ambassadors” for the solution-focus of the provider. The study also addresses the question how the customer’s role in a buying center, in this case decision maker and users, influences the expectations toward complex offerings. Study II pursues a descriptive, variable-oriented research strategy. Data was collected in the German diagnostics devices industry and is analyzed using structural equation modeling.

By answering these questions, the present thesis responds to recent research agendas for B2B marketing: Researches have called to develop and to apply more middle range theories in B2B marketing (Brodie, Saren, and Pels 2011; Saren and Pels 2008); they also call for more quantitative research on solutions (Jacob and Ulaga 2008; Nordin and Kowalkowski 2010; Velamuri et al. 2011), for more differentiated frameworks for the transitions from components manufactures to solution providers (Evanschitzky et al. 2011), and for the inclusion of the customer perspective (Tuli, Kohli, and Bharadwaj 2007). This thesis also offers marketing practitioners a more balanced view on complex offerings, in particular on the omnipresent call for transformation processes.

Objectives and Scope of the Studies in this Thesis

Study	Ia	Ib	II
Main research questions	What types of vendors of complex offerings exist?	Which transformation processes can be identified?	What are the “people aspects” of solutions?
Research strategy	Descriptive, configurative (pattern-oriented)	Explorative, pseudo-longitudinal (pattern-oriented)	Descriptive (variable-oriented)
Sample	Providers <i>n</i> = 527	Providers <i>n</i> = 527	Customers (end users + decision makers) <i>n</i> = 140
Industry	Cross-industries	Cross-industries	In-vitro diagnostics
Main method	Configural Frequency Analysis (CFA); Latent Class Analysis (LCA)	Latent Transition Analysis (LTA)	Structural Equation Modeling (SEM)

Table 1: Studies included in this thesis

1.4 Structure of the Thesis

After this introduction chapter, the thesis proceeds with the theoretical fundamentals of complex B2B offerings. First of all, possible contributions of general theories to the domain of complex offerings are explored, followed by a comparative analysis of closely related concepts such as systems, solutions, and hybrid offerings. The chapter closes with the presentation of the Solution Process Chain Model, which serves as a testable middle range theory for the following empirical studies.

Study 1a in the third chapter classifies B2B suppliers according to their main offering. For this purpose, an innovative measurement and analysis approach is proposed. In the following chapter, the study is reanalyzed by means of more conventional methods of analysis and the results are contrasted. While study Ia focuses on the prevalence of solutions and other forms of complex offerings, study Ib in chapter five takes a look on the incidence, i.e. the perceived dynamism. Study II in the following section takes the customer's perspective and analyzes the role of service and sales employees and also investigates differences between users and decision makers in the perception of the solution processes. The thesis finishes with myths and truths about solutions and returns to the question whether business solutions are a fad or not.

1. Introduction		
2. Theoretical foundations General theories, concepts, findings Towards a middle range theory of complex offerings – the Solution Process Chain Model		
3. Study Ia A configural view on the prevalence of complex offerings	4. Methodological addendum to study Ia CFA vs. LCA / LPA	5. Study Ib The incidence of business solutions – latent changes in configurations
6. Implications and limitations of study I		
7. Study II The customer's perspective: The mediating role of service and sales employees		
8. Concluding remarks		

Figure 2: Structure of the thesis

1.5 Terminology

Since precise definitions will be developed bit by bit in the course of the thesis, it is advisable to set up a preliminary terminology for words that are used differently in the literature:

- Marketing to business customers will be referred to as *B2B marketing*. In older publications, particularly in the U.S-American literature, this discipline is called *industrial marketing*. *B2B marketing* is the broader term because it covers all types of value creation processes between organizations, including services (Grewal and Lilien 2012).
- There is confusion about the use of the terms *goods* and *products* in many publications. In this thesis, tangible offerings will be called *products*. *Offerings* is the umbrella term, offerings can be either *products* or *services*. The word *good* will only be referred to in economic contexts, it has the same meaning as *offerings*.
- *Complex offerings* are somehow customized, integrated or bundled. This is an umbrella term for (*total, full, integrated, business, or customer*) *solutions*, (*integrated, modular or Product-Service-*) *systems*, (*integrated*) *bundles*, and *hybrid products or offerings*. A more detailed definition follows in section 2.4.8.
- The terms *seller, supplier, vendor, or provider* are used interchangeably – independent of nature, tangibility, and complexity of the underlying offering. Only companies that follow a traditional component approach will be called *manufacturers*.
- Although male personal pronouns are used for people behind organizational entities (seller, customer, etc.), all statements apply to women equally.

2 Theoretical Foundations

2.1 Theories in B2B Marketing

“Practice should be the result of thinking, not vice versa.”

Hermann Hesse
German Writer (1877-1962)

The discussion about the status of theories within academic marketing is as old as the discipline itself and is still continuing today (Alderson and Cox 1948; Bartels 1951; Converse 1945; Hunt 2010, 1976). In this discussion, there are essentially two extreme positions: There are those who do not even concede marketing the rank of a science, because it still lacks a paradigm in Kuhn’s sense, which all can agree on (or which is concordantly rejected). In many marketing sub-disciplines, however, the quest for theory is apparently treated more pragmatic: theory is either extant research or the summary of all findings within the field. Due to the lack of own theories, academic marketing frequently borrows theories from other scientific disciplines, such as economics or psychology (Mittelstaedt 1990). This eclecticism has the consequence that these borrowed theories rarely have the same scope and structure as in the originating disciplines; they are often reduced to a few elements (for instance, see Rossiter’s criticism for marketing’s careless handling of psychological concepts such as *personality traits* (Rossiter 2011b)). This also applies to B2B marketing, which has an even lower variety of theories to borrow from than other marketing disciplines if the research objects are firms (Kuß 2013). It is not surprising that there have been calls for B2B marketing theory from the beginning (Peters et al. 2013). Although precursors of theoretical thinking can be traced back to the late 19th century (Schmenner 2009), B2B marketing is a relatively young sub-discipline, which has developed its own body of theory over a period of just 20 to 30 years (Hadjikhani and LaPlaca 2013). In the years before, theoretical approaches from B2C mass marketing and marketing management (e.g. marketing mix (4P)) have been embraced until this practice received massive criticism in the early 1990s (Constantinides 2006). Today – with a returning interest in marketing theory – the

theory development efforts of B2B marketing, e.g. in the area of relationships and networks, have received late recognition (Kohli 2011; Möller 2013; Vargo and Lusch 2011). However, theory development is still a stub, particularly for general theories and paradigms (Hunt 2013; Möller 2013), but this applies to marketing in general and is not limited to B2B marketing (Hunt 2002).

One question remains: Why do we need theory in marketing? This issue was heavily debated in the United States in the late 1950 when several government reports criticized business schools for their limited view on business practice. This led to the foundation of the Marketing Science Institute, whose manifesto (cited by Maclaren et al. 2009, p. 3) gets to the bottom of the problem:

- “Theoretical rules are a prerequisite for developing knowledge. Without a theoretical base we have no base for analysis, nor can we decide what is relevant or not.
- Theory can reduce the risk behind taking decisions and can therefore assist practitioners in increasing their productivity.
- It is not sufficient for marketers to rely on theories developed in other disciplines as theoretical structures from one area are rarely directly applicable to another.”

For these reasons, a profound theoretical foundation for business solutions is needed – *because of* and not *despite of* the closeness to marketing practice.

2.2 Theoretical Superstructure

There is little agreement among marketing scholars on whether a theory should stand at the beginning or at the end of the research process (Maclaran et al. 2009). Positivist researchers start with theory and deduct hypotheses. If these can be confirmed, the theory can be temporarily called true – within the limitations that Popper identified – and allows “law-like generalizations” (Hunt 2002, 1991), i.e. it can be applied and transferred beyond the study context. Interpretivists perceive themselves as embedded in the research situation and start with perceptions. Theory finally emerges by repeatedly interpreting these situational insights. Quite often, however, this theory is more like a story about how these insights were collected

(Maclaran et al. 2009). Research on complex offerings mainly pursues an interpretivist approach; therefore we find a wide range of case study based findings. In the ideal case, positivist-deductive “top-down” research should meet “bottom-up” anti-positivist research anywhere in the middle, i.e. at an intermediate level in terms of generalizability and degree of abstraction. However, this is rarely the case because both camps usually refer to *incommensurability* (Kuhn 2012), i.e. the impossibility to compare theories that originate from different research paradigms¹⁰. It therefore makes little sense to categorize theoretical foundations of business solutions only on the basis of epistemology, i.e. the way knowledge is generated. Instead, this thesis applies a more pragmatic, hierarchical classification schema depending on the level of abstraction into *general theories*, *middle range theories* and *concepts*.

General Theories

General theories (GT) take broad conceptual perspective on a scientific field. They are usually not linked to single phenomena or – in this case – to specific business practices and have as few restricting assumptions as possible, which makes empirical testing difficult. Marketing academia generally agrees that no unitary, general theory for marketing has emerged thus far, not least because the requirements for such a theory are high: Hunt (1983) identifies four fundamental explananda or key research areas that a GT for marketing must be able to address (p. 13-14):

- “The behaviors of buyers directed at consummating exchanges (‘Why do which buyers purchase what they do, where they do, when they do, and how they do’)
- The behaviors of sellers directed at consummating exchanges
- The institutional framework directed at consummating and/or facilitating exchanges
- The consequences on society of the behaviors of buyers, the behaviors of sellers, and the institutional framework directed at consummating and/or facilitating exchanges”

¹⁰ Hunt (1994) rejects this argument because marketing’s paradigms – if they exist at all – were not so strong that marketing scholars from different backgrounds would not find a common ground.

Hunt concedes that instead of just one *general theory for marketing* there could be an “integrated collection of subtheories” (Hunt 1983, p. 16). However, the quest for a general theory for B2B marketing has not been accomplished either (Hunt 2013; Möller 2013), not to mention the one for complex offerings. But since marketing has always been eclectic, there is no reason not to screen GTs from other scientific disciplines regarding their possible contribution to the area of complex B2B offerings. For this purpose, a number of “candidates” is analyzed in the following chapters.

Middle Range Theories

While general theories aim at the *big picture*, a *middle range theory* (MRT) is less broad. MRTs were first outlined by Robert Merton (1967) in sociology:

“Theories of the middle range [are] theories that lie between the minor but necessary working hypotheses that evolve in abundance during day-to-day research and all-inclusive systematic efforts to develop a unified theory that will explain all the uniformities of social behaviour, social organization and social change.” (p. 39)

Thus, MRTs serve as a bridge between empirical findings and GTs “by showing explicit links between the process of theory formulation and verification” (Brodie et al. 2011, p. 77). The same authors regret that the concept of middle range theory has received only “little explicit attention” (p. 80) in the marketing discipline. They also criticize that – even in the context of a (for marketing standards) highly theoretical discourse as in the case of Service Dominant Logic – the interplay between empirical findings and (general) theories has been discussed all too rarely. They propose a “scientific circle of enquiry” that illustrates the MRT’s role as a bridge between general theory and empirical findings. The circle also visualizes two distinct research directions: in the “context of discovery”, general theories are used to formulate propositions and hypotheses and hence to substantiate MRTs, which in turn help to interpret empirical findings. By means of these findings, MRTs can be modified and shaped. In case of success, MRTs consolidate the general theory in the long run.

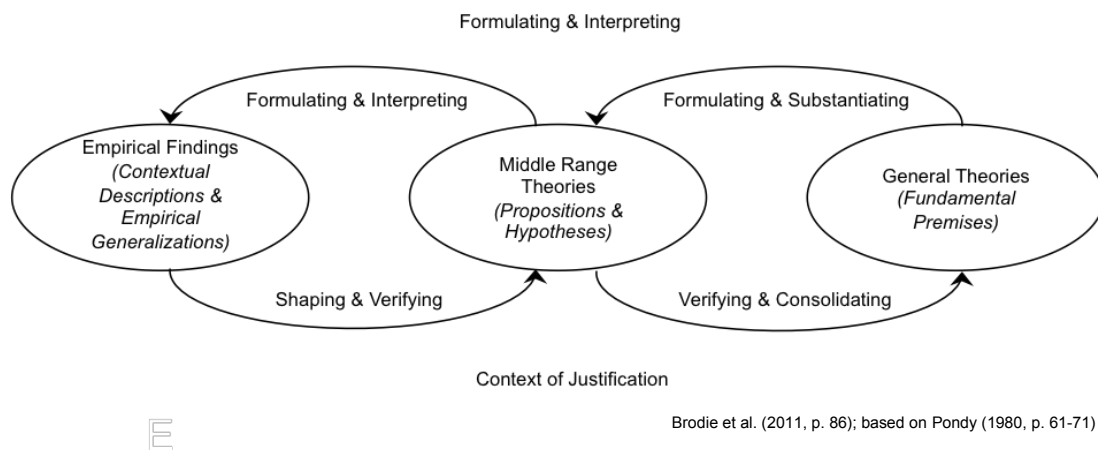


Figure 3: The circle of inquiry – the bridging role of middle range theories

MRTs are non-paradigmatic as they are not restricted to a specific methodology and open to a variety of research traditions, which makes them less prone to incommensurability (Saren and Pels 2008).

As noted earlier, the concept of MRT has not received much attention in academic marketing research so far, therefore only a few authors label their theoretical contributions this way (e.g. Woodside 2003). It is more common in the field of organizational research, in particular within the contingency approach (Zeithaml, Varadarajan, and Zeithaml 1988). *Market orientation* (Jaworski and Kohli 1993; Kohli and Jaworski 1990; Narver and Slater 1990) could be such an example for a MRT, in terms of its bridging function between different methodological approaches and levels of abstractions.

There is currently no theory in the context of complex offerings that – without any modification – could serve as a MRT. It is therefore one of the objective of this thesis to develop such a theory with an intermediate level of specificity, which allows both deductive theory testing and the aggregation of inductive findings.

Concepts, Definitions and Findings

At the lowest level we find theoretical contributions with the highest degree of specificity (cf. Merton 1968). These “practice theories” (Maclaran et al. 2009) are close to the phenomenon under research, or put differently – from an antipositivist perspective – theory, researcher, and research object form an inseparable unit. This

level comprises both conceptual and empirical research, the latter mostly based on case studies¹¹. Publications that mainly aim at defining or describing solutions (or other complex offerings) are the weakest form of theoretical research from an epistemological point of view: Definitions cannot be true or false, only useless or useful, as long as they have no internal contradictions. This category includes mostly practitioner papers. Despite of their low *theoretical* (!) quality, these publications have brought interesting standpoints and insights into the discussion about solutions. *Conceptual research* has a more profound theoretical basis; many publications draw upon theories that are categorized here as GTs. In many cases, these concepts are not intended to be tested empirically (in the positivist sense). The last category contains empirical findings, either quantitative or qualitative. The latter do usually not aim at generalization (from an interpretivist point of view), findings are highly granular and defragmented.

It should be emphasized that the classification of this type of research at the lowest level is not meant to be a dispraise: case study and conceptual research is just closer to real-world phenomena and therefore less abstract than GT's. For *theorizing*, that is the repetitive process of *approaching* a theory, all three levels are equally important: "Products of the theorizing process seldom emerge as full-blown theories [...]. Most products that are labeled theories actually approximate theory. [...] We think it too bad to reserve theory to mean only Good Theory or Grand Theory or Unassailable Theory. We would like writers to feel free to use theory whenever they are theorizing." (Weick 1995, p. 385-386)

Figure 4 depicts the hierarchical classification of theoretical contributions and outlines the structure of the following chapters.

¹¹ This classification is not entirely accurate, because CSR papers often contain conceptual elements or conceptual publications contain exemplary case studies.

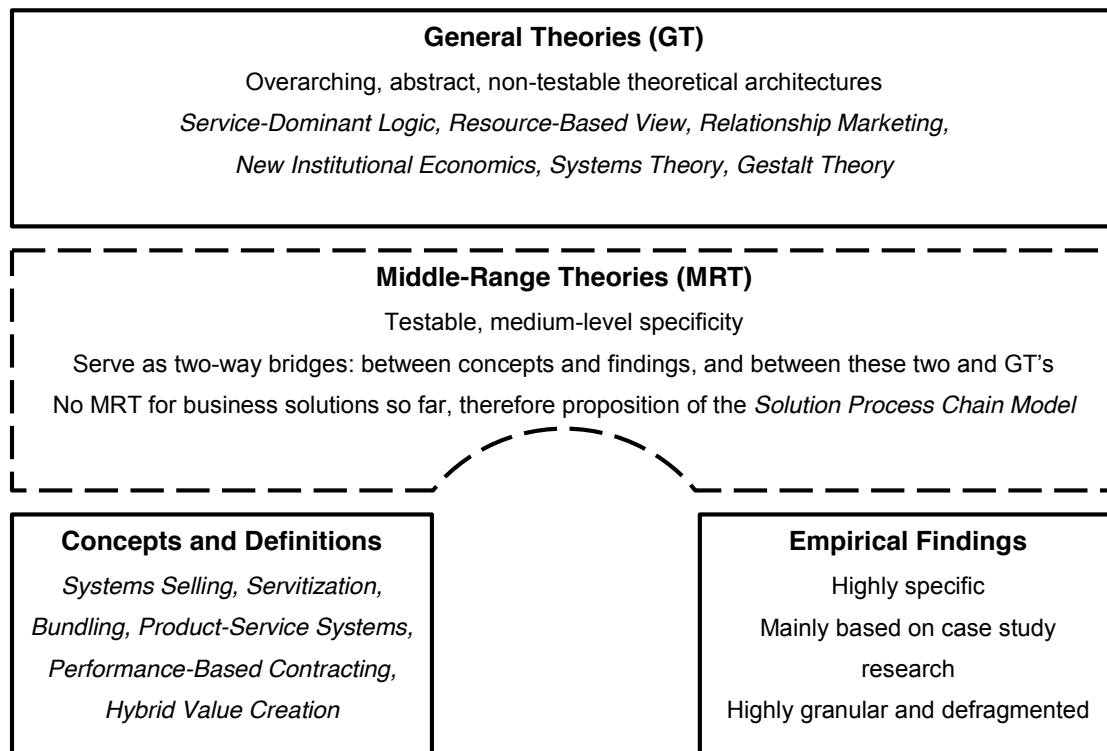


Figure 4: Hierarchy of theories for complex offerings

2.3 General Theories

As outlined above, general theories aim at the big picture at the maximum degree of abstraction. Since such an all-embracing theory is not in sight for either marketing in general, or B2B marketing (or solution marketing) in particular, a selection of *GT candidates* (such as SDL) and GTs from neighboring scientific disciplines are scrutinized with regard to their potential contribution to a theory of complex B2B offerings. A distinction is made between a *direct* and an *indirect* impact on this thesis: GTs might directly influence survey construction, or they contribute a basic principle, which could be reflected in a specific research question. The indirect route goes via influential publications that are cited here.

2.3.1 Service Dominant Logic

The Basics

In their paper "Evolving to a New Dominant Logic for Marketing" (2004), the two U.S. American researchers Stephen L. Vargo and Robert F. Lusch (VL) called for a

fundamental shift in perspective for the discipline of marketing science. Their main criticism: So far, marketing focuses too much on the provision of (tangible) goods. The underlying paradigm of microeconomic maximization, which specifies the function of marketing essentially in the optimization of demand-related management decisions¹² (decision-oriented approach), is no longer able to respond to new developments. Among those, the most significant trend was the growing importance of services. Up until now, marketing literature was at the most concerned with defining the differences between tangible goods and services. Instead, marketing should – here the authors refer to Gummesson (1994) – recognize that customers are primarily interested in the value of offerings, regardless of whether a tangible good or an intangible service provides this value. For this reason, *value* is of central importance in VL's logic. However, in contrast to the current thinking it is not an abstract monetary value that is to be maximized, rather, the focus should be on generating *value to the customer*. For this purpose, Vargo and Lusch draw on the tradition of the distinction between *value in exchange* (trading value) and the *value in use*, which can be traced back to Aristotle, but also plays a major role in the works of Adam Smith and Karl Marx (Vargo, Lusch, and Morgan 2006).¹³

Another key element in the Service Dominant Logic are *resources*, i.e. means that are necessary to generate the value. Here too the authors observe a paradigm shift: the *operand resources* (the usual production factors) become less important in favor of *operant resources*¹⁴ (needed to transform operand resources, e.g. skills). These

¹² Vargo and Lusch also refer here to the 4P framework, which is used to introduce students to marketing thinking. Even if one might question the existence of (research) paradigms in marketing, the 4P framework fulfills without doubt the educational function of a paradigm in the sense of Kuhn (Kuhn 2012).

¹³ Originally, the term micro-economic *utility* value had a similar meaning as *value in use*. During the development of economics as a scientific discipline it increasingly lost this meaning in favor of a *value-in-exchange* connotation. The reasons for this lay, inter alia, in the abstraction of the discipline caused by the mathematical formalization and in a liberal attitude of the economics towards the moral dimension of utility, which arose from the early 20th century zeitgeist (Skidelsky and Skidelsky 2012).

¹⁴ VL chose the microchip as example: the operant resource („silicon“) plays only a minor role compared to the operand resources („knowledge“) that are needed to transform silicon into a functioning computer chip (Vargo and Lusch 2004). At first glance they might neglect the other enormous resources that are needed to produce microchips (e.g. the factory). However, if one looks

operant resources also include customer relationships and even the customers themselves if they – as quite common in the service domain – act as a co-creator of value.

Fundamental Premises of the Service-Dominant Logic

FP1	Service is the fundamental basis of exchange.
FP2	Indirect exchange masks the fundamental basis of exchange.
FP3	Goods are a distribution mechanism for service provision.
FP4	Operant resources are the fundamental source of competitive advantage.
FP5	All economies are service economies.
FP6	The customer is always a co-creator of value.
FP7	The enterprise cannot deliver value, but only offer value propositions.
FP8	A service-centered view is inherently customer oriented and relational.
FP9	All social and economic actors are resource integrators.
FP10	Value is always uniquely and phenomenologically determined by the beneficiary.

Revised form (Vargo and Lusch 2008c), core premises in bold (Vargo and Lusch 2008a)

Table 2: Fundamental premises of the SDL

Indisputably, SDL has had a major impact on marketing theory since its first appearance in the Journal of Marketing in 2004 even though it has also received massive criticism (Achrol and Kotler 2006; Stauss 2005). However, as a potential *general theory* – or at least a candidate for this (Brodie et al. 2011; Hunt 1983)¹⁵ – SDL remains on a highly abstract level. This makes it difficult to derive testable, falsifiable hypotheses or to link the theory to real-world phenomena as middle range theories do (Bryman 2004; Merton 1967; Wright and Russell 2012). As a consequence, empirical research inspired by SDL is rather abstract and less granular (Leroy, Cova, and Salle 2013).

The merits of the SDL are that it a) accurately describes and summarizes already existing shifts in the economy and their reflections in marketing theory; b) offers a vocabulary and a set of axioms as a basic premise for an independent research

more accurately on the microchip market, it appears that ARM Limited is the most agile and innovative contender for market leader Intel. This company does not own any production facilities – their main resources are skills, patents, and close customer relationships with their key customers (e.g. Apple, HP, Dell, Samsung).

¹⁵ VL consider SDL just as a *mindset* (2008c) at a pre-theoretic level that could finally lead to a general theory (2006a)

stream¹⁶, and c) encourages researcher to focus on new phenomena and to re-conceptualize older findings by means of that vocabulary; an aspect that VL call “linguistic telescope” (2011, p. 181).

SDL in the context of Business Solutions

Vargo and Lusch do not hide their fondness for the research tradition of industrial marketing (Vargo and Lusch 2008b; “It's all B2B“, Vargo and Lusch 2011). They argue that B2B marketing has generated ideas that are similar to SDL. Jacob and Ulaga (2008), and Cova and Salle (2008) support this standpoint by identifying conceptual intersections such as systems thinking, the shift from products to value creation processes, business networks, and customer co-creation. In this vein, so VL (2008b), B2B marketing has adopted SDL-thinking earlier than other marketing sub-disciplines, which allows them to conclude, “that it was the B2C model that was flawed” (2011, p. 183).

Although not every reader might agree with the statements above, there was a certain pre / post SDL watershed moment in the industrial marketing literature, especially in the field of industrial services and thus in the closely related research area on business solutions: Before SDL – in the goods-dominant logic – industrial services were mostly seen as *services* (plural¹⁷), i.e. as an intangible type of good (Vargo and Lusch 2008b). Consequently, definitions of complex offerings until approximately 2003-2005 consider business solutions primarily as bundles: product + services (+ x, e.g. financing) and research concentrated on how to integrate these parts (e.g. Brady, Davies, and Gann 2005; Galbraith 2002; Johansson, Krishnamurthy, and Schliissberg 2003). In SDL, services are not “something offered to enhance a good (value added services)” (Vargo and Lusch 2004, p. 2), rather, *service* (singular) stands for “a process of using ones resources for the benefit of and in conjunction with another party” (Vargo and Lusch 2008, p. 1). As a consequence, definitions became broader

¹⁶ However, critics note that a theory without testable hypotheses can never be a *progressive research program* in the sense of Lakatos (Lakatos 1970; Wright and Russell 2012)

¹⁷ The distinction between *service* and *services* has been made by textbook authors more or less implicitly but Vargo and Lusch were the first to explicitly distinguish between singular and plural (Lusch and Vargo 2006b); i.e. *service* indicates “a process of doing something for someone, rather than the plural ‘services’, implying units of output” (p. 282).

(e.g. the process-based definition by Tuli et al. 2007), and research also includes typical SDL topics, for example co-creation (Cova and Salle 2008), business networks (Gebauer, Paiola, and Saccani 2013; Spencer and Cova 2012; Windahl and Lakemond 2006), and resource integration (Cantù, Corsaro, and Snehota 2012).

VL use the term *solution* in their SDL lexicon to contrast the “feature and attribute” thinking in the goods-dominated logic (2006b). Interestingly, the SDL counterpart to *product* is not *solution* but *experiences* (and *offering* for the transitory state) (see table 3). Beyond that, the term has no wider meaning within the SDL. Other researchers, however, draw a direct line between SDL and business solutions; Tuli et al. (2007), for instance, denominate solutions an “embodiment” of the SDL (p. 1).

Conceptual Transitions to a SD Logic (Excerpt)		
Goods-dominant logic concepts	Transitional concepts	S-D logic concepts
Goods	Services	Service
Product	Offerings	Experiences
Feature/Attribute	Benefit	Solution

Table 3: Underlying conceptual transitions to a SD logic (Lusch and Vargo 2006)

The bottom line: the research community around complex B2B offerings received the SDL very well; it is hard to find a recent publication without any reference to the service-dominant logic. However, the impact remains limited to the field of business research, other disciplines also dealing with complex offerings (e.g. engineering, information science) refer less to the SDL.

SDL in this Thesis

There is both a direct and an indirect impact of SDL in this thesis. The distinction between *operant* and *operand resources* finds an echo in the typology of offerings (see chapter 2.5.6). Also, the dependent variables for perceived value of an offering reflect the discussion on *value-in-use* vs. *value-in-exchange*. One of the SDL’s core premises – number ten: “Value is always uniquely and phenomenologically determined by the beneficiary” (Vargo and Lusch 2008c) – is implemented insofar as customers were asked to assess the value-in-use of a complex offering (study II)¹⁸.

¹⁸ This change in perspective is also postulated by Tuli *et al.* (2007). In their paper, however, they directly refer to the SDL.

Although SDL suggests services to have equal (if not greater) value creation capability, research on complex offerings has been product-centered so far (also see chapter 1.2.3). In this thesis, however, offerings can be either products or services, hence, pure service solutions without any tangibles are also considered.

However, as virtually every publication in the area of complex offerings after 2004 takes a reference to SDL, the indirect impact – via papers cited in this thesis – is hard to assess. A second indirect influence does not come straight from SDL but from the discussion about the SDL's quality as a theory. The supporters of SDL argue that an increasingly deeper implementation of a service logic generally leads to higher success. This is one of the reasons why the question of whether solution selling¹⁹ is the best option for any company in any case does essentially not appear, particularly in conceptual and in case-study-based research in B2B marketing, where SDL is rarely questioned. But this very same question belongs to the type of questions that SDL and their followers ultimately have to face (Wright and Russell 2012):

“Demonstrating that SDL *can be used* to describe marketing does not show that SDL *ought to be used* to describe marketing. Nor does showing that SDL may lead to better outcomes in some situations imply that it ought to be used in all situations. [...] The challenge for SDL is to demonstrate under what circumstances a service orientation will give a greater return, rather than assuming that it will always do so.” (p. 219 + 221, italics added)

It is not an explicit goal of this thesis to answer this question with regard to SDL. Yet it touches these issues just because they usually play only a minor role due to the predominance of SDL in this field.

Already in 1973, Peter Drucker put it this way (p. 61): “What the customer buys and considers value is never a product. It is always utility, that is, what a product or service does for him.” (Drucker 1973). Even earlier in 1954 (p. 37) he stated: “It is the customer who determines what a business is. What the business thinks it produces is not of first importance - especially not to the future of the business and to its success. What the customer thinks he is buying and considers 'value' is decisive - it determines what a business is, what it produces and whether it will prosper.”

¹⁹ or implementing any other related concept (PSS, etc., see chapter 2.4.6)

2.3.2 Resource-Based View

The Basics

The Resource-Based View (RBV) is an approach that aims at understanding the sources of competitive advantage of a firm (Barney 1991, 1986; Peteraf 1993; Wernerfelt 1984). It is not a unitary theory with commonly shared assumptions, but rather a family of theories with roots back to the neoclassic economics of the 19th century (Barney 2001). The RBV sees the key to sustained competitive advantage in the resources of a firm. These can be categorized into *physical capital resources* (production facilities, technology and equipment, geographic location, etc.), *human capital resources* (training, experience, intelligence, etc. of *individuals*), and *organizational capital resources* (processes, coordinating systems, relationships among employees and with the environment, etc.) (Barney 1991). However, not all of those resources are important for the competitive advantage of the firm. To be relevant, a resource must be *valuable, rare, not or at least imperfectly imitable, and non-substitutable* (VRIN criteria, Barney 1991; Peteraf 1993). Later RBV researchers (Eisenhardt and Martin 2000; Helfat and Lieberman 2002; Makadok 2001; Teece, Shuen, and Pisano 1997) criticize that just having these resources is not sufficient if the *capabilities* are missing to make use of those resources to achieve a desired end (“resource picking” vs. “deploying”, Makadok 2001). For this reason, *resources* and *capabilities* are often examined together, especially how they interact (Helfat and Peteraf 2003; Ulaga and Reinartz 2011). The RBV shows a certain similarity to the concept of *core competencies* (Prahalad and Hamel 1990); therefore, this approach is often added to the RBV.

The RBV can be seen as an alternative to the *Structure-Conduct-Performance* (SCP) theories, whose most prominent advocate in the area of management is Michael Porter. SCP theories explain strategic success by choosing the right reaction to movements within the market or to other environmental conditions (Porter 1985, 1980). The resources of a firm are seen as interchangeable, they can be imitated, bought or sold; hence, they do not affect competitive advantage. This sooner or later leads to homogeneity within *strategic groups*. The RBV doubts both this homogeneity and the mobility of resources (Barney 1991); on the contrary, it is heterogeneity that – if formed correctly – leads to competitive advantage.

This strong inside-out perspective is one of the criticisms of the RBV (Priem and Butler 2001a). Further criticisms refer to the RBV's role as a theory, at least as a middle range theory. Priem and Butler (Priem and Butler 2001a, 2001b) accuse the RBV to be tautological: a resource is valuable if it leads to increased performance and subsequent competitive advantage, which is also defined in terms of performance. They also criticize the limited predictability and testability. Concerning the usability in practice, Priem and Butler consider the RBV as a *black box* that does not provide guidelines how to create competitive advantage out of the resources. This is partially supported by a comprehensive meta-analysis (Crook et al. 2008): while the link between resources and performance is reasonably strong (mean of weighted correlations $\bar{r} = .22$), no statement can be made to intervening variables that explain this relationship.

RBV in the context of Business Solutions

A few publications explicitly link RBV to complex offerings (Ceci and Prencipe 2008; Fang, Palmatier, and Steenkamp 2008; Hobday, Davies, and Prencipe 2005; Matthyssens and Vandenbempt 1998; Matthyssens, Vandenbempt, and Weyns 2009; Ulaga and Reinartz 2011). Most studies are explorative using interviews or case studies and aim at identifying resources. For instance, Matthyssens and Vandenbempt (1998) consider skills such as “people-oriented commercial technicians” or a “flexible, transparent organization” (p. 345) as prerequisites for developing successful industrial services. Hobday et al. and Ceci and Prencipe (2008) focus on skills (e.g. consulting or systems integration) that allow companies to combine products and services. Ulaga and Reinartz (2011) draw upon the RBV in order to develop their own typology of industrial services for complex offerings.

All publications have in common that they use RBV as more or less loose framework to either explain their findings or to build their own theories upon it. Notable exceptions are the quantitative study by Fang et al. on service transition strategies and their impact on firm value (2008), and the paper by Eggert et al. (2014), which draws upon Matthyssens and Vandenbempt's service capabilities. In this sense, the influence of the RBV on B2B marketing research is more like a general theory than a middle-range theory.

RBV in this Thesis

A direct reference to the RBV is the conceptualization of the companies' integration and customization capabilities as perceived by the customer (study II). Even though the personal selling literature does usually not refer directly to RBV²⁰, a sales force that can think "in solutions" (Bonney and Williams 2009) constitutes a valuable resource for the firm. As stated above, there is a significant indirect impact through influential papers, especially in the field of servitization.

2.3.3 Relationship Marketing

The Basics

The goals of relationship marketing (RM) are to

"establish, maintain, and enhance relationships with customers and other partners, at a profit, so that the objectives of the parties involved are met. This is achieved by a mutual exchange and fulfillment of promises." (Grönroos 1997, p.327)

The relationship marketing approach emerged during the late 1980ies / early 1990 in mainstream academic marketing (Dwyer, Schurr, and Oh 1987; Gummesson 1994, 1987; Morgan and Hunt 1994) as a response to the limits of traditional transactional marketing on hypercompetitive markets (Brodie et al. 1997). Even though relationships between market participants have been considered as a vital part of marketing theory years before ("The primary focus of marketing is the exchange relationship." (Hunt 1983, p. 9), but already earlier, cf. Bagozzi 1974, 1975) and have always had a prominent position in B2B (Ford 1980) and services marketing (Berry 1983; Grönroos 1990), many voices called for a paradigm shift at that time (Brodie et al. 1997; Grönroos 1994; Sheth and Parvatiyar 1995).

RM received input from multiple sources (Aijo 1996; Brodie et al. 1997; Egan 2008), e.g. from services marketing (particularly from the Nordic school, notably represented by Evert Gummesson and Christian Grönroos), marketing channel

²⁰ Literature on sales and personal selling considers a capability rather as a result of a personality trait than as a feature of a company (Weitz and Bradford 1999).

literature, B2B marketing, strategic management (inter-organizational relationships), information technology science (customer databases); but also from other abstract theoretic frameworks, e.g. social exchange theory (Thibaut and Kelley 1959) and new institutional economics (transaction cost theory and agency theory). But what makes relationship marketing a paradigm or even a candidate for a GT, if relationships have always been present in academic marketing? The answer depends on the broadness of the underlying definition of relationship (figure 5). In the narrowest definition (RM = database marketing), relationship marketing is more or less just a technology-driven tool for managing customers. For Egan (2008) this is not RM at all (in the sense of a new marketing approach) since the main purpose of these tools is the easier handling of customer *transactions*. The next broader category focuses on the value of the relationship between company and customers and how this value can be increased (this also includes the retention / loyalty literature). The third level emphasizes the *partnership* aspects between customer and company and analyzes the interactions between these parties. This is also the foundation for the customer co-production / integration literature.

The broadest definition considers all marketing exchanges as relationships and has received most support by the researchers calling for a paradigm shift. At the turn of the millennium, several researchers doubted the importance of RM for scientific marketing (O'Malley and Tynan 2000), despite its success with practitioners (who – in fact – usually pick the CRM / tool idea).

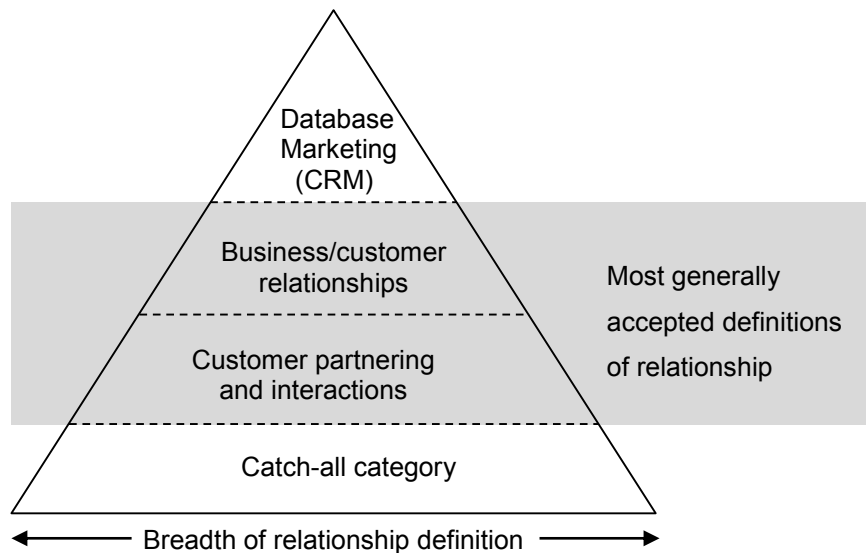


Figure 5: Relationship marketing definitions (based on Egan 2008, p.21; and Brodie et al. 1997)

This disappointment was due to the lack of shared concepts, with the result that “it has become impossible to delimit the domain. The boundaries are completely permeable and elastic.” (O’Malley & Tynan 2000, p. 809)²¹. Also Sheth and Parvatiyar sound considerably less enthusiastic in 2002 than they did seven years before:

“[...] not all marketing can be relationship marketing. Relationship marketing has to be a subset of marketing. In other words, not all marketing relationships are relationship marketing. Just as we have services marketing, international marketing and social marketing, there is or should be a unique domain called relationship marketing whose objectives, processes, performance and governance are unique with respect to organization’s marketing and non-marketing resource allocations.” (Sheth and Parvatiyar 2002, p. 11)

A second stream in the literature does not criticize the paradigm-shifting attempts of RM but the necessity of the *closest possible* relationships between firm and customer (Ashley et al. 2011; Danaher, Conroy, and McColl-Kennedy 2008; Mitreęa and

²¹ Interestingly, O’Malley and Tynan limit their statement to relationship marketing for consumers because this domain – in contrast to B2B marketing – would always have transactional elements. Thus, RM cannot replace the traditional, transactional paradigm.

Zolkiewski 2012; Ritter and Walter 2012); it also takes a look at the *dark side* of customer relationships (Anderson and Jap 2005; Fang, Chang, and Peng 2011; Grayson 2007; Grayson and Ambler 1999; Villena, Revilla, and Choi 2011).

Although RM might not have met the expectations for a paradigm shift – and certainly not for a general theory for marketing – it definitely has left significant marks in contemporary marketing theory and practice. Moreover, meta-analyses and longitudinal studies on RM *activities*²² generally support the effectiveness of this approach (Palmatier, Dant, and Grewal 2007a; Palmatier et al. 2006; Palmatier et al. 2007b).

Relationship Marketing and Business Solutions

Customer relationships have played a major role in the B2B marketing literature even before there was a verbalized RM approach. Mattsson (1997) saw B2B marketing about one or two decades ahead of B2C; also – as mentioned above – Vargo and Lush concede B2B marketing to have anticipated many aspects that later influenced SDL, among those the focus on exchange relationships. Moreover, empirical research shows that B2B firms indeed pursue a rather relational approach in their marketing practice (Coviello and Brodie 2001). It is therefore not surprising that many publications on business solutions and other complex offerings refer to this tradition within B2B marketing research (Bonney and Williams 2009; Penttinen and Palmer 2007; Tuli et al. 2007; Windahl and Lakemond 2006). Tuli et al. (2007) go as far as defining (see level 2 in Figure 5 for this definition) a business solution as a special form of a customer relationship that is characterized by *relational processes*. As an extension of the RM approach (Anderson, Håkansson, and Johanson 1994), more recent publications try to shift the focus from the analysis of dyadic buyer-seller relationships towards relationship networks (Biggemann et al. 2013; Gebauer et al. 2013; Spencer and Cova 2012) that also include suppliers, distributors etc. (Achrol and Kotler 1999; Mattsson 1997). This focus shift is also a primary concern of the IMP group (Snehota and Håkansson 1995).

²² As mentioned before, the RM literature in a broader sense also comprises research on loyalty, commitment, trust, and satisfaction. However, the literature on personal selling and sales management is usually not considered to be part of RM research even if they share a variety of topics (Weitz and Bradford 1999).

Relationship Marketing in this Thesis

RM has both a strong direct and indirect influence in this thesis. The testable middle range theory for complex offerings that will be developed here – the Solution Process Chain Model – draws upon on the relationship-based definition by Tuli et al. (2007). In contrast to these authors and in line with some critics of the RM approach, not every relationship between buyer and sellers needs to be as close as possible (and therefore should be based on solution offerings). Other forms are thinkable and appropriate. Thus, complex offerings represent a transactional-relational continuum (Grönroos 1997; Palmer 2007) where full solutions represent only the relational end. Therefore, the idea of a continuum has a direct impact on the formulation of the scenarios in study I. The conceptual distinction between systems seller (= one-off projects) and full solution provider also refers to the RM idea because only the latter fully implements relationship thinking.

The indirect impact of RM is relatively high, not only because the paper by Tuli et al. (2007) and its *solution-as-relationship* definition is the most cited paper on customer solutions, but also because case study research on complex B2B offerings uses buyer-seller relationships as primary unit of analysis. However, these authors - many among those in the IMP or Nordic School tradition – do not necessarily refer to RM as an emerging movement during the 1990ties. For those, B2B marketing has always been relationship-intensive marketing.

2.3.4 New Institutional Economics

The Basics

New institutional economics (NIE) is a family of micro-economic theories; the most prominent are *property rights theory* (PRT), *transaction cost theory* (TCT), and *agency theory* (AT). The first two are usually attributed to Ronald Coase (Coase 1937, 1960) but were formulated as theory first by Harold Demsetz (Demsetz 1967) and Oliver Williamson (Williamson 1981, 1975) who also coined the term *new institutional economics*. AT is credited to Michael Jensen and William Meckling (Jensen and Meckling 1976). This theory has two sub-streams (Eisenhardt 1989a), the *positivist AT* and the mathematically more rigorous *Principal-Agent Theory* (not to be confused with the *principal-agent-problem* that also is the basic metaphor for

the positivist AT). In some synopses (Kleinaltenkamp and Jacob 2002; Kuß 2013), *information economics* (IE) – pioneered by George Akerlof, Michael Spence, and Joseph Stiglitz – is also part of NIE.

NIE was a reaction to neo-classic economic theory whose basic assumptions (rationally acting, utility maximizing *homo economicus* and *full information*) were questioned (Hax 1991): information is not fully available or asymmetrically distributed; individuals pursue individual goals but are limited by their information processing capabilities (*bounded rationality*) and imperfect availability of information. In order to maintain or increase general welfare, interaction among economic actors (individuals, firms) must be controlled by means of *institutions*, i.e. regulatory systems such as contracts, laws, and social rituals.

Property rights theory takes a look at rights associated with ownership and usage of an economic good (Kuß 2013). These are:

- The right to use a good (*usus*)
- The right to keep the earnings of a good (*usus fructus*)
- The right to change shape or appearance of a good (*abusus*)
- The right to transfer the good (*ius abutendi*)

In marketing, PRT is applied to analyze make-or-buy decisions (Fischer 1993) or to describe *access vs. ownership* approaches (e.g. in *build-to-operate* models in B2B marketing (Kleinaltenkamp and Jacob 2002)). In contrast to TCT, however, PRT's influence on marketing research is relatively small.²³

Transaction cost theory focuses on the costs involved in the transfer of a good. In its original realm – the intersection between economics and law – the theory was applied to analyze the efficiency of exchange systems, e.g. markets and organizations (“*vertical integration vs. market governance*”, Williamson 1975). Soon after its appearance, other disciplines discovered TCT's potential relevance for their

²³ PRT is usually associated with common goods. The main representative of this research area, Elinor Ostrom, was awarded the Noble Prize together with Oliver Williamson (= TCT) in 2009.

discipline²⁴ (Williamson 1981). One of the first applications in marketing was the costs analysis of sales structures – whether a firm should use sales reps or sell directly – by Erin Anderson (1985, respectively 1982 in her dissertation thesis). As usual with borrowed general theories, marketing scholars do not refer to the entire body of the theory but only to specific concepts or core ideas. One of these basic and most predictive concepts is *asset specificity*²⁵, i.e. specific investments in a relationship that would otherwise be lost. Asset specificity serves as an explanation for a variety of phenomena in marketing, e.g. in the discussion of loyalty vs. customer lock-in (Chiou and Droge 2006; Joshi and Stump 1999; Yang and Peterson 2004). TCT has also been applied in strategic marketing (e.g. market entry decisions (Klein, Frazier, and Roth 1990)), in relationship marketing (e.g. Heide and John 1992), and notably in the marketing channel literature (e.g. Heide and John 1988), which has referred to TCT as the “workhorse model” for marketing channel research (John and Reve 2010). Meta-analyses and research syntheses generally support hypotheses generated by TCT for marketing (Geyskens, Steenkamp, and Kumar 2006; Macher and Richman 2008; Rindfleisch and Heide 1997) but also criticize the broadness of the theory (when is a cost analysis a *transaction* cost analysis?) and the rather weak link between core concepts and their operationalization for empirical research.

Agency theory assumes that information and power in relationships is distributed unequally. In the AT basic setting, the agent (to whom work is delegated to) possesses information that are not available to the principal (who delegates work) (Jensen and Meckling 1976). Issues arise, if principal and agent have different goals and attitudes toward risk (Eisenhardt 1989a). If the agent behaves opportunistically –

²⁴ Williamson stated (1981, p. 548-549) he originally wrote strictly for an economics audience and that he was more or less surprised by the practical implications, which other disciplines discovered in TCT. In contrast to many other economists (and Nobel laureates in particular) he works inter-disciplinarily with rather application-oriented disciplines such as marketing and management science (cf. Nobel Prize Committee 2010).

²⁵ A second core concept is *uncertainty* (*environmental, volume, technological, behavioral uncertainty*) associated with those investments. However, as Williamson (1998) recognized, “asset specificity [...] is the big locomotive to which transaction cost economics owes much of its predictive content” (p. 9).

as AT suggests – he will capitalize on that information advantage (*hidden information* and *hidden action*). Initially, the main focus of AT was on contractual arrangements and monitoring systems but then has widened to other units of research, e.g. buyer-seller relationships (Bergen, Dutta, and Walker Jr 1992). Even though AT was fruitfully applied in conceptual and empirical academic marketing research, e.g. for B2B relationships (Jap 2001), for trust and loyalty (Singh and Sirdeshmukh 2000), distribution channels (Mishra, Heide, and Cort 1998; Weitz and Jap 1995), the great breakthrough did not happen. Reasons for this lack of acceptance might be the limited scope of AT but also its underlying image of humanity that is characterized by mistrust, dishonesty and malevolence²⁶.

Information economics (IE) also examines asymmetric information. In contrast to AT, the research paradigm is not the principal agent dyad but a failing market. In such *markets for lemons* (Akerlof 1970), some vendors sell goods of below average quality. The customer is aware of the fact that inferior copies exist (*lemons*) but he cannot test the quality prior to the purchase. Hence, he is willing to spend less than its original reservation price. As a long-term consequence, the more expensive honest vendors will be priced out of the market. To balance the information asymmetry, the vendor can *signal* his quality level (e.g. by means of a certificate); the search for hidden information is called *screening* (often via self-revealing choice tasks). The strongest link between IE and marketing is the concept of *search, experience* and *credence quality attributes*²⁷ (Darby and Karni 1973; Ford, Smith, and Swasy 1988; Nelson 1974, 1970) that had a strong impact particularly on service research (Parasuraman, Zeithaml, and Berry 1985) and the research on perceived risk (Mitra, Reiss, and Capella 1999).

Without a doubt, NIE has had a significant impact on marketing academia and still has today – but with two limitations: First, not all NIE streams are equally influential. TCT has had the biggest impact of all NIE theories on empirical research in marketing (Gatignon and Gatignon 2010; John and Reve 2010; Williamson and

²⁶ Marketing academics tend to have a rather philanthropic idea of man (and of their own discipline), at least since the emergence of RM (Firat, Dholakia, and Venkatesh 1995).

²⁷ *Search attributes*: allow customer to evaluate quality prior to purchase; *experience attributes*: only after purchase; *credence attributes*: evaluation not possible, customer has to trust in vendor

Ghani 2012), mainly due to concepts such as *asset specificity*. Second, NIE in marketing is isolated in schools. Top journal publications come largely from a handful of scholars who are new institutional economists “by conviction”, i.e. researchers who have adhered to NIE throughout their entire academic career, e.g. Erin Anderson and Jan Heide, to a lesser extent Barton Weitz, George John, Sandy Jap, and Stefan Stremersch.

New Institutional Economics and Business Solutions

In Germany, NIE had a relatively strong impact. During the late 1970ies and early 1980ies, there was a heated argument about the theoretical foundation of marketing and its position at German universities (Kuß 2013). Resistance was directed against behavioral approaches (“Konsumentenverhalten”), and there were calls for a return to economic theories, preferably NIE. Additionally inspired by the IMP group, German B2B marketing researcher (e.g. Werner Engelhardt, Klaus Backhaus, Michael Kleinaltenkamp, Wulff Plinke) uncoupled from the international community and established a *German approach* to industrial marketing (Kleinaltenkamp and Jacob 2002). Within this approach, NIE has a strong influence on the definition of the research objects and the scope of the research: Many of the German typologies (e.g. by Backhaus, also see chapter 2.5.5) contain at least one dimension that is inspired by NIE (e.g. quasi-rent in Backhaus’ typology). We also find a couple of German dissertations in the context of systems (“Systemgüter”) that are based on NIE (synopsis in Homburg, Stock, and Kühlborn 2005c).

Very close to its original focus, TCT can be applied to the customer’s analysis of internal vs. external arrangement decisions, more specifically to *make* (buying single components and integrate these to something more complex) vs. *buy* (buying already integrated offerings, i.e. systems or solutions) decisions (Geyskens et al. 2006; Stremersch et al. 2003). On the seller’s side, *bundling* can decrease transaction costs (Spiller and Zelner 1997), but this might not be the best strategy from a pricing perspective: usually, the price for a bundle drops compared to the sum of its ingredients (Stremersch and Tellis 2002). Accordingly, customers can reduce transaction costs associated with purchasing by buying bundled, non-integrated offerings if they have the capabilities to integrate these into their working environment (Hobday et al. 2005; Schilling 2000).

Asset specificity has been discussed in the context of complex offerings particularly in form of lock-in effects (Toffel 2008; Ungruhe 2011; Weiber and Beinlich 1994). In this vein, relationship-specific investments can foster or hinder solution selling (or buying), depending on the quality of the existing relationship between buyer and seller (Zimmer, Scholze, and v. Wangenheim 2010).

IE is used in the context of communication activities for complex offerings (Sichtmann 2007; Weiber 2004): With the integration of services into complex offerings, the focus shifts from search to experience and credence quality attributes (Raff 2000); therefore, advertising of complex offerings should include signaling tactics to reduce pre-purchase uncertainty (Homburg et al. 2005c).

New Institutional Economics in this Thesis

NIE has a direct impact via asset specificity on contractual and technological lock-in effects as perceived by the customer in study II. Also, the provider's basic dilemma between standardization and customization (study I) can be regarded from a TCT perspective: Customized offerings are adapted to – in an extreme case – just one customer. This is an investment into the relationship with this single customer and can usually not be transferred to other customers (apart from *economies of repeatability*; Davies and Brady 2000), e.g. through project management skills or industry insights). Likewise, other investments in the course of the relationship are highly asset specific, such as trainings during the implementation phase or proactive post-sales activities to guarantee the performance of the offering (e.g. via service level agreements)²⁸.

This thesis does not explicitly draw upon the German B2B marketing research stream, which is strongly influenced by NIE. However, there is an indirect impact through literature on B2B typologies (see chapter 2.5.5) in which a large part of German conceptual research is concentrated (Kleinaltenkamp 1994; Kleinaltenkamp and Jacob 2002).

²⁸ In accordance with transaction *costs* economics, these specific investments reflect only the *cost side*. Sellers try to receive compensation for their efforts but usually struggle with billing these costs, particularly for services (Reinartz and Ulaga 2008).

2.3.5 Systems Theory

The Basics

As the name suggests, the focus of the systems theory are *systems*, i.e. structured entities that consist of single elements that interact with each other in order to fulfill a specific task (Kast and Rosenzweig 1972). Similar to RBV, there is no single, unitary systems theory; it is therefore more appropriate to speak of a family of theories: many scientific disciplines feature specific sub-disciplines that have developed their own systemic approach (von Bertalanffy 1972), e.g. biology (ecosystems, and the principles *autopoiesis* and *autonomy*) and sociology (sociological systems theory (Luhmann) or structural functionalism (Parsons)), or physics (thermodynamics, among others).

There have also been attempts to establish a systems meta-theory, the most prominent is by biologist Ludwig von Bertalanffy, who laid the foundations for a *general systems theory* in 1949 (von Bertalanffy 1949) and introduced basic principles and terms such as *complexity*, *feedback*, and *equilibrium*. The scientific discipline with the closest relation to a general systems theory is *cybernetics*, the science of control and regulation, which has a rather trans-disciplinary and application-oriented character (in contrast to the systemic approaches cited above).

The potential of systems theory for describing phenomena in economics and management / organization research and implementing the findings by means of cybernetics has been discovered shortly after Bertalanffy's fundamental work (Boulding 1956) and has been further developed into an independent systems approach in organization science (Kast and Rosenzweig 1972; Scott 1961; Simon 1962).

One of the first applications of systems theory in marketing is by Adler (1967). In his article in the Harvard Business Review he describes by means of case studies how the entirety of all market-related decisions can be viewed as a system and that marketers should take interactions and coherences between these decisions into account rather than optimizing single ones. The product or service – he also uses the generic term *offering* – is only one area of decisions among many (i.e., the offering is

just a sub-system) that form a *marketing system*²⁹. In B2B marketing, the empirical study by Naumann and Lincoln (1989) on marketing organization as open system is one of only a few publications in the marketing literature that directly draws upon systems theory (albeit the organizational sub-discipline).

Systems Theory and Business Solution

After a first mention in a practitioner context (Murray 1964), the *systems selling* approach appeared in the industrial marketing literature in the mid 1970ties (Dunn Jr. and Thomas 1986; Günter 1979; Hannaford 1976; Mattsson 1973; Page and Siemplenski 1983). In contrast to the conceptually broader *marketing systems* approach, *systems selling* – especially in Mattsson’s conceptualization³⁰ – focuses on the systemic character of the underlying offering.

As so often when eclectic-absorptive disciplines such as marketing borrow a theory from other disciplines, the original theory is assimilated and trimmed. In the case of systems theory and systems selling, there is only little left of the former formal rigor³¹. What remains are some core concepts, such as the *plurality of elements* and *complexity* (Mattsson 1973): The complexity of the offering must reflect the complexity of the demand, which is usually high in industrial markets. A high level of complexity can usually not be achieved by means of standardized components, instead *systemic* offerings - consisting of individualized components and a knowledge factor for the integration of these parts – are better suited to meet customer requirements. However, since the direct link between Mattsson’s systems

²⁹ Sometimes the term marketing system is supplemented by the word *vertical* (Davies, Brady, and Hobday 2007; Etgar 1976; Wuyts et al. 2004). Marketing systems as an administrative mechanism for the distribution of goods and services are one of the research objects in the macromarketing sub-discipline (Dowling 1983; Eric Reidenbach and Oliva 1981; Iyer and Shapiro 1999; Layton 2007).

³⁰ Hannaford’s research focus is rather on the *selling* part of *systems selling*; especially on contractual arrangements for systems sales (Hannaford 1974, 1976).

³¹ Other business research sub-disciplines have remained closer to the general systems theory, e.g. organizational and management science (e.g. with *management cybernetics*). Another spin-off – *system dynamics* (Forrester 1995, 1958) has been applied in marketing from time to time, but rather as a modeling and simulation tool than a coherent research approach.

selling approach and systems theory as a *general (!) theory*³² is rather weak, we return later to system selling as a *concept* in chapter 2.4.1.. Systems theory also had – together with NIE – an impact on the German-speaking B2B marketing literature and typology-based concepts (*Systemgüter* (Backhaus 1997) and *Leistungssysteme* (Belz 1988), see chapter 2.5.5).

Systems Theory in this Thesis

Similar to other general theories, the direct influence is weaker than the indirect. Mattsson's systems selling approach anticipated much of the forthcoming literature on business solutions and other complex offerings, without being sufficiently acknowledged (Davies et al. 2007). As will be shown later, the intersection between systems and solutions are so large that it is difficult to disentangle these two concepts. Even though the link between general systems theory and systems selling is weak because only a few core defining elements were picked, it is strong enough to claim that without a systems theory an academic systems selling approach would not exist.

2.3.6 Gestalt Theory

The Basics

Gestalt theory is a psychological theory that appeared in the end of the 19th century in Germany. Since there is no adequate translation for the German word *Gestalt* (\approx holistic shape, form or appearance, but often used figuratively or in a prescriptive manner in combination with adjectives, e.g. "gute Gestalt"), the term *Gestalt* has also been established in non-German scientific language. The original focus of gestalt theory was on sensory perceptions and the fact that the human brain is capable to assign meanings and structures to non-integrated stimuli (Koffka 1922), e.g. interpreting a sequence of single tones as a melody. This neurophysiological mechanism, however, served later only as a metaphor for a variety of phenomena that circle around the Aristotelian "the whole is greater than the sum of its parts".

³² Grönroos (1997, p. 332) once called the systems approach a good candidate for a general theory for marketing, at least as suitable as relationship marketing. Schilling (2000) had the goal to develop a „general modul systems theory“ but with focus on “interfirm product modularity” as corporate technology strategy.

Max Wertheimer, one of the founders of gestalt theory, put the *gestalt principle* this way (Wertheimer 1924):

“There are contexts in which the whole cannot be derived from single parts or how they are composed, but the other way around – what occurs to a part depends on the inner structural laws of the whole.”

Today, gestalt theory sees itself as an interdisciplinary field, but the majority of the contributions, still comes from psychology. The *gestalt principle*, however, is occasionally referred to also in business research, e.g. in the context of strategic fit (Gebauer 2008; Gebauer et al. 2010; Venkatraman 1989), perceived value (Woodall 2003), branding, packaging and design (Orth and Malkewitz 2008; Solomon 1988), and the interpretation of consumer narratives (Thompson 1997).

Gestalt Theory and Business Solutions

The *gestalt principle* can also be found in one of the defining elements of business solutions, the process of integration of several components into a solution. This is the moment when the solution-specific added value is created (Sawhney 2006):

“The value of integration and the value of customization represent the difference between the “whole” (the value of the solution) and the “sum of the parts” (the value of component products and services)”. (p. 370)

A similar train of thought can be found in the bundling literature in the differentiation between price and product bundling (Stremersch and Tellis 2002): a price bundle consists of several ingredients at a discount price whereas the product bundle can be sold at a higher price than the sum of the single components. This price markup is a result of the integration process that creates an added value for the customer.

Gestalt Theory in this Thesis

The *gestalt principle* has a direct influence on the scenario design in study I. The question of whether a price premium is enforceable for an offering serves as a litmus test for being a business solution in a narrower sense. The indirect influence is harder to assess since the “the whole is greater/different than the sum of its parts” –

idea is often not referred to as gestalt principle³³. Even though this idea plays an important role in the literature on complex offerings, it has not enough weight to serve as the primary general theory for business solutions.

2.3.7 Evaluation of the Role of General Theories

None of these theories is suitable to serve as *the* single general theory for complex B2B offerings. In addition, not all theoretical aspects of complex offerings are derived from these theories or approaches. SDL, for instance, was not an existing theoretical basis that a potential theory for complex offering could draw upon³⁴. However, SDL reflects in many ways the core concept – or *spirit*, or *thinking* – of the solution approach. This also applies to RM and to a lesser extent to RBV. NIE had a rather local impact on marketing of systems in Germany.

Some core ideas are shared by several theories, they are not mutually exclusive. The gestalt principle (“the whole is greater than the sum of its parts”), for instance, is similar to the idea of a systemic added value derived from systems theory. Furthermore, the general theories presented here are clearly on different levels regarding abstraction and explanatory power: systems theory has the ambition to serve as meta-theory for many scientific disciplines; NIE and RBV are also applied in other economic research areas. It is therefore not surprising, that marketing-specific approaches such as SDL and RM have a bigger impact than the others.

³³ This is also true for other disciplines in business research: Finance does not refer to gestalt theory in explaining price-to-book ratios or abnormal returns.

³⁴ Already the chronological order speaks against such an assumption.

Influence of General Theories on Business Solutions and other Complex B2B Offerings			
Theory / Approach	Adopted or shared ideas	Impact	
		Direct	Indirect
Service-Dominant Logic	<ul style="list-style-type: none"> Idea of service as a co-creational process instead of just an add-on to a product Services can render the same value as tangible products (→ service-based solutions) Scope of the solution should be defined by customer Only value as perceived by the customer is decisive 	★★★★★	★★★★★
Resource-Based View	<ul style="list-style-type: none"> Seller needs specific resources and capabilities for customizing and integrating components Sales force needs to think “in solutions” 	★★★★★	★★★★★
Relationship Marketing	<ul style="list-style-type: none"> Solutions as relationships: total solutions presuppose relationships Transactional-relational continuum: intermediate forms between transactional component and relational solution selling exist Not every customer needs a <i>close</i> relationship, therefore, not every customer needs a total solution 	★★★★★	★★★★★
New Institutional Economics	<ul style="list-style-type: none"> Buying complex offerings can be cheaper for customer when their additional costs of integration or customization are high. Bundling reduces transactional costs for sellers. Asset specificity creates lock-in both for buyers and sellers, has potential to hinder or foster solutions. With increasing complexity and share of services, the quality of the search attributes shifts towards experience and credence qualities (→ signaling necessary) 	For TCT: ★★★★★ For other: ★★★★★	For TCT: ★★★★★ For other: ★★★★★
Systems Theory	<ul style="list-style-type: none"> Idea of <i>systemic integration</i> of several components that delivers an additional value for the customer Complexity “matching”: complexity of offering must be consistent with customer’s demand 	★★★★★	★★★★★
Gestalt Theory	<ul style="list-style-type: none"> “The whole is greater than the sum of its parts” – solutions deliver a benefit for the customer that is higher than the individual benefits of the components 	★★★★★	★★★★★

Table 4: General theories and complex B2B offerings

As expected, the indirect route, i.e. via other works cited in this thesis, is in most cases stronger than the direct route. This is especially true for SDL – a reference to SDL is standard in the body of literature of almost any paper on complex B2B offerings after 2004 – and NIE, which influenced German B2B marketing typologies that in turn have an impact of the design of the scenarios in study I.

Is B2B marketing (and thus research on business solutions and other complex offerings) really poor in theory? Not necessarily! The analysis of established general theoretical frameworks shows a significant flow of ideas streaming down to the level of conceptual and (to a lesser extent) empirical research. The apparent lack of theory has two causes: First, many researcher in the area of B2B marketing might not be aware of the origin of the concepts they use (in worst case, they opt for a *grounded theory approach*) or they refer only loosely to the basics (e.g. in RBV). Second and more general, a theoretical approach in marketing is rarely replaced by another; theory development is more like an amalgamation as a revolution. Therefore, the influence of a single theory is often hard to assess. We also find less attachment to *schools* (except NIE) than in other scientific disciplines, even compared to other social sciences.

The most relevant general theoretical frameworks for this thesis are relationship marketing, the Service-Dominant Logic (respectively the developments and ideas that led to SDL), and transaction cost theory as part of the new institutional economics.

2.4 Business Solutions and Related Concepts

While general theories aim at the big picture, i.e. statement on a higher level of abstraction, the following *concepts* put more emphasis on *phenomena* in the context of complex B2B offerings. As will be shown, these concepts partially overlap, so that disentangling is challenging. Reasons for this are different local, chronological and theoretical origins.

2.4.1 Systems Selling

As mentioned earlier, the systems selling approach is derived – albeit loosely – from the general system theory. In Mattsson’s adaptation (1973), a *system offering*

- consists of several elements that could also be sold separately, plus a knowhow factor. The components are standardized to a certain degree.
- is “more than selling a set of products which can be used by the buyer to construct a system. The seller has to take prime responsibility for the design of the system.” (p. 109)
- is a form of *vertical integration*: “the seller takes a more active part in the decision process to solve a customer problem” (p. 109).
- allows the seller to distinguish from the competition, to increase turnover (through bundling), to set higher prices and to establish barriers to entry. Page and Siemplenski add increased and constant revenue streams through consumables, services, and complementary products, and the opportunity to productize the knowledge and to market it separately (Page and Siemplenski 1983).

Even though Mattsson uses only product-based systems to exemplify his idea in this article, his definition is more generic: “In systems selling the seller provides, through a combination of products and services, a fulfillment of a more extended customer need than is the case in product selling” (p.108). In fact, this definition is not far away from other, later published seller-centric characterizations of business solutions; and also the motives for and consequences of system selling anticipate much of the following research. Perhaps the time was not yet ripe for Mattsson’s

approach; his ideas lay dormant for almost 20 years without receiving much academic attention.

Around the turn of the millennium, the systems approach has been extended by the concept of modularity (Ghosh, Dutta, and Stremersch 2006; Schilling 2000; Stremersch et al. 2003). While the conventional systems selling focus on the decisions of whether and how to integrate components, the dominating issue with a modular system is the degree of compatibility with offerings of other firms. In turn, buyers put all eggs in one basket when they outsource integration processes to just one vendor. As Stremersch et al. (2003) demonstrated, this primarily concerns customers with moderate knowledge about how to integrate a system.

2.4.2 Business Solutions

Systems Repackaged

From its first appearance around 1970 until the end of the 1990ties, *system selling* stood for an approach to market composite offerings as opposed to components (Davies et al. 2007). Although the authors mentioned that systems should solve customers' problems, this aspect has not been given the highest priority. Indeed, almost any current topic in the marketing of complex offering has somewhat been touched in the early literature on systems. What was missing was a persuasive "packaging", which highlights the benefits of buying a system compared to an assortment of components. In this sense, the word choice *solution* is clever because this term communicates in a *one-word promise* what the customer can expect from the offering – in contrast to the more technical, seller-oriented *system*. Thus, the move from systems to solutions, which became apparent in the academic literature between the middle of the 1990ties and the mid 2000, primarily represents a shift in the motives, why a seller should provide such an offering. From today's perspective, the origins of this turnaround cannot be clearly identified. However, many authors agree (Azimont, Cova, and Salle 1998; Bosworth 1995; Brown 2000; Galbraith 2002; Wise and Baumgartner 1999) that struggling technology giants such as IBM, GE, XEROX, and Nokia during their restructuring phase during the late 1980ies and top-management consultancies (namely Booz, Allen & Hamilton, and McKinsey) involved in these processes provided the proving ground for this development. It is

not a coincidence that early mentions of *solutions* were mostly in conjunction with *selling*. Authors such as Bosworth (1995) and Azimont et al. (1998) consider solution selling primarily as a practical implementation of *consultative selling* (Hanan, Cribbin, and Heiser 1970). Hanan’s catchy mantras (primacy of listening to the customer; selling added value instead of added costs; specify benefits instead of citing spec sheets; sellers should become consultants, customers should become clients; seller as a “customer profit improver” (Hanan 2009)) lack scientific precision but their adoption turned out to be successful (Gerstner 2002; Gschwandtner 1987)³⁵. In the following years a couple of publications by marketing scholars picked up the idea of solution selling primarily as an issue of organizational structure and corporate culture (Galbraith 2005a, 2002; Gulati 2007).

In the first half of the 2000s, we find two major advances towards business solutions: The first was the prolongation of the systems approach, i.e. integrated, bundled offerings, slightly repacked as solutions, anchored in the academic literature on industrial marketing, with local focus on Europe (in particular Scandinavia and France, but Germany almost completely decoupled) and the United States (Brady et al. 2005; Brown 2000; Davies 2004; Davies and Brady 2000; Davies, Brady, and Hobday 2006; Davies and Hobday 2006; Matthysens and Buyl 2005; Sawhney 2006; Stremersch et al. 2001; Windahl et al. 2004; Windahl and Lakemond 2006).

Selected Early* Academic Publications on Business Solutions, Focus on Conceptual Work

Publication	Focus	Type of work	Findings / Contribution
Brown (2000)	Basic idea	Conceptual	<ul style="list-style-type: none"> • Goods-dominant companies become service-driven solution providers • Drivers: product commoditization, customer demand • For more services: higher profitability, more stable revenue streams, low initial investments

³⁵ The former IBM CEO Lou Gerstner describes the enormous efforts for the turnaround in his 2002 book. In fact, IBM was close to bankruptcy in 1993 and needed – so Gerstner – a total reengineering of its business model. Gerstner saw no future for the hitherto dominating engineering philosophy and built the new IBM around the service department. By establishing a solution-oriented mindset as the new corporate culture, Gerstner fostered the consulting business and reduced IBM’s hardware and software activities at the same time.

Davies and Brady (2000)	Capabilities	Conceptual + case studies	<ul style="list-style-type: none"> • Main issue for complex product systems: no economies of scales because volumes are low and high customization effort is needed • Extant RBV must be supplemented by special learning capabilities that allow for “economies of repetition”
Galbraith (2002)	Organization	Conceptual + exemplary cases	<ul style="list-style-type: none"> • Cultural change is essential: <i>customer centricity</i> as prerequisite for a solution organization • This goes along with de-emphasizing product thinking: e.g. best solution instead best product, relationship management instead of new product innovation management • More flexible structure around <i>customer-facing units</i> with new / different skills, and back-end units with product / technology focus • New reward systems required since solutions are long-term
Hax and Wilde II (2003)	Strategy	Conceptual + exemplary cases	<ul style="list-style-type: none"> • Three strategic options for customer bonding, arranged as a triangle: <ul style="list-style-type: none"> ○ <i>Best product</i> (via product economics, rivalry) ○ <i>Total customer solutions</i> (via “customer economics” and cooperation) ○ <i>System lock-in</i> (via system economics and market dominance). Preferred position but not reachable for most companies
Windahl et al. (2004)	Capabilities + Innovation	Conceptual + case studies	<ul style="list-style-type: none"> • Companies need a “partnering” competence, should also take-over customer processes (→ PBC) • Solution as an architectural innovation: ingredients remain the same but are recombined
Brady et al. (2005)	Capabilities	Conceptual + case studies	<ul style="list-style-type: none"> • Four capabilities needed: systems integration, operational service, business consulting, financing. • Radical customer-centric thinking, including the insight that “the best solution for the customer may require incorporating a competitor’s product rather than [the] own” (p. 362) • Taking over customer processes and herewith risk (but also chance for receiving valuable information on future needs) • Selling and purchasing solutions is highly strategically relevant → senior management level
Matthyssens and Buyl (2005)	Channels	Conceptual + case studies	<ul style="list-style-type: none"> • Solution only in trustful and stable relationships • Maybe better to offer solutions as an additional channel for a start
Hobday et al. (2005)	Capabilities	Conceptual + case studies	<ul style="list-style-type: none"> • Systems integration as the capability “to define and combine all the necessary inputs for a system” (p. 1110) • Has two faces: integration of resources from 1) within the firm (to design, build, operate) 2) from outside (project management and network coordination skills) • Counterpart of outsourcing, but also necessary for buy / build decisions and up / downstream moves on the value chain
Davies et al. (2006)	Capabilities + Organization	Conceptual + case studies	<ul style="list-style-type: none"> • Solutions also for service-based offerings • Decision on single vs. multi-vendor • Three stage process: 1) new front-end, 2) new back-end, 3) re-focus rest of organization for repeatable solutions

Sawhney (2006)	Strategy	Conceptual + exemplary cases	<ul style="list-style-type: none"> • Solutions as a mindset, replacing the product mindset (triggered by SDL) • Solution more profitable through services • Too much customization cuts margins • Marketing integration (one-stop shopping) and operational integration (functional benefit) • Solution design process starts with expected outcomes (drill vs. holes) • Plea for value-based pricing, including gain-sharing
Davies et al. (2007)	Strategy	Conceptual + exemplary cases	<ul style="list-style-type: none"> • Comparative advantages of systems (solution) seller: Extensive control over design and components, single vendor → can set proprietary standards + reduces transaction costs vertical integration → more strategic choices • Advantages of systems integrator: multi-vendor with deep knowledge of competition and open standards, greater organizational freedom, no ballast of production facilities etc.

*early means before or in 2007 (when the paper by Tuli et al. was published)

Table 5: Early academic publications on business solutions

The second approach is rooted in the transfer literature by and for practitioners (especially top management consultants), with influences from personal selling, business process reengineering, and organizational restructuring, and with a strong local focus on the United States (Bennet, Sharma, and Tipping 2001; Cerasale and Stone 2004; Charles and Ahmed 2000; Cornet et al. 2000; Doster and Roegner 2000; Foote et al. 2001; Johansson et al. 2003; Sharma et al. 2002; Sharma and Molloy 1999). Both approaches share the emphasis on the seller and usually derive normative advices on how to become a solution provider.

Publications by Management Consultants and Practitioners on Business Solutions

Publication	Affiliation	Type of work	Propositions / Findings
Bosworth (1995)	Xerox	Conceptual / case study	<ul style="list-style-type: none"> • Solution selling as implementation of consultative selling • Guiding customers from a "latent pain level" (= problem) to a "vision of a solution"
Sharma and Molloy (1999)	Booz, Allen & Hamilton	Conceptual	<ul style="list-style-type: none"> • Solutions as a change in viewpoint, looking "through the customer's lens" • Focus on results and relationships • Solution value proposition goes beyond those of products and services (and bundles thereof!) • Solutions as an evolutionary step in selling • Suggested solution spectrum, from single products to multiple custom solutions • Seller requires new capabilities

Wise and Baumgartner (1999)	Boston Consulting Group	Conceptual / case studies	<ul style="list-style-type: none"> • Solution selling as “moving downstream” in the value chain to “where the money is” (p. 134) since demand for products is stagnating • Spending on services on average five times higher than on products • Metrics support strategic decisions, e.g. ratio of installed base vs. new sales, product vs. service margins, degree of product-based differentiation, power over distribution channels
Cornet et al. (2000)	Booz, Allen & Hamilton	Conceptual	<ul style="list-style-type: none"> • Focus on organizational capabilities for solutions: value identification, value creation, value capturing • Picking the right customers for solutions: e.g. those with strong existing relationship, those under pressure, those who can reuse parts of the solution for the future • Value capturing e.g. through gain-sharing
Doster and Roegner (2000)	McKinsey	Conceptual	<ul style="list-style-type: none"> • Solution provider “packages and integrates components to deliver a complex turnkey solution that meets a specific need” (p. 51) • Solution seller delivers more value to the customer than a “bundler” or integrator” • Proposed typology: Level of customization and level of integration (solution score high on both) • Solutions allow for a price premium
Charles and Ahmed (2000)	NCR	Conceptual	<ul style="list-style-type: none"> • Focus on innovation • Solution: beyond market pull strategies because needs are only latent • Sales team to uncover solution needs • Seller’s organizational structure is biggest challenge to solutions
Bennet et al. (2001)	Booz, Allen & Hamilton	Conceptual	<ul style="list-style-type: none"> • Biggest challenge is scalability • Value capturing trap: Solution provider deliver more value but are unable to get paid for that • Solutions improve operational performance, increase market expansion, mitigate risk and accelerate adoption
Roegner and Gobbi (2001)	McKinsey	Conceptual	<ul style="list-style-type: none"> • “Only about 20 percent [of all solution sellers] ultimately recapture their cost of capital. • Fewer still achieve the 20 to 25 percent premium to which these value-added offerings are entitled.” (p. 1) • Picking the right target segment is pivotal, not every customer wants and needs a solution
Roegner, Seifert, and Swinford (2001)	McKinsey	Case study	<ul style="list-style-type: none"> • Pricing strategies for solutions based on net present value of functional, process and relationship benefits for the customer plus operating and capital cost savings • Risk perceived by customer may lower the price • Pricing is tricky if components (e.g. software) has been a free add-on before
Foote et al. (2001)	McKinsey	Conceptual	<ul style="list-style-type: none"> • Solution selling: mainly a change in the value proposition • “Best customers for solutions may not be existing customer for products” (p. 88) • Requires organizational makeover: strong front-end solution units, more flexible back-end units, leaders as boundary spanners
Sharma et al. (2002)	Booz, Allen & Hamilton	Conceptual	<ul style="list-style-type: none"> • Solutions are always co-created product-service bundles tailored to the customer • Seller always accepts additional risk • Relationships between seller and customer are more intimate than usual, both must benefit (“symbiosis”)
Miller et al. (2002)*	McKinsey	Conceptual / Case study (30+)	<ul style="list-style-type: none"> • “Solutions are about outcomes that make life easier or better for the client” (p. 3) • Explicit mention of service solutions • Creating a “solutions surplus” by “by managing the tensions between client and capability requirements” (p. 4)

Johansson et al. (2003)	McKinsey	Conceptual	<ul style="list-style-type: none"> • Biggest challenge: profitability of solutions • Reorganization of sales force (75% need to be laid off to become successful) • Value based pricing instead of cost-plus
Krishnamurthy et al. (2003)	McKinsey	Conceptual based on interviews	<ul style="list-style-type: none"> • “75 percent of the companies that attempt to offer solutions fail to return the cost of their investment” • Solution business implies “pain/gain-tradeoffs” • Customization / integration matrix to classify offerings • Commercial integration (= bundling) vs. technical integration (adds value) • Transformation to solution provider requires at least two of these points checked: <ol style="list-style-type: none"> 1. Value proposition using customer metrics, not price/performance 2. Change selling approach (maybe sales force too) 3. Pricing based on value not on component features 4. Entire organization, not just sales, must be aligned to solutions 5. Control of the entire implementation process to ensure quality
Cerasale and Stone (2004)	IBM	Conceptual / case studies	<ul style="list-style-type: none"> • Customer’s demand for services as main driving force for solutions • Solutions are not for every customer

* First author from academia, co-authored by business consultants (McKinsey)

Table 6: Publications by business consultants and practitioners on business solutions

Despite of their non-scientific nature, these contributions from marketing practitioners have been cited extensively in the academic literature. Nordin and Kowalkowski (2010) consider this to be a rather questionable practice. However, it should be noted that these publications contributed useful insights for academic research. For instance, the idea of solutions going beyond mere bundling has emerged in the practitioner literature earlier than in academia (cf. Sharma and Molloy 1999). Also, practitioners first warned of the negative sides of solutions and that solutions are not for any customer (Roegner and Gobbi 2001), and they explicitly mentioned pure service-based solutions (Miller et al. 2002). That gives the impression that “this is a domain where practice is well ahead of academic research” (Sawhney 2006, p. 378). Marketing academia should acknowledge this and therefore put even more focus on the scientific facets of this topic.

Rethinking Business Solutions

Stremersch et al. (2001) were among the first academics, who rejected both the input-oriented tradition of systems in the systems literature and the *solutions-as-*

selling approach³⁶. Finally, Tuli et al. (2007) heavily criticized both the seller-centricity and the limited view on solutions as integrated and customized bundled offerings: This interpretation may be shared by providers but if the basic idea of solution – solving a *customer's* problem is taken seriously then it should be up to the customers to decide on what a solution is for them. Through interviews with solution customers Tuli et al. came to two conclusions:

1. Integration and customization is just one process step – albeit an important one – that leads to a successful solution from the customers' point of view. This step is preceded by an extensive phase in which the exact requirements, which are mostly latent and difficult to express, are defined. After the assembly, the provider hands the solution over to the customer, implements it into his business environment and makes sure that the customer is fully capable to use the solution. In the fourth step, the provider keeps the solution working by means of extensive and proactive support services, and monitors future requirements of the customer.
2. The solution – in the narrow sense – is not just a bundle of products and service, but a result of a deep relationship between buyer and seller. More precisely: a business solution *is* a special type of customer relationship that is characterized by the four processes *requirements definition, customization and integration, deployment and post-deployment support*.

In terms of general theories, this reconceptualization of solution breaks with the *systems* origin and puts solution in the tradition of relationship marketing. Tuli et al. (2007) and (Cova and Salle 2008) also draw a line between business solution and SDL, pointing to the aspect of value co-creation and to the mindset of *market with instead of market to*³⁷.

Tuli et al.'s conceptualization of business solutions is also the main theoretical basis for this thesis and will be extended to a testable middle range theory in chapter 2.5.6.

³⁶ Consequently, they label their concept *Full-Service Contracts* „since service activities are beginning to dominate goods even within manufacturing companies, and the offering of total solutions is by definition a service activity“ (p. 3).

³⁷ A third – albeit more abstract – link refers to Vargo and Lusch's suggestion to choose processes as units of analysis (Vargo and Lusch 2011).

2.4.3 Bundling

Research on bundling, i.e. the process of combining several separate components (at first products only, later services as well (Gultinan 1987)) into one package, has two roots, both in economics. In the early 1960, bundling strategies received academic attention when they were perceived as an anti-competitive practice (Burstein 1960)³⁸. Later, research focused – influenced by transaction cost economies – on the decision of whether a firm should bundle its offerings, and on price setting for those bundles (Adams and Yellen 1976; Hanson and Martin 1990). Research on bundling in marketing reached its peak between mid-1980ties and mid 1990ties (see Eppen, Hanson, and Martin 1991) but it is still an active research field, especially in retailing and channel marketing (cf. Bhargava 2012; Wang, Sun, and Keh 2013). A substream of the literature deals with the effects of unbundling of formerly bundled-only offerings (Roehrich and Caldwell 2012; Soman and Gourville 2001; Wilson, Weiss, and John 1990).

Stremersch and Tellis (2002) made a significant theoretical contribution with their distinction between *price* and *product*³⁹ bundling: “*price bundling* [is] the sale of two or more separate products in a package at a discount, without any integration of the products” (p. 56). The bundling process does not create any functional added value – or *value in use* – for the customer; hence, the seller must offer a discount (but can potentially achieve higher total sales). On the contrary, “*product bundling* [is] the integration and sale of two or more separate products or services at any price” (p. 57). This integration process does create value for the customer; hence the reservation price for the bundle is higher than for the sum of the components. As mentioned earlier, this application of the *gestalt principle* can be regarded as a guideline by which a system or solution can be distinguished from a mere bundle that

³⁸ This *tying* of products reduces the set of choices for customers. For instance, Microsoft was accused in the United States and Europe for bundling Windows and Internet Explorer and herewith abusing monopolistic market power.

³⁹ For Stremersch and Tellis, *products* can be either tangible goods or services.

does not create an integrative added value (Sawhney 2006)⁴⁰. This extended definition of bundling, however, overlaps largely with that of a system.

2.4.4 Product Service Systems (PSS)

The concept *Product Service System* (PSS) emerged during the late 1990s in Scandinavia and in the Netherlands. It can be regarded as a special type of system, which necessarily consists of a product plus a service (Goedkoop et al. 1999):

A PSS “is a marketable set of products and services capable of jointly fulfilling a user’s need. [...] It can enclose products (or just one) plus additional services. It can enclose a service plus an additional product. And product and service can be equally important for the function fulfillment. [...] The ‘service part’ has to come on top of essential and unavoidable service activities in the production chain and should contribute for a substantial part to the economic value creation.” (p. 18)

A second facet that allows PSS to be distinguished from other systems or solution offerings are the motives and drivers: Besides the usual economic driving forces (differentiation, creating added value for customers, higher revenues, etc.), PSS emphasize the ecological advantages through the reduction of materials needed for the product components and possible side-effects thereof for the company (improved image, tax savings, etc.; Goedkoop et al. 1999; Mont 2002; Tukker 2004; Tukker and Tischner 2006). As a result, a separate research field has been established with a narrow focus on sustainability topics (most of the articles were published in the *Journal of Cleaner Production*). In fact, the interpretation of systems is closer to *marketing as a system* (which also includes macromarketing aspects) than to *marketing of systems* (Mont 2004a, 2004b).

The term PSS is also widely used in European, especially German, engineering and computer science research (Aurich et al. 2009; Azarenko et al. 2009; Beuren et al. 2013; Boehm and Thomas 2013; Visnjic Kastalli and Van Looy 2013). However, for

⁴⁰ The author of the thesis remembers some unfruitful discussions about whether a *McDonalds Happy Meal* is a customer solution or not, which could be terminated – at least for a while – with this argument.

this research the environmental aspect plays only a minor role, if at all. Instead, this research stream focuses on integration of hardware, software and services particularly in early stages of the design process (Thomas, Walter, and Loos 2008).

2.4.5 Hybrid Value Creation and Hybrid Offerings

Hybrid Value Creation (HVC) stands for the *localized* German version of research on complex offerings. The term first appeared in the early 2000s⁴¹ and was used for a call for proposals by the German Ministry for Education and Research in 2005. As part of the German innovation strategy for manufacturers, research should focus on product-related services to reduce the economy's dependence on tangible goods. Thus, HVC comes closest to the definition of PSS (without the ecological facets) but authors also draw upon other definitions and research streams, including systems and solutions (Bonnemeier, Buriánek, and Reichwald 2009; Buriánek et al. 2007; Velamuri et al. 2011). Although HVC should be a generic term, research has focused mostly on manufacturers' servitization strategies (product plus a service), pure service solutions have not been considered. The research program also addressed hybrid B2C products.

Independent of this German localization, Shankar et al. later picked up the concept *hybrid offering* or *hybrid solution* ("hybrid solutions [are] products and services combined into innovative offerings"; 2009, p. 95). Ulaga and Reinartz (2011) and Ulaga and Loveland (2014) used the term in a purely B2B setting.

2.4.6 Performance Based Contracting and BO(x)-Projects

There are similarities between business solutions and *project marketing* (Azimont et al. 1998; Brady et al. 2005; Cova and Holstius 1993; Cova and Salle 2007; Gann and Salter 2000; Kujala et al. 2010): projects are complex, highly specific (mostly batch sizes of one), long-term and discontinuous; they are "isolated markets for goods and services" (Azimont et al. 1998) where requirements are so unique that conventional market research is superfluous. Research objects in project marketing are e.g. large

⁴¹ To the best knowledge of the author, the first mention of hybrid products was in 2000 by Korell and Ganz (Korell and Ganz 2000).

(public) infrastructure projects, often in form of tenders. Within this approach, a special contracting and financing tool has gained attention and is now also applied in non-project industries: Performance Based Contracting (PBC). The fundamental idea is to base the payment of the provider on the performance output (e.g. “power by the hour” for Rolls Royce aircraft engines), not on the input, i.e. product and service components. Performance contracts therefore contain a precise definition of the customer’s expectations and an agreement on the quality of the outcome (systems availability or service level agreements, see Kim, Cohen, and Netessine (2007). Projects that encompass PBC were originally called *BOT projects* (build, operate, transfer) or sometimes *BOOT* (build, own, operate, transfer), which implies that ownership is finally transferred from the provider to the customer. This refers to the common practice in private-public partnerships (PPP) in which state institutions seek support from private investors for large infrastructure projects⁴².

Over time, more complex contract types have been developed. While the transfer of ownership was initially part of the concept, contracts on an operate-only basis or managed services are more common today. Examples are BLT (build, lease, transfer), BLTM (build, lease, transfer, maintain), BTO (build, transfer, operate), LROT (lease, renovate, operate, transfer), BOOR (build, own, operate, remove), DBFO (design, build, finance, operate), and DBFOM (design, build, finance, operate, manage) (Grimsey and Lewis 2004, p. 12).

The benefits of BO(x) models, however, are also appealing to private companies, e.g. lower fixed assets, simplified calculability (variable costs only) and risk mitigation⁴³. In 2003, Lay showed that customer demand is the second strongest driving force (behind need for differentiation from the competition) for German manufactures; about one fifth of those offer PBC.

⁴² Performance or concession contracting in PPP’s (or their historic ancestors) has a long tradition, e.g. for the water supply in Paris (1782) or the Suez Channel (1869) (Walker and Smith 1995). It has also been common practice in military supply in the U.S. and UK, albeit concealed from the public (Kim et al. 2007; Ng and Nudurupati 2010).

⁴³ It is difficult to distinguish PCB from business process outsourcing (BPO) because most BPO relationships are also likely based on results (Glas 2012; Tukker 2004).

From a theoretical perspective, PBC has foundations both in RBV and NIE (customer decision for outsourcing based on *transaction costs*, and the actual contract as *principal-agent* setting) (Buse, Freiling, and Weissenfels 2001; Hypko, Tilebein, and Gleich 2010a; Kim et al. 2007). However, empirical research papers – mostly case studies – usually do not draw on these theories (Hypko, Tilebein, and Gleich 2010b).

Some authors see *performance provision* as an extended form of solution selling (Helander and Möller 2007; Pekkarinen, Piironen, and Salminen 2012), with exemplary key differentiating elements “can see future beyond customer’s present needs” and “continuously designs and optimizes customer’s system”. These aspects, however, are already covered by an extended comprehension of solutions (e.g. inclusion of future needs is an essential part of the requirements definition process; also see Windahl et al. 2004). In this thesis, performance based contract types without the transfer of ownership are categorized as pure service solutions.

2.4.7 Servitization

By the turn of the millennium, the biggest service companies had not been “traditional” ones (such as banks, insurances) but IBM and GE (Brown 2000). This is essentially what the term “servitization (of business)”, coined by Vandermerwe and Rada in 1988, describes: An increasing number of manufacturers offer services that go beyond repair and maintenance⁴⁴. The authors see this trend mainly driven by customers since services simply deliver more value to them than just products do, and customers are willing to pay for that. Therefore managers should develop strategies to successfully bundle products and services. Even Vandermerwe and Rada call comprehensive bundles including consultative services for complex customer problems *solutions*. Thus, on this level, servitization and the subsequent B2B service infusion / transformation literature pursues the same objectives as the systems / solution research stream. As mentioned above, service research has always been part of academic B2B marketing research. But until the mid 1990ties, research on services was mainly limited to *customer services* (Frambach, Wels-Lips, and

⁴⁴ The label „servitization“ might be new but the phenomenon first appeared in the second half of the 19th century (Schmenner 2009). Even the motives were similar.

Gundlach 1997; Kyj 1987; Morris and Davis 1992; Samli, Jacobs, and Wills 1992; Wagner 1987), i.e. pre and post-sales activities to maintain and enhance the customer relationship (e.g. customer satisfaction through responsive repair services). At the turn of the millennium, the attention has shifted from *services supporting the supplier's product* (SSP) to *services supporting the client* (SSC) (Mathieu 2001), hence *process-oriented services* (Oliva and Kallenberg 2003). This goes along with a fundamental decision on the companies' services strategy, namely "whether the supplier's service value proposition is grounded in the promise to perform a deed (input-based) or achieve performance (output-based)" (Ulaga and Reinartz 2011, p. 15). This focus shift also complies with the *services to service* transition in the SDL and service as value creation strategy as proposed earlier by the Nordic School (Gummesson and Grönroos 2012). In this vein, the proposed transformation process that enables companies to offer client-supporting services (SSCs) is essentially congruent with the transformation to a solution provider. In fact, recent publications mention the trend towards comprehensive industrial services and solutions in the same breath (Antioco et al. 2008; Eggert et al. 2011; Fang et al. 2008; Ghosh et al. 2006; Stremersch et al. 2001).

Thus, the mere addition of any service to the company's portfolio of offerings does not automatically turn this firm into a solution provider. However, there are similar motives, processes, and outcomes for servitization and the transformation to a solution provider.

2.4.8 Complex Offerings: A Synopsis

Similar to general theories, there is no shortage on concepts for complex offerings. Yet, disentangling the research streams is challenging. Baines et al. (2009) identify 60 papers on servitization but more than 90 papers from other research communities (e.g. PSS) that actually deal with the same topic but label it differently. Velamuri et al. (2011) acknowledge the heterogeneity of the concepts in their review of 169 publications, but finally decide to analyze them jointly. Boehm and Thomas (2013) use quantitative bibliometric methods in their literature review and show that the generic theoretical concepts overlap between different disciplines (IS, business

research, engineering) but not their labels and foci (e.g. strategy in business research, environmental impact in engineering).

Table 7 gives the following insights with relevance for this thesis:

- All concepts feature key elements such as *customization*, *integration* and the inclusion of *services* (at least no concept excludes one of those explicitly), but to varying degrees. Services, for instance, are defining elements of servitization but it is very unlikely that complex BOT contracts do not include at least one service element.
- The homogeneity of core ideas and definitions (also see table A1) can be lower within a family of concepts than outside. A late publication on bundling might have greater conceptual overlap with the PSS research stream than with early bundling papers.
- The concepts have different local origins and therefore different schools of thought: the systems and PSS literature is rooted in the IMP group and the Nordic School, hybrid value creation has its origins in Germany (and at least early conceptual papers draw upon the institutional economic tradition of German B2B marketing).
- Due to these large overlaps, findings from all conceptual families must be considered.

All these research streams are currently active with the exception of systems selling, which has more or less evolved to solutions. In general, *solution* serves as a catch-all word, as a generic term for bundled, customized and integrated offerings for all concepts within and outside academia. Clearly, this reflects the fact that the slogan “we offer solutions (to your problems)” sounds more appealing for marketing practitioners than the unexciting, technical phrase “we sell systems”.

In demarcation from this generic meaning, *solutions in the strict sense* are defined as follows:

Definition	<p>Offering solutions is a corporate strategy that aims at satisfying needs of business customers holistically. Hence, the seller first identifies the customer's present and future needs. He composes a customized and integrated offering consisting of products and / or services in a way that this complex offering provides a greater functional added value to the customer than its individual ingredients. He then implements this offering in the customer's business environment and makes sure that the customer is fully capable to draw the desired benefit from the offering. Solution offerings are embedded in long-term customer relationships in which the seller assumes responsibility for the offering even after purchase by proactively taking measures to maintain functionality and availability (performance) of the offering. The seller checks if the customer's needs have changed on a regular basis and adapts the offering accordingly.</p>
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This definition (based on Tuli et al. 2007) serves as basis for the solution process chain model, which is later used to classify complex offerings⁴⁵.

⁴⁵ Complexity has been proved to be difficult to grasp, both in products and services (Dellaert and Stremersch 2005; Hobday 1998; Homburg and Kebbel 2001; Nordin, Lindahl, and Brege 2013; Persson and Åhlström 2006). Since complexity – as a construct – is not of central importance in this thesis, a *complex offering* is therefore defined pragmatically *as a non-stand-alone, customized and / or integrated product or service, or bundle thereof*.

	Systems (Selling)	Business Solutions	(Product) Bundling	Product-Service-System (PSS)	Hybrid Value Creation (HVC)	Performance Based Contracting / BO(O)T Projects	Servitization / Service Infusion
Key Concept	Integrating offerings	Solving customer needs through integrated product (+ service) bundles <i>or: process view</i>	Higher turnover through offering product <i>or</i> (!) service bundles	Products and services as one entity, decreased impact on environment	Added value through adding services	Outcome-based payment of (infrastructure) projects, often non-ownership (built-own-operate-transfer)	Manufacturers transforming to service providers Adding services to industrial products
Key Publications	Hannaford (1976), Mattsson (1973)	Sawhney (2006), Tuli et al. (2007)	Eppen et al. (1991), Stremersch and Tellis (2002)	Goedkoop et al. (1999), Mont (2002)	Velamuri et al. (2011), Ulaga and Reinartz (2011)	Walker and Smith (1995)	Vandermerwe and Rada (1988)
(Structured) Literature Reviews + Meta Analyses	Kühlborn (2004)	Nordin und Kowalkowski (2010)	Stremersch and Tellis (2002)	Beuren et al. (2013), Boehm and Thomas (2013)	Velamuri et al (2011)	Hypko et al. (2010b)	Baines et al. (2009)
Decade Emerged	1970ies (in academia)	Mid 1990ies	1980ies (in marketing)	Late 1990ies	Mid 2000	1990ties (in academia)	Late 1980ies
Geographic Origin	Scandivia + USA	USA, UK	USA	Scandinavia + Netherl.	Germany	Unknown	USA
Markets	B2B	B2B	B2C + B2B	Focus on B2B but also B2C	B2B and B2C	B2B / PPP	B2B
Defining Elements: Bundling	Per definitionem	Per definitionem	Per definitionem	Per definitionem	Per definitionem	De facto	Per definitionem
Services	Possible	De facto	Possible	Per definitionem	Per definitionem	De facto	Per definitionem
Customization	De facto *	Per definitionem	Possible, not intended	Possible	Possible	De facto	De facto
Integration	Per definitionem	Per definitionem	Price bundle: no, p.d. Product bundle: yes, p.d.	Per definitionem	Per definitionem	De facto	De facto
Cust. Relationship	De facto	De facto Tuli <i>et al.</i> : per def.	Possible	Possible	Possible	De facto	De facto
Primary Added Value for Customer	Value in use	Value in use	Price bundle: Value in exchange Product bundle: Value in use	Value in use	Value in use	Value in use	Value in use
Differentiating Elements	-	In recent publications: process and relationship view	Focus on tangible goods	Service component is mandatory, research focus on P/S integration	-	De facto service solutions	Original focus on transformation <i>process</i>
Comments	Anticipates many aspects of other concepts but lacks focus	Term <i>solution</i> also used by practitioners → greater reach beyond academia		Often in sustainability context	Original focus on Germany (corresponding research funding program) but later used universally	Focus on projects and infrastructure	

Per definitionem = required by common definitions in scientific and practitioner literature; *de facto*: common business practice; *possible*: not mentioned in common descriptions
* in system selling according to Mattsson (1973), components are usually not customized (standardized = less expensive) but a compilation of standardized components counts as customization.

Table 7: Synopsis of complex B2B offerings

2.4.9 Positive Outcomes of Solutions

Early on, literature on systems has emphasized that these offerings are a means, not an end (e.g. Hannaford 1976). The most recent word *customer solution*, however, more accurately reflects the primary purpose of such an offering: solving customers' problems or as Miller et al. (2002) put it: "solutions are about outcomes that make life easier or better for the client" (p. 3) or to relief customers from a "latent pain level" (Bosworth 1995, p. 4). We therefore first focus on these positive outcomes for customers and then – since not all firms might offer solutions for the philanthropic motives that Miller et al. and Bosworth suggest – on often cited benefits for solution providers.

Benefits for Customers

Superior Value Generation

The idea that the primary objective of market offerings is solving customers' problems is neither limited to solutions nor is it new: "Customers attach value to a product in proportion to its perceived ability to help solve their problems or meet their needs. All else is derivative" (Levitt 1980). We might have a less good-centered perspective today but the key question remains: What can solutions do better for customers than other offerings do? Advocates of solutions argue that these offerings deliver a "superior value" (Miller et al. 2002). The conceptual-prescriptive literature proposes three routes of how this superior value is generated:

1. Through *customization*, offerings can be modified to meet customer needs better (Minculescu, Kleinaltenkamp, and Pick 2011). The scope of customization activities ranges from development of components from scratch (Lampel and Mintzberg 1996), to modification of only a few key attributes (mass customization; Dellaert and Stremersch 2005; Pine II 1992), and reconfiguring standardized, modular components (Persson and Åhlström 2006; Schilling 2000; Stremersch et al. 2003). Some authors also count the inclusion of services as customization due to the interactive nature of most services (e.g. Sawhney 2006).

2. Through *integration*, the process of combining and fine-tuning several components so that the whole is greater than sum of its parts⁴⁶ (*gestalt* principle or systemic added value, see chapters 2.3.5 and 2.3.6). As noted earlier, integration increases both the value-in-use (functional value) and exchange value (higher willingness to pay), whereas pure bundling without integration reduces the exchange value, usually without affecting the functionality⁴⁷.
3. Through *reversed product-to-market design*: Solution “providers begin by thinking about the desired outcome for the customer and work backwards to the products or services required to meet those needs“ (Brady et al. 2005, p. 3; also mentioned by Sawhney 2006). This is similar to a classic *market pull strategy* or to *customer focus* in the context of market orientation (Kohli and Jaworski 1990; Narver and Slater 1990), but with two distinctive features: 1) With solutions, the focus is usually on smaller segments or on just one customer; 2) this mindset not limited to own offerings, it requires the inclusion of competitors’ offerings if these are more suitable (Brady et al. 2005). Needs for solutions are often only latent (Charles and Ahmed 2000), therefore uncovering these unexpressed or inexpressible requirements is a pivotal task in solution selling (Bosworth 1995; Tuli et al. 2007).

Cost and Risk Reduction through Outsourcing of non-Core Activities

In the extreme case, business solutions address a problem of customers that they are not able to solve by themselves due to the lack of the required capabilities. This particularly applies to *integration capabilities*, i.e. the skills, knowledge and experience to create a *gestalt* added value through the systematic integration of the individual components (Ghosh et al. 2006; Mattsson 1973; Stremersch et al. 2003). But as both RBV and TCT suggest, customers also tend to purchase solutions – which is in fact an outsourcing of business processes (BPO) – if the provider can

⁴⁶ Kuruzovich et al. (2013) find empirical support for what they call the “Steve Jobs hypothesis” according to Apple’s strategy to deliver added value through integrated hardware, software and services (Apple Care).

⁴⁷ Caveat: There is a certain risk of a circular definition when solutions are mainly defined by both the integration process and its outcome.

perform these activities at lower costs or at a lower risk (Brady et al. 2005; Brown 2000; Miller et al. 2002).

Solutions also reduce transaction costs that would otherwise arise when components are purchased from several suppliers (Page and Siemplenski 1983). Sawhney (2006) compares this “market integration” with *one-stop-shopping* in B2C retailing: Customer save money when they “pay a single bundled price for the solution, have a single provider install and deploy the solution, call a single number for customer support and service, and maintain a single vendor relationship” (p. 369).

Benefits for Solution Providers

Differentiation from the Competition

Commoditization – the loss of perceived qualitative differentiation (Reimann, Schilke, and Thomas 2010) – is an often-cited driver of the trend towards solutions (Brown 2000). Firms hope that their product is more likely to be perceived as unique when it is offered as a solution. Systems selling was first restricted to massively complex systems (e.g., plants, special machinery) where commoditization was less of a problem because the number of suppliers was limited (Paliwoda and Bonaccorsi 1993). This situation changed in the 1970s, when markets for industrial goods have become increasingly global and system selling strategies were also applied to less complex offerings.

Already Mattsson (1973) highlighted the role of the seller-specific *knowledge component*, which is rather inhomogeneous and hard to evaluate from the customer’s perspective. When bundled with the remaining, standardized components, the knowledge component transfers this characteristic to the entire systems offering, thereby making it more unique for the customer. Increased perceived uniqueness is particularly expected from the addition of services to the core product (Homburg, Staritz, and Bingemer 2011b; Oliva and Kallenberg 2003; Vandermerwe and Rada 1988), mainly because services are expected to be hard to imitate (Shankar et al. 2009). Yet empirical evidence is rare; to the author’s best knowledge, no single

quantitative study has found a positive effect of the mere addition of services to an offering on perceived uniqueness⁴⁸.

Lewitt (1980) takes a critical view on the threat of commoditization. He argues that commoditization only occurs at the level of the generic offering (e.g. “steel”), if at all. However, the particular product that a customer buys always comprises some degree of variation in, for instance, delivery options, terms, salespeople’s behavior, customer relationship, potential modifications, etc. and hence leaves room for differentiation: “It is the process, not just the product, that is differentiated” (Levitt 1980, p. 91). Paradoxically, it could be this process-orientation that leads to a commoditization of services (Bruhn 2011; Davenport 2005). An increasing share of services is based on standardized technology, standardized interfaces and industry-standard service level agreements. This development makes it increasingly difficult for companies to differentiate through services (Turner 2009).

Higher Profitability of Services

Solution providers expect from their service components lower initial investments and more stable profit streams (Brown 2000; Bundschuh and Dezvane 2003; Cohen, Agrawal, and Agrawal 2006; Cohen et al. 2000). Wise and Baumgartner (1999) perceive an increasing saturation in the installed base for products, but the expenditures for services (e.g. operation or maintenance) for the installed base are 5 to 21 times higher than the costs for new products⁴⁹.

Other authors assume a generally higher profitability of industrial services (Kyj 1987; Sawhney, Balasubramanian, and Krishnan 2004; Vandermerwe and Rada 1988) especially for the service component in bundles: Roegner and Gobbi (2001) expect an enforceable price markup of about 10% for product-service bundles and 25% for integrated solutions. Stremersch et al. (2001) estimate sales margins in the traditional, product-related maintenance market to be approximately 0.5% but for

⁴⁸ However, it is less likely that a firm adds services to a product without changing any strategy or other organizational factors. For existing service business, service characteristics do have a differentiating effect (Ulaga and Eggert 2006).

⁴⁹ The authors show that in the U.S. 1.4 billion \$ are spent annually on new locomotives but 28 billion on maintenance and operating locomotives and the related infrastructure.

solutions 10-15% due to the lower level of price transparency. However, if service pricing is not transparent, for instance because services were given away for free as add-ons to products, providers may have difficulties to bill these service components (Reinartz and Ulaga 2008; Roegner et al. 2001).

Empirical quantitative research generally supports the assumption of positive effects of the service business on the profitability of manufacturers, albeit with some restrictions: Visnjic Kastalli and Van Looy (2013) find a high profitability for initial service investments, followed by a long plateau phase; Fang et al. (2008) assume a service ratio of at least 20-30% for services to become effective (also see section 2.4.11.).

Increased Loyalty through Services

In contrast to one-off systems, business solutions are embedded in long-term customer relationships (Brady et al. 2005; Paliwoda and Bonaccorsi 1993; Tuli et al. 2007). Services as solution components further strengthen these relationships: they bring providers closer to the customer (Baveja, Gilbert, and Ledingham 2004) due to their interactive and interpersonal nature. Maintenance personnel, call center agents or specialists for service design have – together with the sales force – their foot in the door when it comes to detecting dissatisfaction with the solution or the discovery of latent future needs (Brady et al. 2005). The positive effect of service-related activities on satisfaction and loyalty has found empirical support (Bolton, Lemon, and Verhoef 2006; Fang et al. 2008; Palmatier et al. 2006). Besides of these behavioral and attitudinal links, services can lead to a customer lock-in in the sense of non-voluntary loyalty effects⁵⁰ since maintenance services or proactive uptime guarantees are usually based on long-term contracts (contractual lock-in). A strong dependence of the provider is also created if he takes over critical processes and activities from the customer.

⁵⁰ These are of course beneficial primarily for the provider.

2.4.10 Potential Drawbacks of Solutions

Threats and Hurdles for Providers

While failure stories in the scientific literature are scarce, practitioners report figures on unsuccessful transformation projects: Krishnamurthy (2003) estimate that 75 % of the companies that want to offer solutions fail to return the associated costs. According to Roegner and Gobbi (2001), only about 20% of all solution sellers finally recapture their capital costs, and even fewer achieve the 20 to 25% increase in profitability that McKinsey expects from successfully implementing solutions. Baveja et al. (2004) report that only one in five companies succeeds with its service strategy.

Profitability of complex offerings is threatened by customization. First, it is costly because of the direct costs of the adaptation process, e.g. by redesigning products or changes in the production process (Anderson, Fornell, and Rust 1997; Lampel and Mintzberg 1996). Second, customization is a form of asset specificity, i.e. investments are made into a relationship to just one customer and can usually not be transferred to other customers. As a consequence, the provider does not benefit from economies of scale (Bennet et al. 2001); in the worst case, a solution starts from scratch. However, solution sellers can develop specific project management capabilities over time and thus benefit from economies of repetition (Davies and Brady 2000).

Profitability is also threatened by extensive organizational restructuring measures and new project-based capabilities: the “front-end” must carefully balance customer-specific demands and technological and economic feasibility, the “back-end” must develop modular product and service components, and a “strong center” must mediate between these units (Galbraith 2002; Miller et al. 2002; Sawhney 2006). The role of the sales force changes dramatically: Sales persons must become aware of customers unexpressed needs for solutions (Bonney and Williams 2009). They also need a comprehensive understanding of the customer’s business model and new skills for selling services (Ulaga and Loveland 2014). More important, their mindset must change from a focus on deal-closing towards an attitude that prioritizes the outcomes for the customer (“hunter vs. farmer”, Ulaga and Loveland (2014)). McKinsey consultants estimate (Johansson et al. 2003) that 75% of the sales

personnel do not meet the requirements for solution selling and therefore need to be trained intensively or even laid off. Since solution selling relies on teams rather than on individuals and often extends over several periods, new reward schemes are necessary (Galbraith 2005a).

If solution providers take the promise to solve a customer's problem seriously, they assume a number of *risks* (Nordin et al. 2011; Sharma et al. 2002; Zimmer and Ulaga 2010): The *time frame* for solution development is longer than for components (Page and Siemplenski 1983) and is difficult to predict, particularly if the end of the project depends on the customer's assessment that the underlying problem is solved. Project profitability is even more at risk when the payment is contingent on the outcome, e.g. in case of gain sharing or performance contracting (Sawhney 2006). Furthermore, with increasing complexity of the solution the provider runs the risk that the individual parts cannot be successfully integrated (*functional incompatibility risk*, Harris and Blair 2006). As a consequence, the value-in-use decreases and it becomes difficult to justify a price premium⁵¹ (Roegner et al. 2001).

Solutions: Not for every Customer

There are a number of reasons why customers do not want to purchase a solution, primarily, however, because they do not value the additional benefit of a solution. This is the case when:

- Needs are manifest and the complexity of the underlying problem is low. Then, simple components should meet the customer's requirements.
- Needs are manifest, complexity is high but the customer has customization and integration capabilities (Dunn Jr. and Thomas 1986; Ghosh et al. 2006; Hobday et al. 2005; Schilling 2000). Then the customer purchases components and integrates those himself.

Full solutions are embedded in close relationships between customer and supplier. However, not every customer wants this close relationship (Danaher et al. 2008; Palmer 1996), e.g. because it involves the disclosure of data or granting insights into business processes. Vice versa, if the relationship is ineffective or dysfunctional, the

⁵¹ This is equivalent to a degradation from a *product* to a *price bundle* (Stremersch and Tellis 2002).

customer is less likely to purchase a solution from this provider (Cornet et al. 2000; Palmatier et al. 2008; Zimmer et al. 2010).

Purchasing a solution also involves risk for the customer. It is often a new buying task situation; the strategic importance is high, particularly if many central processes are taken over by the provider, and solution purchases usually have a high monetary value (Stremersch et al. 2001). Long-term contracts for services or consumables and “walled gardens” (closed systems, no hardware or software interfaces) create additional lock-in effects and increase switching costs. If the solution contains service elements, the overall purchase risk increases due to the shift from search to experience and credence qualities (Homburg et al. 2005c; Kühlborn 2004).

Given these pros and cons, both buyer and seller should carefully deliberate about whether they want to opt for solutions (or for other complex offerings) or should remain within the component business (see figure 6).

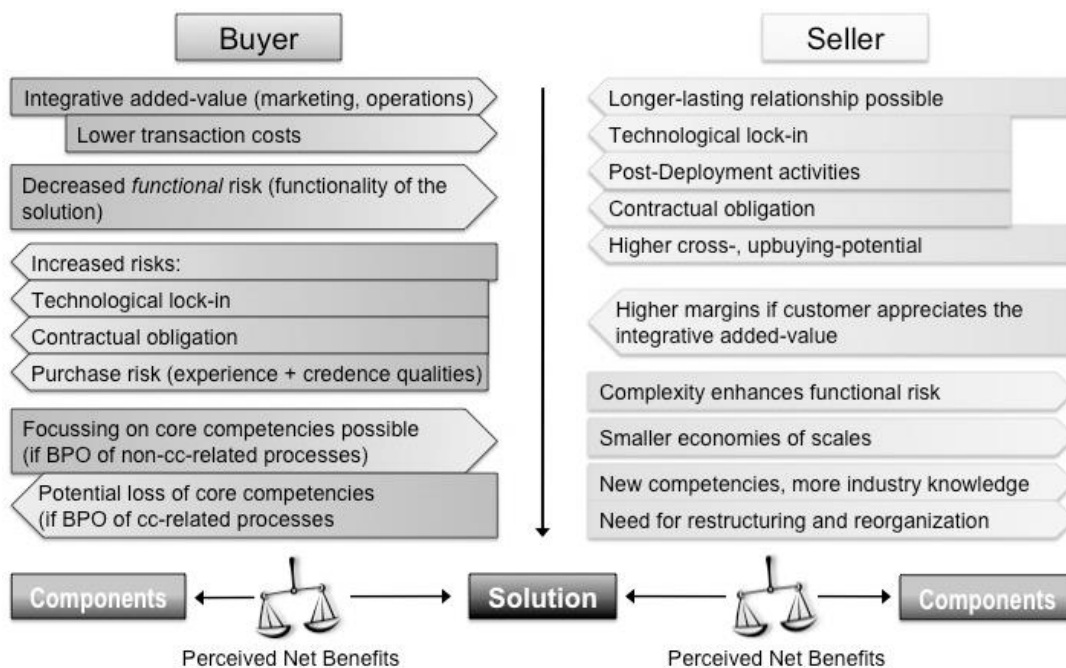


Figure 6: Perceived net benefits of solutions for buyer and seller

2.4.11 Selected Findings on Complex Offerings

Table 8 shows selected journal publications with a focus on empirical-quantitative research on complex B2B offerings (more precisely: systems, solutions, and product bundling, plus servitization). For the aforementioned reasons, purely descriptive case study research that does not aim at generalization beyond the cases is not considered. In contrast, qualitative research papers that take measures to broaden their scope, for instance by conducting content analysis of a sufficient number of interviews (as done by Töllner, Blut, and Holzmüller 2011), are included.

Empirical findings on solutions are as fragmented as one would expect considering the lack of a common theoretical framework. Early publications (before 2007) focus on internal vs. external integration of solutions (Ghosh et al. 2006; Stremersch et al. 2003; Stremersch et al. 2001) and directly refer to general theories, in these cases TCT. Homburg et al. (2005) advocate a solution-oriented communication style for complex offerings based on information economics. Recent publications examine the outcome of solution selling practices: Li (2011) finds a positive effect on perceived relationship value, Kuruzovich et al. (2013) observe a positive impact of bundling (IT hardware + software + services) on customer satisfaction and loyalty. Jacob, Kleipañ, and Pohl (2014) discover increased satisfaction among buyers of IT solutions if sales persons have solution-orientated project management skills and are less selling-oriented. Also, other authors focus on sales strategies that are related to solutions, Storbacka et al. (2011) even identify 69 business practices on different management levels. More recent publications draw upon extant (general) theories to a lesser extent than earlier papers. A notable mention is the work by Töllner et al. (2011), the only journal publication so far that explicitly uses the framework by Tuli et al. (2007) in an empirical research setting. They identify two additional processes: signaling (in a PAT sense, i.e. to demonstrate competence and experience to the customers in order to reduce purchase risk) and “inter-process management” as the competence to integrate the remaining processes.

A different picture emerges in the field of servitization, where research questions are more focused. This could be due to a quasi-paradigmatic “disciplining effect” of the basic assumption of servitization (manufacturers turn into service providers because services are more profitable). Several publications examine the impact of services on

either firm value (Fang et al. 2008) sales and services volume (Antioco et al. 2008; Dachs et al. 2014), overall profit (Eggert et al. 2011) and relationship quality (Homburg, Fassnacht, and Guenther 2003). They find support for the basis hypothesis about the positive outcomes of services; however, they must reach a certain intensity in order to become effective (Dachs et al. 2014; Fang et al. 2008). The fundamental differentiation between SSP and SSC (introduced by Mathieu in 2003) has been empirically supported (Gebauer 2007; Raddats and Kowalkowski 2014). It could also be shown that SSPs indirectly increase general turnover and profits (e.g. through supporting product sales), whereas SSCs can lead to higher profits autonomously but need more time and resources (Antioco et al. 2008; Eggert et al. 2011). In any case, the service strategy must be aligned to product and general innovation strategy and organizational characteristics (Dachs et al. 2014; Eggert et al. 2011; Fang et al. 2008; Gebauer 2007; Gebauer et al. 2010). The empirical findings of servitization research are insofar relevant to solutions as they show possible pathways for manufacturers that want to turn into solution providers by adding services (also see section 5.2). Thus, the first step would be to establish a SSP business (cf. Oliva and Kallenberg 2003).

Selected Journal Publications on Complex B2B Offerings. Focus on Quantitative Research (or Mixed Methods) Allowing for Generalization

Publication	Area / Concept	Research Focus	Sample	Design / Methods	Main Findings / Contribution
Frambach et al. (1997)	Servitization	<ul style="list-style-type: none"> • Classification of proactive product related services • Segments for services 	217 experts from health sector (Europe)	Exploratory, EFA, CA	<ul style="list-style-type: none"> • Relevant factors for service categories: purchase, usage, and relationship related • 5 target segment with varying propensity to adopt
Mathieu (2001)	Servitization	<ul style="list-style-type: none"> • Services supporting the product vs. supporting the client (SSP vs. SSC) 	49 sellers, clients and distributors (Europe)	Descriptive, content analysis, CA	<ul style="list-style-type: none"> • Differentiation SSP vs. SSC meaningful • SSC less traditional and less common but promising • The three interviewed groups use different lexica: client = action / technology related, supplier = abstract, generic, distributors = everyday speech
Stremersch et al. (2001)	Solutions (labeled as "Full- Service Contracts", FSCs)	<ul style="list-style-type: none"> • Factors and conditions for purchasing FSCs 	109 members of buying units in NL + BE	Exploratory, interviews + conjoint analysis	<ul style="list-style-type: none"> • Offerings are evaluated by value and price, not by price alone • Total costs and performance are more relevant for FSC • Communication should emphasize results • Higher level of risk associated with FSC
Homburg et al. (2003)	Servitization	<ul style="list-style-type: none"> • Service orientation (culture and HRM) • Impact on profitability 	271 manufacturers	SEM	<ul style="list-style-type: none"> • Service orientation (firm's emphasis of services, not number!) leads to higher quality of customer relationships, higher service and overall profitability
Stremersch et al. (2003)	Modular Systems (≈ Solutions)	<ul style="list-style-type: none"> • Preference for multiple vs. single sourcing • Role of (tacit) knowledge • Theory: transaction cost theory 	55 telecom managers (worldwide)	Experiment, RA (probit)	<ul style="list-style-type: none"> • Inverted U-shape relation for knowledge on outsourcing the systems integration decision (= buying systems), those with low knowledge cannot, those with high knowledge do not want (for safeguarding reasons) • Moderate-knowledge buyers prefer multiple sourcing • → "System integrators should target moderate know-how buyers" (p. 348)
Homburg et al. (2005c)	Systems (≈ Solutions)	<ul style="list-style-type: none"> • System-oriented communication • Customer orientation of sales team • Theory: information economics 	261 systems seller (GER)	Descriptive, SEM	<ul style="list-style-type: none"> • System-based market performance trough <ul style="list-style-type: none"> ○ System-oriented communication as signaling strategy to reduce buyers' uncertainty ○ Customer orientation of sale force and team-selling ○ Value-based pricing (competition-based has negative impact)

Ghosh et al. (2006)	Complex Products (≈ Systems)	<ul style="list-style-type: none"> • Customization control (CC): seller vs. buyer (normative from sellers' perspective) • Impact on closeness to customer needs, delivery performance, and the seller's operating profits • Theory: transaction cost economics 	304 managers (seller)	Descriptive, Confi.-FA, RA (LGS + probit)	<ul style="list-style-type: none"> • Sellers "should take more CC with increasing technological unpredictability and decreasing modularity and customer knowledge" (p. 675) • Customers with a high absorptive capacity also enable seller to take over CC • Direct positive effects of CC and customer knowledge on closeness to customer needs, complex interaction effects for performance and profits
Gebauer (2007)	Servitization	<ul style="list-style-type: none"> • Organizational factors that enable SSC • Internal and external strategy 	211 manufacturers (GER + CH)	Descriptive, SEM	<ul style="list-style-type: none"> • Customer demand and – to a lesser extent – competitive situation are motives to offer SSC • Internally, development activities, service manager decision-making authority, and creation of an innovation culture have a positive impact on an SSC orientation
Fang et al. (2008)	Service / Solution Transition	<ul style="list-style-type: none"> • Do service transition strategies increase firm value and what level of service intensity is required? • Which firm and industry factors moderate the relationship? • Theory: RBV 	477 manufacturers (secondary data from COMPUSTAT) (USA)	Descriptive longitudinal, RA	<ul style="list-style-type: none"> • Service ratio must be > 20-30% (of sales revenues) to have a positive effect on firm value (U-shape) • Relatedness to the firm's core product business has an moderating influence on firm value • Services transition strategies are more effective in low-growth industries and in those with a high industry turbulence
Sturm and Bading (2008)	Solutions	<ul style="list-style-type: none"> • How common is solution selling? • How do companies integrate products and services? 	99 manufacturers (GER)	Descriptive, MA	<ul style="list-style-type: none"> • Solution provider? 30.3% of companies totally agree, 48.5% rather agree • Customer needs for integrated offerings are hard to identify • Integration of products and services is the biggest challenge, often separated business units
Antioco et al. (2008)	Servitization	<ul style="list-style-type: none"> • Impact of service orientation (SSP vs. SSC) on product sales and service volume 	137 companies (BE, NL, DK)	Descriptive, SEM	<ul style="list-style-type: none"> • SSC but not SSP-orientation leads to higher product sales • SSP but not SSC has an impact on service volume • Greater top management commitment fosters SSP-orientation but not SSC • SSP likely easier to bill (easy money), hence SSC (≈ solution) has lower top management support

Gebauer et al. (2010)	Servitization	<ul style="list-style-type: none"> • Service strategy identification and fit with configurations of service-related organizational design factors 	195 manufacturers (Europe)	Descriptive, SEM, CA	<ul style="list-style-type: none"> • Aftersales service provider: rather low general service orientation, medium service oriented corporate culture • Customer support service provider: general high service orientation • Outsourcing partner: High service orientation apart from personnel recruitment and training • Development partner: High service orientation, but no specific service organization • Conclusion: organizational design factors as fundament for transition strategies to solution provider
Lay et al. (2010)	Servitization	<ul style="list-style-type: none"> • Service infusion strategies • Share of turnover with services 	3367 manufacturers, secondary data (EMS panel) (Europe)	RA (Tobit)	<ul style="list-style-type: none"> • 85% of all manufacturers offer at least one type of service • Service share about 16% of total turnover • Majority of services are SSP • Number of services offered has biggest influence on sales turnover • Servitization more relevant for small-batch manufacturers
Eggert et al. (2011)	Service / Solution Transition	<ul style="list-style-type: none"> • Revenue growth through services • SSP vs. SSP • Theory: RBV 	414 manufacturers, secondary data (NIFA panel) (GER)	Descriptive longitudinal, (secondary data) LCGA	<ul style="list-style-type: none"> • Service offerings do not automatically improve firm profits, companies must align service offerings with product innovation strategy: <ul style="list-style-type: none"> ○ For companies with high product innovation activity, only SSPs increase firm profitability ○ For companies with low product innovation activity, SSCs increase firm profitability, SSP have indirect effects • SSCs require more resources, thus they threaten long-term profitability • SSPs foster SSCs
Li (2011)	Solutions	<ul style="list-style-type: none"> • Impact of competence-based solutions (additional engineering, coupling, risk taking, etc.) on perceived relationship value • Capabilities needed for solution provision 	403 OE manufacturers (CN)	Descriptive, SEM	<ul style="list-style-type: none"> • Solutions have a positive effect on supplier–buyer relationship value • Cross-functional information dissemination and joint innovation capabilities are required
Storbacka, Polsa, and Sääksjärvi (2011)	Solutions	<ul style="list-style-type: none"> • Identification of management practices in solution selling • Effect of these practices on sales performance 	135 sellers (Europe)	Explorative (interviews), EFA + descriptive, + SEM	<ul style="list-style-type: none"> • Identification of 68 solution sales practices, condensed to 13 major (e.g. customer acquisition, product configuration and pricing) in 5 blocks (strategy planning, sales planning, sales model design, capabilities and skills, performance management) • However, only performance management (assessment) has effect on sales performance
Töllner et al. (2011)	Solutions	<ul style="list-style-type: none"> • Buying center members' perceptions in solution purchases <p>Theory: Tuli et al. (2007)</p>	17 buyers, decision makers and users from 9 firms (GER)	Explorative (interviews) + descriptive, content analysis	<ul style="list-style-type: none"> • Additional two processes: <ul style="list-style-type: none"> ○ Signaling: demonstrating competence and experience to the customers to reduce purchase risk ○ Inter-process management: competence to integrate the remaining processes • Buying center members assess relevance of processes differently: <ul style="list-style-type: none"> ○ User: C+I ○ Decision maker: C+I and inter-process management Buyer: signaling and inter-process management

Kuruzovich et al. (2013)	Solutions (≈ Bundling)	<ul style="list-style-type: none"> Does bundling of IT hardware, software, and services increase customer satisfaction and loyalty (“Steve Jobs hypothesis”)? 	36,000 IT seller ratings (secondary data) (USA)	RA	<ul style="list-style-type: none"> Customers purchasing hardware, software, and services as a bundle from a single vendor report higher satisfaction and loyalty than buyers of single components or smaller bundles (e.g. hardware and software only) Applies both on customer and seller level Satisfaction and loyalty: hardware > software > services
Raja et al. (2013)	Solutions	<ul style="list-style-type: none"> Dimensions of value-in-use for solutions Impact on customer satisfaction 	33 buyers (UK + IRL)	Repertory Grid	<ul style="list-style-type: none"> Dimensions: knowledge, access (e.g. promptness of personnel), relational dynamic (quality), range of product and service offerings, delivery, price, and locality Strongest effect on satisfaction: relational dynamic and access
Raddats and Kowalkowski (2014)	Servitization	<ul style="list-style-type: none"> Types of service offerings Manufacturers’ service strategies 	145 manufacturers (UK)	EFA, CA	<ul style="list-style-type: none"> Three service types: SSP, operations services on own products, vendor independent operations services Three strategy types: service enthusiasts (45%, high service turnover, no service focus), service pragmatics (37%, low service turnover, mainly SSP), service doubters (18%, low turnover, no focus)
Dachs et al. (2014)	Servitization	<ul style="list-style-type: none"> Quantitative insights on servitization 	3693 manufacturers, secondary data (EMS panel) (Europe)	MA, RA, TT	<ul style="list-style-type: none"> 80-90% of firms offer services services’ contribution to turnover is < 20% U-shaped relation between service share and firm size Positive relationship between product complexity (batch size) and service share Positive relationship between product innovation and servitization
Jacob et al. (2014)	Solutions	<ul style="list-style-type: none"> Satisfaction (with consulting) of solution customers 	106 IT professionals (GER)	Explorative (interviews) + descriptive, SEM	<ul style="list-style-type: none"> Consulting satisfaction has a positive impact on trust and loyalty Consulting satisfaction depends on the provider’s project management skills, the quality of information exchange, and the providers flexibility Application of (hard-) selling techniques has a weak negative impact on consulting satisfaction

EFA: exploratory factor analysis, Confi.-FA: confirmatory factor analysis, SEM: structural equation modeling, RA: regression analysis, CA: cluster analysis, MA: descriptive analysis of item means, LCGA: Latent Growth Curve Analysis, TT: t-test

Table 8: Selected journal publications on quantitative findings on complex B2B offerings

2.5 Towards a Middle Range Theory of Business Solutions - A Configural Approach

2.5.1 Typologies and Theories

As shown above, there is ample conceptual research and a considerable amount of quantitative papers, but both are only loosely connected in most cases. Early quantitative research usually refers directly to GT's (e.g. transaction cost economics) or the theoretical corpus is developed in qualitative pre-studies. The lack of a testable mid-range theoretic framework complicates the aggregation of knowledge because almost any research must start from scratch. To address this issue, a typology of complex offerings is developed and tested in the following.

Without a doubt, there is no shortage of typologies in this field – why yet another? There are two reasons: 1) Many typologies for business solutions, in particular those by business consultants, lack a sound theoretical foundation, and 2) none of those typologies has been tested empirically using confirmative statistical methods.

There has been a long debate about whether typologies are theories or just non-theoretic descriptions (Doty and Glick 1994): Bacharach (1989) defines a theory as “a statement of relationships between units observed or approximated [by constructs] in the empirical world [...] to answer the questions of *how*, *when*, and *why*, unlike the goal of descriptions, which is to answer the question of *what*” (p. 498). The mere categorizing of objects, no matter if qualitatively or quantitatively, can only answer *what* questions. This applies – so Bacharach – also to typologies even if they were more abstract and might include theory-based ideal types. Hunt shares this attitude (Hunt 1971). He considers classification schemes – be it typologies or taxonomies – not as theories but rather as *pre-theories* (Hunt 2010): “Classification schemata, no matter how elaborate or complex, are not by themselves theoretical, though most theoretical construction will contain classificational schemata as components” (p. 199).

Doty and Glick (1994) vehemently contradict these views: The criticism might apply to some “typologies” that are results of a misunderstanding about what typologies

should be. If done properly, typologies are a “unique form of theory building” (p. 231). For that purpose, the researcher must 1) specify the *constructs* (using *ideal types*, which in turn can draw upon unidimensional first-order constructs used for conventional theory building), 2) formulate *relationships among constructs*, both between the internal first order constructs and external variables, and 3) empirically test theories, which requires that typologies must be *falsifiable*. Doty and Glick emphasize that typology research addresses both general and middle range theories: patterns of relationships among the dimensions of the typology, i.e. the internal consistency, make statements on an intermediate theoretical level, whereas relationships between certain types and an independent variable or other environmental conditions are directed towards general theories.

If applied appropriately, typology theories have a number of advantages over conventional theories: they go beyond linear or interaction relationships, give a rather holistic view by allowing complex multidimensional patterns, and explicitly allow several ways to reach a goal (equifinality) instead of identifying the best one.

2.5.2 Unscrambling Classifications and Configurations, Taxonomies and Typologies

Every scientific discipline classifies its research objects and in return gains insights from this process and the resulting classification scheme (Speed 1993). This is highly evident in biology; consequently, most of the concepts and designations originate from this discipline (McKelvey 1975, 1978). However, the use of the expressions *classification*, *typology*, and *taxonomy* was mixed up and much confused during early studies in management in the 1950ies and 1960ies – and occasionally still is today (Doty and Glick 1994; Meyer, Tsui, and Hinings 1993).

In the following, the distinctions made by McKelvey (1978) are applied (also see table 9):

- *Classification* is the procedure of classifying entities. A classification can be *general* – taking all attributes into account – or *special* – focusing on a selected number of attributes. They can be based on *ideal* or *real* types.

- *Typologies* are *a priori* conceptual frameworks based on theory. The classification process is based on pre-defined rules and schemes.
- *Taxonomies*⁵² are *post-hoc* classifications based on empirical similarity (Marradi 1990). These are typically generated by cluster analysis.
- In conventional classification studies, a *type* is an object in a typology or taxonomy.

Typologies vs. Taxonomies		
Dimension	Typologies	Taxonomies
Definition	<i>a priori</i>	<i>post hoc</i>
Source	Conceptual framework	Measurement
Objective	Define ideal types	Identify similarities
Nature	Ideal and remainder categories	Positive categories (clusters)
Examples	Miles and Snow (1978) Mintzberg (1979)	Bowen (1990) Homburg, Workman Jr, and Jensen (2002b)
Principal problems	Identification and validation	Interpretation and extension

Table 9: Typologies and taxonomies (based on Speed 1993)

Study Ia follows a *configural* approach (von Eye 2002; see chapter 2.5.4) that has special connotations for some expressions:

- A *configuration* is a cell in the cross-tabulation of (categorical⁵³) variables under research. These variables are selected prior to the data collection based on theory. In this sense, a *configuration* corresponds to a *type* (as an object within a typology).
- In the language of the Configural Frequency Analysis (CFA) (von Eye 2002) – the main method of analysis in study Ia – a *type* describes a *configuration* that occurs significantly more frequently than expected. Following this line

⁵² Indeed, McKelvey did not use the term *taxonomy* for post-hoc classification, but subsequent generations of researchers used the term in the sense of McKelvey. In a similar vein, Harvey (1969) uses the terms *logical partitioning* for ex-ante classifications and *grouping* for post-hoc classifications.

⁵³ If the variables are continuous, it is referred to as a *profile* (Hancock and Mueller 2010; von Eye 2002). An exception is fuzzy-set Qualitative Comparative Analysis (Ragin 2008; Rihoux and Ragin 2009): even though continuous fuzzy variables are used to determine the membership in a specific configuration, the table containing all configurations is described by means of dichotomic ideal types.

of thought, an *antitype* is a *configuration* that is found less often than expected.

In order to avoid further confusion in the following, the expression *type* is only used in its CFA sense, and *configurations* also appear in *typologies*.

A usable typology must fulfill three formal criteria (Speed 1993, p. 175): It must classify each case (*comprehensiveness*) to just one category (*mutually exclusiveness*) based on specified rules (*explicitness*). Additionally, typologies should be *meaningful* (which can be an issue in case of special typologies with too narrow concepts), *useful* (which can be problematic when too “ambitious” general typologies lose practical relevance), *parsimonious* (but too few possible configurations increase within-variance), and they should *add value to research* – Especially the latter is not a trivial point as typologies are often used in non-scientific contexts, e.g. by business consultants or for educational purposes. It should be noted that Speed’s formal criteria are rather recommendations for constructing typology frameworks; they are less strict than Doty and Glick’s requirements for typologies to be theories⁵⁴.

2.5.3 Contingency Approach: Focus on Market Performance

Typologies are frequently used within the *contingency approach* (Boyd et al. 2011; Ginsberg and Venkatraman 1985; Hoffer 1975; Meyer et al. 1993; Zeithaml et al. 1988). The contingency approach suggests that an influence of variable *A* on *B* depends on a third variable *C*: $A \rightarrow B \mid C$ (Speed 1993). The simplest form of a contingent condition is a moderating or interaction hypothesis for a single variable. However, contingent conditions tend to be rather comprehensive and aim at describing complex, exogenous situational factors (Boyd et al. 2011; Zeithaml et al. 1988). For such multivariate frameworks, typologies are particularly suited (Speed 1993): They reduce empirical variance by pooling cases just as cluster analysis but they do so based on a formulated theory. The contingency and the *configural* approach (see next chapter) are closely connected. In both approaches the idea of

⁵⁴ Doty and Glick (1994) also differentiate between *typology* in a stricter sense, i.e. an elaborated classification schema, and *typology theory*.

equifinality (more than one way leads to the goal) is central. Most theories that follow the contingency approach suggest that more than just one condition exists that allows (or further specifies) the hypothesized relation between the variables (Zeithaml et al. 1988).

The contingency approach is widely accepted in strategic management⁵⁵, organizational theory (Boyd et al. 2011; Ginsberg and Venkatraman 1985); and also in marketing, where it is often applied in research on marketing organization (Ruekert, Walker Jr, and Roering 1985) and marketing strategy (Gardner et al. 2000). As mentioned above, the inclusion of a moderating or interaction hypothesis formally constitutes a contingency approach. However, explicit contingency studies mostly focus on choice of strategy as the independent variable, (market) performance as the dependent variable, and market, firm, or product characteristics as contingency variables (Boyd et al. 2011). Contingency hypotheses in academic marketing research also focus on these variables⁵⁶, probably a legacy from the origin in strategic management research.

2.5.4 Configural Approach: Multicontingent Research

The term “configural / configurational approach”⁵⁷ is used ambiguously in social and business research: In a broader sense it is an extension of, or – as some theorists argue (Meyer et al. 1993) – a breach with the contingency approach: The main criticism directed against the contingency approach was its *reductionism*, i.e. the focus on selected aspects that need to be investigated (Demers 2007). Research, however, should be *synthetic*:

“Configurational inquiry represents a holistic stance, an assertion that the parts of a social entity take their meaning from the whole and cannot be

⁵⁵ Boyd et al. (2011, p. 278, 280) notice half ironically that a large part of strategic management research can be summarized in just one sentence: „It depends. “

⁵⁶ A more recent example is Homburg, Artz, and Wieseke (2012), for an overview of older studies see Zeithaml et al. (1988; p. 50-54)

⁵⁷ As a rule of thumb, „configurational approach“ stands for the meaning in the broader sense, “configural approach” for the strict sense, i.e. when configural methods are applied.

understood in isolation. Rather than trying to explain how order is designed into the parts of an organization, configurational theorists try to explain how order emerges from the interaction of those parts as a whole.” (Meyer et al. 1993, p. 1178)

With configurations defined “as any multidimensional constellation of conceptually distinct characteristics that commonly occur together” (Meyer et al. 1993, p. 1175), configurational research can be seen as a holistic, multidimensional – or multi-contingent (Snow, Miles, and Miles 2006) – form of contingency research. However, with increasingly complex contingency hypotheses, this distinction becomes blurry (Boyd et al. 2011). Ignoring the historic focus of contingency studies on market performance (see chapter before), it can be stated that the *configurational approach* has become an umbrella term for empirical business studies that include a typology or taxonomy. Likewise in B2B marketing research we find a range of studies that explicitly refer to the configurational approach (Ceci and Prencipe 2008; Gebauer 2008; Homburg, Jensen, and Krohmer 2008; Homburg et al. 2002b; Stock and Zacharias 2011; Vorhies and Morgan 2003).

However, most journal publications suffer from what Fiss calls a "mismatch between configural theory and methods" (2007, p. 1181): the vast majority of configurational studies – including the abovementioned – are based on either cluster analysis or profile deviation analysis⁵⁸. Cluster analysis classifies *post hoc* based on empirical correlations in the data and thus essentially generates a taxonomy. Hence, it is not suitable for the empirical verification of a theory-based typology⁵⁹. Profile deviation analysis is in fact closer to typology research (and thereby to theory). In research practice however, researchers move away again from their previously established theoretical foundation once they take the scores for defining the ideal types out of the sample (as e.g. in Vorhies and Morgan 2003). Special *configural methods* (Configuration Frequency Analysis and Qualitative Comparative Analysis) address

⁵⁸ There are also qualitative papers based on case studies, which call themselves *configural/configurational*. These are not included here because they do not pursue the goal of generalizability, e.g. Aurich et al. (2009).

⁵⁹ Additional problems are an objective, reproducible determination of the number of clusters.

these issues and are therefore well suited for testing typologies (Fiss 2011). We return to these methods in chapter 3.2.1.

2.5.5 Exemplary Typologies in Business Research

Miles and Snow (1978) and Mintzberg (1979)

Even though not directly linked to B2B marketing, the typology by Miles and Snow (1978) is worth mentioning because the authors were among the first to introduce this kind of theory development to business research. Their concepts are widespread in the management literature and triggered a long series of validation studies. Study Ia and Ib in this thesis use a similar but improved scenario technique that Snow et al. applied in their 1980 survey as measurement method.

According to Miles and Snow (1978), a firm has to face three fundamental challenges, namely entrepreneurial, engineering/operational, and administrative issues. There are four types of strategic organizations, each with a set of characteristic behavioral patterns to solve those problems: *prospectors* (rather proactive), *defenders* (rather reactive), *analyzers* (both pro- and reactive), and *reactors* (no strategy, therefore a residual category). The choice of strategy depends on the environment of the firm. If selected and implemented properly, those strategies lead to a competitive advantage – apart of course from the *reactor's* option, which cannot be considered a strategy at all and hence should always be inferior.

In general, the existence of the strategic groups could be empirically validated (Doty, Glick, and Huber 1993; Shortell and Zajac 1990; Zahra and Pearce Ii 1990). Also, a fit between strategy and environment explains 24% of the variation in organizational performance (Doty et al. 1993). However, almost every researcher in the Miles and Snow tradition address severe issues in operationalizing the strategic types, especially the *reactors* (Shortell and Zajac 1990; Zahra and Pearce Ii 1990), and question the reliability and validity of the measures.

Miles and Snow do not refer to a single theory in the construction of their typology. The authors also include their tacit knowledge as business consultants and academics

teaching to MBA students. Snow empirically tested his typology (1980) but had to admit issues in measuring strategy (Snow and Hambrick 1980). It gives the impression that the success of their typology is more likely due to its effective use in education and business practice rather than to methodological rigor.

German B2B Marketing Typologies

Typologies have always played an important role in German marketing academia (Kleinaltenkamp 1994; Kleinaltenkamp and Jacob 2002). In accordance with the German research traditions and foci, the main purpose of these typologies is twofold: 1) defining the research object and 2) structuring the field of research. Thus, we often find these typologies as guiding frameworks for B2B marketing textbooks (Backhaus and Voeth 2010; Kleinaltenkamp et al. 2006). Due to their descriptive purpose these typologies have never undergone empirical testing as a whole⁶⁰. But since they have served as a framework for almost every German dissertation theses in B2B marketing during the last 15 years (e.g. Bonnemeier 2009; Helm 2004; Ungruhe 2011), they have had at least an indirect, although locally limited impact on research.

Depending on the involved parties, these typologies can generally be classified into *supply-side*, *demand-side* and *integrative* typologies, as they consider both supplier and customer (Kleinaltenkamp 1994). However, demand-side typologies, e.g. the classification by Robinson, Faris, and Wind (1967) – new task, modified/straight rebuy – are not in the focus of this review.

Engelhardt et al.

The main motive behind the supply-side typology by Engelhardt, Kleinaltenkamp, and Reckenfelderbäumer (1993) was to overcome the dichotomy between goods and services by concentrating on bundled offerings (“Leistungsbündel”). The vertical dimension represents the *autonomy* of the production process, reaching from

⁶⁰ If these typologies are interpreted just as definitions then empirical testing is not necessary; instead, they have to prove their internal consistency and face validity. Nevertheless, these frameworks contain assumptions about ideal types – whose existence needs to be proven – and implicit hypotheses (e.g. about the distribution of the return on investments in the Backhaus typology).

autonomous to integrative (= customer co-production). The horizontal dimension describes the *tangibility* of the outcome, illustrated by a continuum from tangible to intangible. Engelhardt et al. exemplify the ideal types by means of four B2B offerings (*autonomous-tangible*: component; *autonomous-intangible*: database service; *integrative-tangible*: machinery, *integrative-intangible*: business consulting). They emphasize, however, that most B2B transactions are so complex that usually several types are combined in the course of settlement, visualized by the complex CIM (computer-integrated manufacturing) solution.

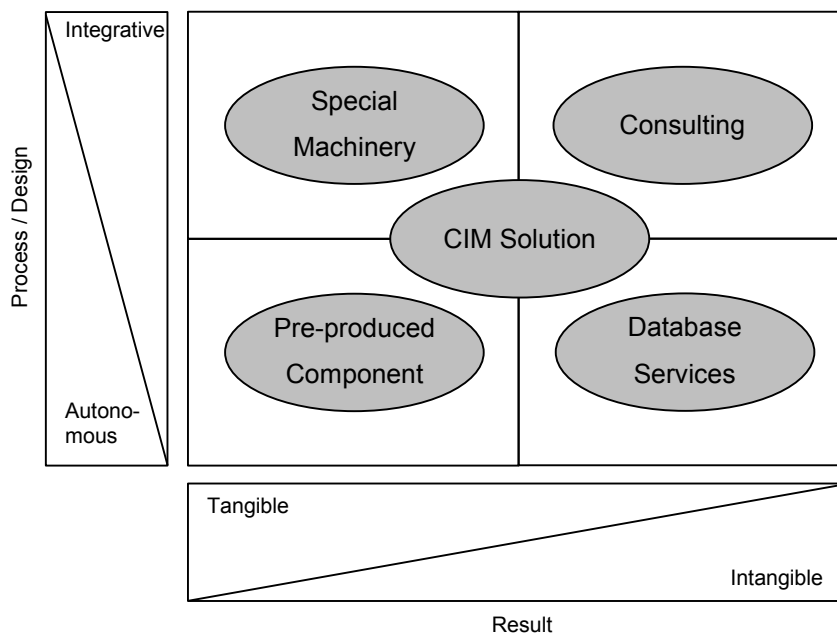


Figure 7: Typology according to Engelhardt et al. (1993, p. 417)

The typology by Engelhardt et al. (1993) anticipated much of what has later been discussed in context of product-service-systems (Goedkoop et al. 1999; Mont 2002, 2000; Tukker and Tischner 2006). Unfortunately again, it has never been published in English-language journals, therefore its impact remains limited to Germany. Similar to PSS, the typology has also been adopted in the engineering research community and served as a basis for discussion in several German multi-disciplinary research projects, e.g. SFB 768 and TR 29 (Lindemann 2013; Uhlmann 2013).

This thesis reflects the typology’s main ideas of focusing on complex offerings and relational processes instead of the *product + x approach*.

Richter

Richter (2001) proposes the two dimensions relationality (intensity of the relationship) and specificity. As an integrative typology and in contrast to Engelhardt et al., it does not describe the offerings but the transactions. This higher level of abstraction is a result of the underlying theories; Richter draws upon NIE, in particular TCT. A residual category (combination deals) has medium levels of relationality and specificity.

The relationality dimension (also: transactional-relational continuum, see Grönroos 1997) will be used later in the Solution Process Chain Model. Asset specificity plays an important role explaining the strategy of the SPCM ideal types.

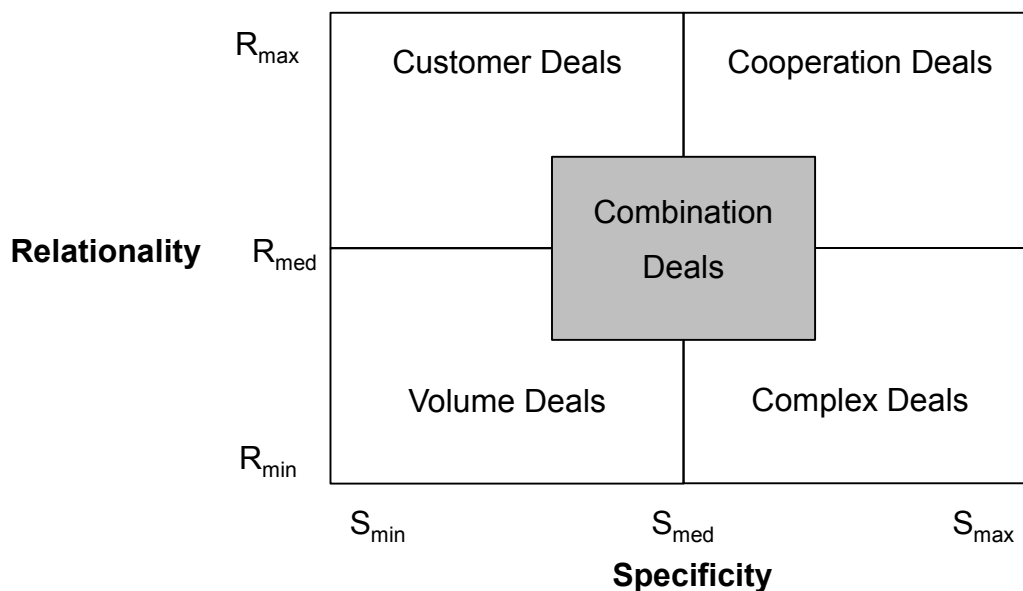


Figure 8: Typology of B2B deals according to Richter (2001, p.155)

Kleinaltenkamp

Kleinaltenkamp's (2001) two-dimensional integrative typology originally had a third dimension – tangibility – and existed in two forms, one for customers and one for suppliers (Kleinaltenkamp 1994). It was later condensed to the four by four grid shown below. Similar to Richter's typology we find here a dimension that describes the *intensity of the business relationship*. The *integrativity* dimension resembles Engelhardt's *autonomous-integrative* continuum and describes the degree of interaction of customer and supplier during the creation of the offering. It is

important to note, however, that this dimension does not have a systemic or *gestalt* character; it does not refer to the integration of several individual components into a system or solution, i.e. something with an increased functional benefit (Sawhney 2006). In this sense, *spot business* and *systems business* (“Anlagengeschäft”) differ in the intensity of customer integration; both are not embedded in a long-lasting business relationship that goes beyond the mere transaction. We also find this aspect later in the SPCM typology this thesis is based on (One-off Systems, see chapter 2.5.6).

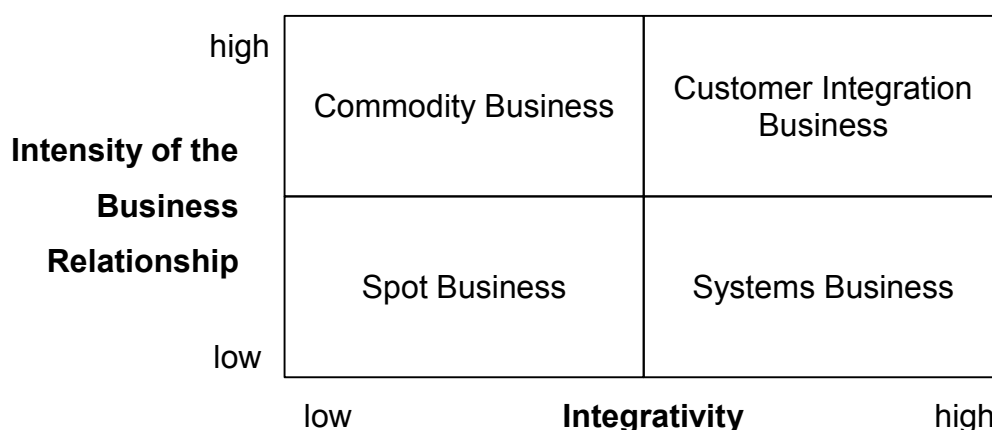


Figure 9: Business types according to Kleinaltenkamp (2001)

Backhaus (1997)

Backhaus draws upon TCT for his integrative typology (Backhaus 1997). In the center are the concept of *quasi-rents*, the differential return of the next best alternative investment, and the question of whether the customer or the provider benefits from a business. This in turn depends largely on the investments made into the relationship and the associated risks.

The vertical axis describes the inner connection between the purchases (single transaction vs. “combined” purchase); the horizontal axis reflects the market focus (single customer vs. market segment). In most cases, there are several strategies to market an offering; however, the decision for one of the options has far-reaching consequences for the company. It literally has to face the question what business it is in:

- In the *product business*, customers commit themselves to just one transaction and thus do not invest in the relationship with the supplier. As they can purchase the offering anywhere else, they do not depend on the provider; therefore, the loss risk or the threat of being locked in is low. Likewise, the supplier is not bound to a single customer because he focuses on segments. This low risk business, however, results in low quasi-rents for both parties.
- The more the customer invests into the relationship with the provider – either through repeated purchases or larger purchase volumes (also see Bolton, Lemon, and Verhoef 2004), or through investing into a technical system that might cause a lock-in – the higher the quasi-rent for the customer. However, quasi-rents should not be mistaken for margins. They rise only formally as the specificity of the investments increases and so do the risks. In this *systems business*, the customer is dependent on the supplier whereas the supplier's commitment is still low.
- The opposite is true in case of the *investment business*. Here, the provider invests in an individual customer, e.g. by customizing the offering or adjusting its production processes. These investments might be at stake if the customer does not return.
- In the *supply business* customer and provider build close relationships with mutual dependencies, e.g. in the form of overlapping production chains in the automotive industry. This type is closest to the definition of business solutions in this thesis.

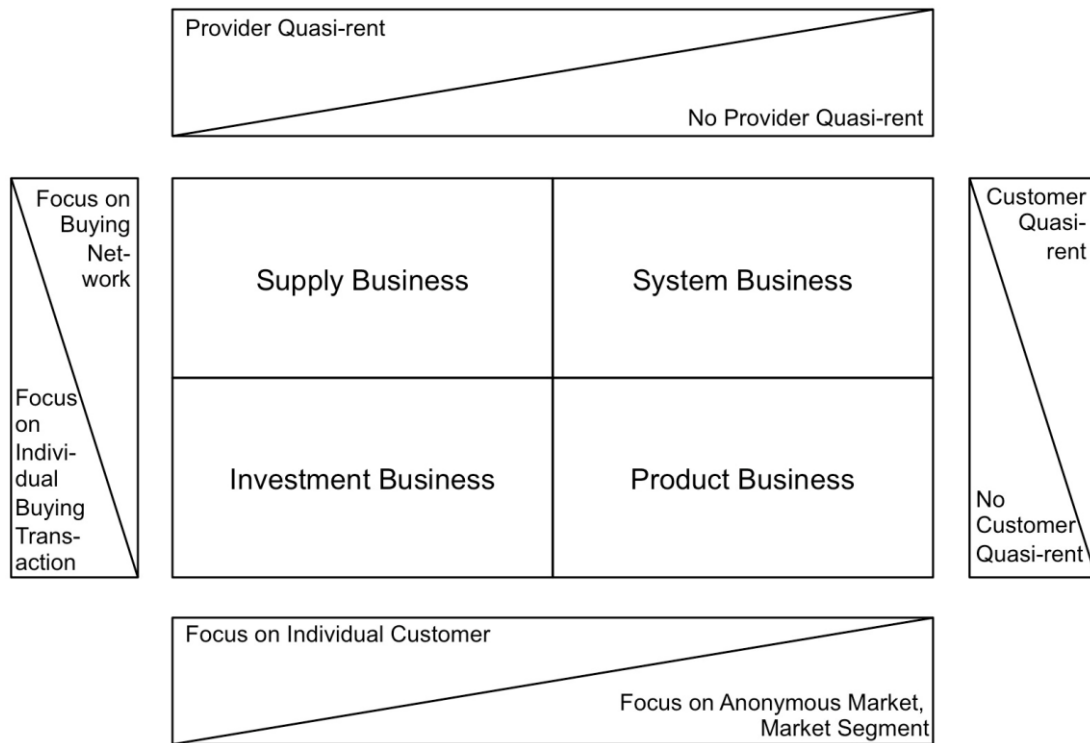


Figure 10: Business types according to Backhaus (1997, p. 295)

As mentioned previously, this typology primarily aims at describing and structuring. However, a closer look reveals testable propositions: Considering the dual function of quasi-rents as risk and profit opportunities, only the *product* and the *supply business* are stable constellations because risk⁶¹ is equally distributed (low/low and high/high). In contrast, the *investment business* has an unattractive risk structure for the supplier. He has three options: 1) Reducing the risk of lost specific investments into an individual customer by moving into either the *product* or *systems business*; in any case by focusing on larger market segments. This likely involves standardization and potentially a loss of customer focus (Sawhney 2006). 2) Moving into the *supply business* by deepening the relationship to the customer or creating technical, contractual or legal lock-ins. This does not reduce the supplier's risk but the customer is less likely to defect. 3) The supplier could increase prices as risk compensation. This, however, requires a strong market position. The *systems business* is a risky position for a customer who is technically, legally or contractually

⁶¹ Since the Backhaus typology has a micro-economic background, risk essentially means loss of specific investments. However, there are other types of risks involved in business solutions (see chapter 2.4.10)

bound to a supplier and who is only of minor relevance to the supplier. Consequently the customer's way out of this situation is to reduce dependency or to increase his importance, e.g. by a (prospective) higher willingness to pay.

The typology by Backhaus is definitely the most coherent of the four and fulfills at least two of Doty and Glick's criteria for typology research (testing is missing). However, the strictly cost-based theoretical framework is also a limitation: It lacks a conceptualization of *utility* (or *value-in-use*) that could help to explain customer behavior. It is not plausible why a customer should demand business solutions primarily for the reason of reducing potential financial losses. Therefore the typology as a whole is not pursued any further but some elements will be referred to later, e.g. to the dimension *focus on individual customers vs. market segments*.

Burianek et al. (2007)

Buriánek et al. (2007) propose a continuum for the characterization of hybrid value creation based on complexity. It is basically a composition of various dimensions of other, mostly practitioners' and German academics' typologies. Since these dimensions are at least to some extent mutually dependent, the model is de facto one-dimensional. The model is less suitable for typology research because: 1) no more than two ideal types can be derived⁶², and 2) the internal consistency is rather weak due to the intercorrelation of the dimensions.

⁶² Doty and Glick (1994) explicitly allow continua for modeling ideal types. However, *ideal scores* must be given for all positions, especially for the intermediate types.

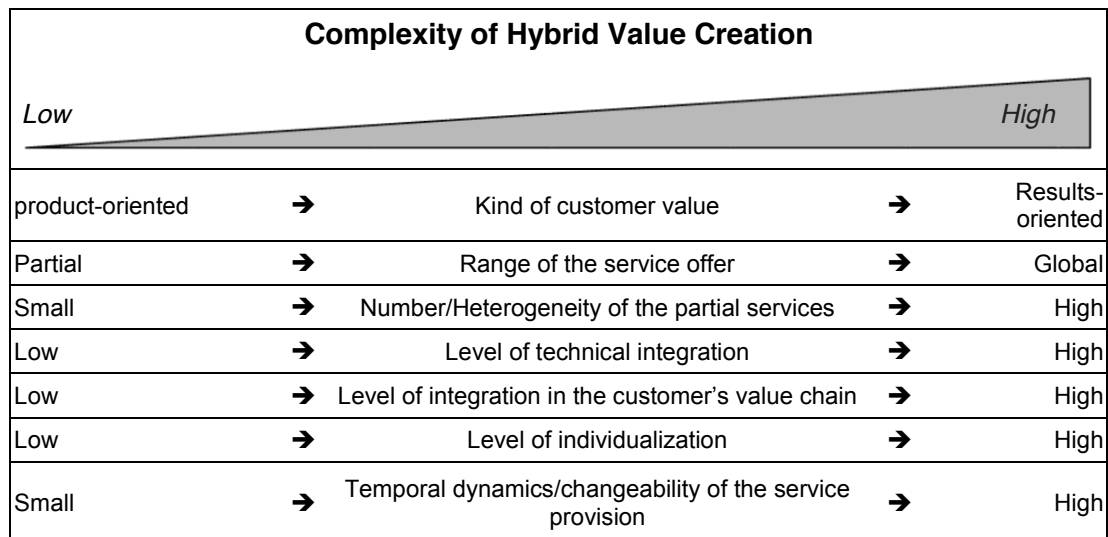


Figure 11: Continuum model of hybrid value creation by Buriánek *et al.* (2007)

Typologies by Practitioners: McKinsey

In several publications by McKinsey business consultants (Doster and Roegner 2000; Roegner and Gobbi 2001), a typology with the dimensions “degree of integration” and “degree of packaging” (= bundling) was used. The authors derive the ideal types “component specialist”, “integrator”, “bundler” and “solution provider”. Apart from a short description of the axes there is no theoretical underpinning. In contrast to many other typologies, the authors give an external criterion that could be used for empirical testing⁶³: the operating margins (return on sales) should be more than 25% higher for solution providers than for component sellers, and 10% higher for integrators. On the contrary, bundlers must decrease their prices by 10%. In fact, similar statements – albeit not as numerically precise – can be found in the scientific literature, e.g. the differentiations *product vs. price bundle* by Stremersch and Tellis (2002) or *systems seller vs. system integrator* by Davies *et al.* (2007).

⁶³ Indeed, Doster and Roegner (2000) refer to an unpublished McKinsey survey and internal analyses that support these assumptions about „potential performance“ but give no further information.

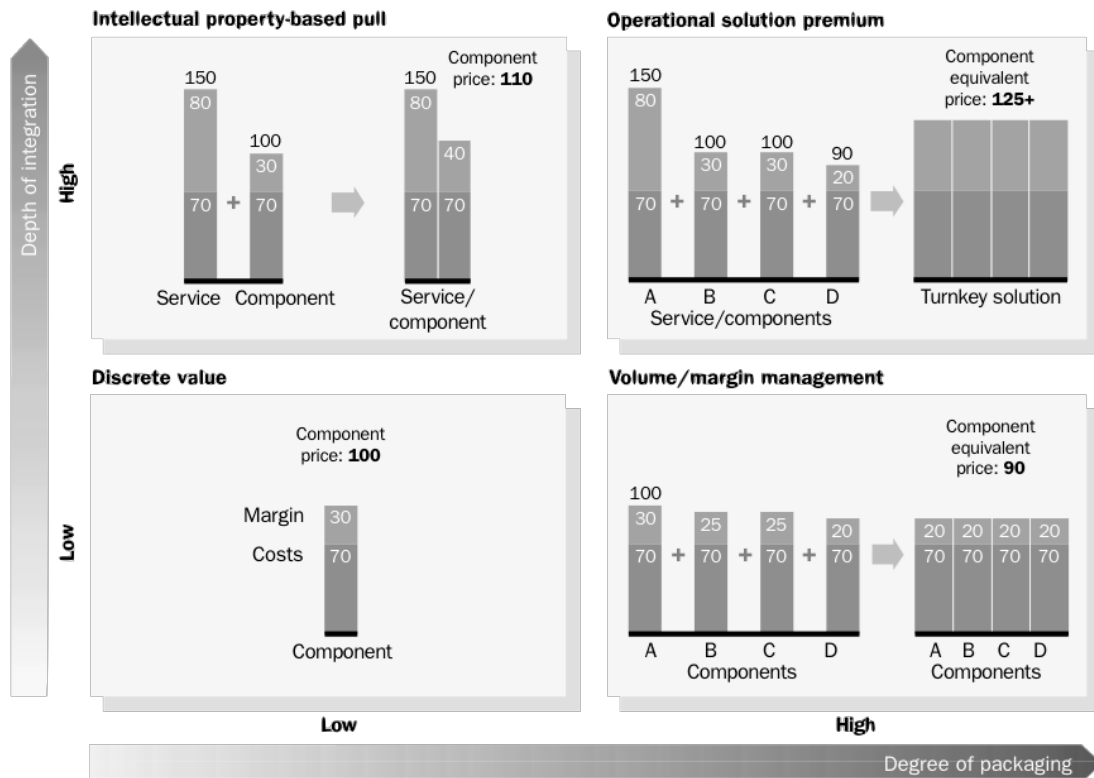


Figure 12: McKinsey typology for complex offerings (Roegner and Gobbi 2001)

Summary Typologies for B2B offerings have been used primarily for educational or consulting purposes. Since they were not developed for *typological research* in the sense of Doty and Glick (1994), they do not meet all three criteria cited by the authors: *Theoretical foundation of the constructs*, *internal consistency* and *empirical testing*.

2.5.6 The Solution Process Chain Model

The proposed typology for complex offerings draws upon the concept by Tuli et al. (2007). According to this concept, a solution is a business relationship that is characterized by the relational processes *requirements definition*, *customization*, *integration*, *deployment* and *post-deployment support*. Defining solutions as business relationships has two major advantages: first, the definition is broad enough to cover the various manifestations of solutions across different industries because it is not limited to particular product-service combinations. Second, this definition locates business solutions in the well-developed theory field of relationship marketing.

However, a definition is not a theory, and typology research in the sense of Doty and Glick requires a theory with operationalizable dimensions. For this purpose, each relational process is interpreted as a partial strategy that pursues either a *conventional* or *component* (C) approach or a *solution* (S) approach.

Requirements Definition (R)

A *solution-style requirements definition process* aims at the identification of *individual* customer needs. These needs are often only latent and hard to express (Davies et al. 2007). Therefore, background information about the customer's problem is required. A solution-oriented provider also tries to anticipate future needs (Day 1994). Since solutions are often highly strategically relevant, several specialist departments and – if necessary – senior managers or executives are usually involved on the customer side (Brady et al. 2005; Ulaga and Sharma 2001). In order to fulfill the customer request, the development of additional internal company resources and capabilities might be necessary. These are asset-specific investments that cannot be transferred to other customers.

For *conventional or component requirements definition*, the identification of *individual* customer needs is not necessary; further background information about individual customer problems is not needed. Instead, market research tries to identify the requirements of preferably large customer segments. This is feasible because customers are usually aware of their needs and can express those (Narver, Slater, and MacLachlan 2004). C-style customer requirements definition is thus not generally less market oriented than the solution approach (Slater and Narver 1998). On the customer side, only a limited number of persons from lower hierarchy levels are involved in the purchase, in most cases a special procurement department. On the supplier side, no additional resources or capabilities are necessary to realize the customer request.

Customization (C)

Tuli et al. (2007) pool *customization* and *integration* into one process, but other researchers (Davies et al. 2007; Mattsson 1973) provide reasonable arguments to make a distinction between these two processes. Among others, the authors underline that system integrators may only process standardized, modular components in order

to keep costs low. Therefore, customization and integration are considered separately.

In case of an S-style approach, an adaptation of the offering to customer needs is required. This ranges from simple modifications of existing elements to a complete new development (Lampel and Mintzberg 1996). The provider acts according to the motto: "If a modification is needed, we adapt our offering to the customer."

In the C-style approach, the customer uses the offering "as it is"; no customization is required or the customer himself must (or wants to) take care of it (Ghosh et al. 2006). This is in accordance with the motto: "If a modification is necessary, the customer adapts to our offering." The seller tries to standardize the offering as much as possible to reach economies of scales. Customization is expensive and arduous; it can reduce margins and might interfere with operations (Anderson et al. 1997; Lampel and Mintzberg 1996). But in many cases, the customer does not demand any modification; he just needs a commodity offering (Doster and Roegner 2000; Roegner and Gobbi 2001).

Integration (I)

Integration is a pivotal process for business solutions (Brady et al. 2005). However, not every customer needs integrated offerings or he has the capabilities to accomplish the integration by himself.

An S-style provider markets offerings that have a "system" nature; these consist of several components that work as a whole (*gestalt principle*) (Mattsson 1973; Sawhney 2006). Therefore, special competences are required for the systemic design of components and interfaces (Hobday et al. 2005) or "design-to-service" capabilities (Ulaga and Reinartz 2011). Using this integration expertise, the vendor makes sure that all the parts fit together and provide an *integrative added value* (Dunn Jr. and Thomas 1986; Schilling 2000). If it is necessary or if the customer wishes, the provider also integrates components from other vendors into the offering. Customer satisfaction and perceived differentiation from the competition depends rather on how product and service parts interact than on the quality of individual components. Finally, the customer is willing to pay a price premium for the integrated added value of the offering (Sawhney 2006; Stremersch and Tellis 2002).

In the conventional / component approach, the offering has either a *stand-alone* characteristic, i.e. it does need to be integrated or consists only of one component, or the customer takes care of the integration process so that all parts fit together (Ghosh et al. 2006). The offering lacks an integrative added value; as a consequence, the customer is not willing to pay a price markup and perceives the seller as less unique.

Deployment (D)

Deployment comprises all activities to implement the offering and make it work. The primary question at this stage is the responsibility. In case of the S-style approach, it is the provider's task to implement the offering into the customer's working environment and to ensure the integration into the customer's technical and business processes. It is not enough to hand over the offering to the customer; the provider takes responsibility even after the delivery. The vendor feels committed to the promised performance of his offering; therefore, he must ensure that the customer receives the desired benefit, e.g. by training the customer's staff or additional adaptations of the offering. As with the other processes, these activities apply to products and services equally. In case of a consulting service, for instance, the consultant's job does not end with presenting the concept; he also has to take measures to implement this concept (Gummesson 1978; Halinen 1997; Lapierre 1997). These measures can be interpreted as specific investments into the relationship with this customer (Heide and John 1992); they are usually not transferable to other customer relationships.

The C-style seller's responsibility ends with the delivery of the offering (apart from maintenance or repair). It is the customer's task to implement the offering and make it work (Anderson 2002). If necessary, the customer must take measures to receive the maximum benefit out of the offering.

Post-Deployment Support (P)

Post-deployment support comprises all post-sales activities. In the case of the C-style vendor, the offering is no longer in the central focus of the customer relationship after delivery. Therefore, post-purchase activities are essentially limited to recovery services such as repair and maintenance (in the sense of exchanging wearing parts). These activities are responsive, i.e. the seller reacts to failures. However, vendors can

also excel in these services through promptness and effectiveness (Gounaris 2005; Parasuraman, Zeithaml, and Berry 1988).

The S-style provider has a different mental frame⁶⁴ (Crowe and Higgins 1997): instead of reacting to failures, he tries to proactively prevent those. This includes activities such as proactive failure detection, offering help and seeking feedback (Challagalla, Venkatesh, and Kohli 2009), but also comprises complex legal constructs such as service level agreements or payment contingent on uptime and system availability. In any case, the offering is still part of the customer relationship even after its implementation. Hence, the seller tries to discover, whether the customer's requirements have changed or developed in order to improve the offering, through modifications or complementary offerings (cross- or up-buying). By means of modern information and communication technology, the provider can perform some of these activities remotely, e.g. remote monitoring or other remote services (Schumann, Wunderlich, and v. Wangenheim 2012; Wunderlich 2010).

Configurations and Ideal Types

The choice for a partial strategy (R, C, I, D, P) depends on the core offering of the firm or a strategic business unit (SBU). The partial strategies are independent dimensions, that is, they are not in a compulsory, coherent order. This results in $2^5 = 32$ possible strategy configurations. However, not every combination makes sense in the logic of an intra-strategy *fit* (Boulding 1956; Scholz 1987; Venkatraman 1989). Those configurations that make sense constitute the ideal types within the ***Solution Process Chain Model*** (SPCM, figure 13). Firms within the same configuration belong to identical populations in the sense of the *population ecology* theory (Freeman 1977; Hannan and Freeman 1989; Carroll 1984; Singh and Lumsden 1990). Firms in the same population make similar decisions on resource utilization and the corresponding organizational factors (Hannan and Freeman 1989). These decisions also depend on interaction with the ecological *niche*, i.e. the microenvironment in which the population operates. These niches provide resources, such as payments by customers (Michael and Kim 2005). Firms survive if they fit in

⁶⁴ Also see regulatory focus theory (Higgins 1998) in social psychology that distinguishes between *prevention focus* (avoiding pain) and *promotion focus* (seeking advancement and accomplishment).

these niches. In turn, these niches have only a limited capacity, which results in competition. Fit and attractiveness of the niches contribute to the dynamic of configural changes, to which we will return in study Ib.

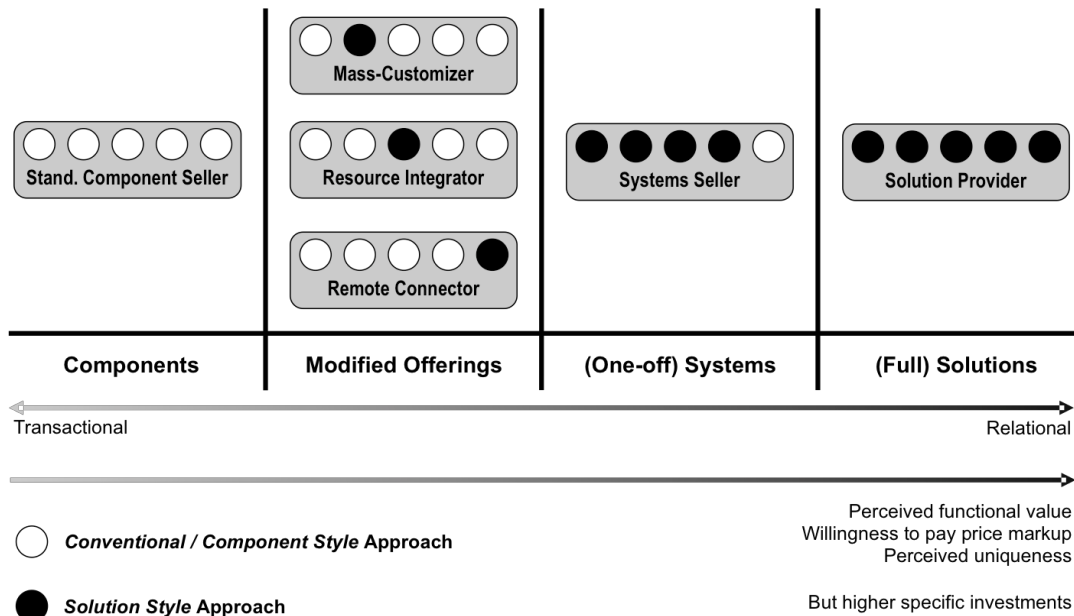


Figure 13: The SPCM typology

Component Seller

Component Sellers pursue an entirely conventional / component-oriented approach. Typical Component Sellers aggregate customer requirements in advance: when doing market research, they try to match the preferences of a preferably large and homogenous target group. The core offering is standardized; no customization is needed or possible. If the component is part of a system, the customer assumes the task of integration but also the risks associated with this process (e.g. compatibility issues). The customer is also responsible for the implementation of the offering into his environment (this can also mean consuming or processing the component) and takes all necessary measures to receive the maximum benefit out of the offering. The vendor's duties end with the delivery (apart from warranty); this specific offering is part of the history of the customer relationship and not of part of the future.

The Component Seller is an element of many typologies in the practitioner and scientific literature (e.g. Backhaus 1997; Bennet et al. 2001; Davies et al. 2006;

Doster and Roegner 2000; Engelhardt et al. 1993; Hax and Wilde II 1999; Johansson et al. 2003; Matthyssens and Vandenbempt 2008; Penttinen and Palmer 2007; Richter 2001; Roegner and Gobbi 2001; Stremersch et al. 2001; Turner 2009). These typologies (except the German) usually have a prescriptive attitude: the Component Seller position is the point of origin for transformations toward a Solution Provider. Due to the increasing commoditization of technical products and standardized services and due to the global division of labor, component markets are highly competitive. As a result, Component Sellers may be under pressure and want to escape from this ecological niche.

Example for B2B product components: Screws, chemical intermediates, gear parts

Example for B2B service components: Standardized information services, e.g. web hosting (cf. Engelhardt et al. 1993), standardized corporate loans

Mass Customizer

Firms find themselves in the fundamental dilemma between standardization (to benefit from positive economies of scale) and customization (to better meet customer needs, assuming that customers are willing to pay for it) (Lampel and Mintzberg 1996). Mass Customizers (Gilmore and Pine II 1997; Hart 1995; Pine II, Victor, and Boynton 1993) try to find the right balance between these two objectives by modifying those key attributes, whose variation generates the highest possible perceived benefit for the largest possible customer segment (Dellaert and Stremersch 2005; Franke, Keinz, and Steger 2009). In this vein, Mass Customizers identify customer requirements in a component / conventional style. However, they modify some modular *key features* of the offering (e.g. length of a hydraulic cylinder, number of processors for a server) and are thus able to meet customer requirements better without sacrificing economies of scale. They also pursue a mass marketing strategy during the other process steps (of course except customization) and thereby keep specific investments into individual customers low. The mass customization approach first appeared in B2C but is also applied to B2B offerings, including services (Jiao, Ma, and Tseng 2003). Mass customization requires a special production systems and product / service designs. In the B2B domain, this is typically achieved through modularization (Persson and Åhlström 2006; Schilling

2000; Stremersch et al. 2003), which easily allows several product / services configurations.

Example for mass-customized B2B products: Computer workstations, pneumatic actuators in lengths according to customer needs

Example for mass-customized B2B services: Web shop with customized elements (such as various payment options, interfaces to the ERP system (enterprise resources planning)), media planning

Resource Integrator

While the mass customizer modifies components in order to better meet customer requirements, the Resource Integrator combines several standardized product or services components into one offering (Davies et al. 2007; Hobday et al. 2005). The Integrator can be historically traced back to U.S military procurement processes during the time after the Second World War (Sapolsky 2003), e.g. rocket parts by Lockheed for missile projects of several allies (ibid). The Integrator's output delivers an integrative added value and might have other systems characteristics (e.g. complexity or hierarchical structure), but in contrast to the Systems Seller, the integrator aims at larger customer segments⁶⁵. Its main focus is the *process of integration*, i.e. the selection and coordination of internal and external resources (Davies et al. 2007). Integrators do not necessarily have their own production or service delivery facilities; they are usually not as vertically integrated as systems or solution sellers. Similar to Mass Customizers, Resource Integrators benefit from industry-wide standardization and modularization (Stremersch et al. 2003). This also applies to an increasing extent to standardized services (see “service oriented architecture” for IT-based services). Service-based Integrators also include providers for process outsourcing of support activities (e.g. Accenture, Cap Gemini).

Integrators can also be found in other typologies, e.g. by Davies et al. 2007; Doster and Roegner 2000; Johansson et al. 2003; Matthyssens and Vandembemt 2008; Penttinen and Palmer 2007; Roegner and Gobbi 2001).

⁶⁵ The German IT industry coined the term “Branchenlösung”. This is in most cases software that is customized to the needs of an entire industry.

Example for B2B tangible Integrators: Producers of aircraft engines (Brusoni, Prencipe, and Pavitt 2001)

Example for B2B service-based Integrators: BPO provider for accounting, data analysis or logistics

Remote Connector

As more and more products feature network connectivity, vendors can use these channels to maintain communication to the buyer even after the purchase. Technical realizations are so called *remote services*. The service provider can assist the customer remotely (e.g. with maintaining or repairing) or actively take control (Schumann et al. 2012; Wunderlich, v. Wangenheim, and Bitner 2013). Remote services are already integrated in wide range of products (such as remote maintenance in printing machines, remote diagnosis in vehicles) but also as a part of software (update services, remote desktop, etc.). Due to the bi-directionality of the connection, user behavior and hence further customer requirements can be analyzed if permitted (Breibach, Kolb, and Srinivasan 2013). The potential relationship value can be increased by means of better-suited cross- and up-buying offers, either as additional products or services (Ulaga 2003). Data generated by these connected objects also help to improve future generations of offerings (Brady et al. 2005).

These backchannel technologies can be part of customized, integrated solutions but they are increasingly common for standardized components too, in particular for software products. If the seller strikes the balance between customers' privacy concerns and technical feasibility, establishing connections to offerings at the customer's site is an innovative way to maintain and deepen relationships after purchase.

Example for connected B2B offerings: B2B smartphone apps

Modified Offerings

Mass Customizer, Resource Integrator, and Remote Connector share one characteristic: They avoid asset specificity. Consequently, they pursue a standardization strategy and try to address the largest possible customer segments. As the name already suggests, even the mass customizer does not adapt his offering

to the need of individual customers. The Integrator attempts to create added value by integrating standardized, modular components, but also by identifying and aggregating customer requirements beforehand. All this is realized within the capabilities of these firms; they avoid building or acquiring new competences in order to fulfill requirements of individual customers – unless these new skills can also be transferred to other customers⁶⁶. Similarly, these sellers do not undertake efforts to implement the offering at the customer's site and hence to ensure the functionality of the offering. This is up to the customer or special firms (e.g. SAP and its network of resellers, consulting and education partners).

Remote Connectors also belong to the category of *object modifiers*, since they can change some characteristics of the offering even after purchase (e.g. through firmware updates or software upgrades).

(One-off) Systems Seller

In contrast to object modifiers, the Systems Seller and the Solution Provider attach greater importance to specific customer needs: They identify requirements of individual customers and, if necessary, acquire the capabilities to meet these requests. The offering, an integrated bundle of products and / or services, is then cut-to-suit to the customer's requirements. The vendor implements the offering at the customer's site and makes sure that it delivers the promised benefit. The system is designed as a one-off project; a longer-lasting relationship that "follows" the customer's original problem and adapts the system to more recent requirements is not intended⁶⁷. Post-purchase activities are limited to warranty and repair, partially for legal reasons only. That does not mean that the customer relationship is terminated; but if it continues, it starts with a new offering.

⁶⁶ For example, Würth, a German manufacturer of screws, provided logistic services for key customers. This business was then separated into a new unit. Today, Würth Logistics is a service integrator that procures transport and logistic services without operating those (Würth 2013).

⁶⁷ In an interview in preparation of this thesis, a manager of a professional service firm considered this approach as the best possible embodiment of the solution *philosophy*: If the customer's problem is really solved, no post-purchase relationship is necessary.

As outlined in section 2.4.2, systems are predecessors to business solutions; they emerge in the pre-RM era, where the quality of customer relationships was considered important (as it has always been in industrial marketing) but not as an end in itself. However, not all offerings have to be integrated into long-term relationships, or customers do not want or need close relationships with their provider (Anderson and Jap 2005; Grayson 2007; Grayson and Ambler 1999). From the customer's perspective, *systems* are appropriate, if:

- The offering is “consumed” during delivery. This applies to many service-based complex offerings, when service production and consumption coincide (Grönroos 1982); e.g. for a one-time B2B advertising campaign.
- A third party can provide after-sales services, possibly at lower costs or higher quality. This is the case if 1) standardized technology and interfaces exist, which turn post-purchase product-supporting services – usually a suitable starting point for service strategies (see Oliva and Kallenberg 2003) – into commodities; or 2) access to customers is restricted, e.g. by resellers or other distribution partners. Thus, these constellations hinder Systems Sellers to become solution providers.
- A relationship with the provider requires specific investments, e.g. in form of long-term contracts. The customer remains more flexible with systems instead of solutions.

Examples for product-based B2B systems: Building projects, special machinery that can be maintained by third parties

Example for systemic B2B services: B2B advertising campaign (including production, media planning, etc.)

(Full) Solutions Provider

The key difference between the Systems Seller and the (full) Solution Provider is the embedment of solution offerings in long-term customer relationships (Azimont et al. 1998; Penttinen and Palmer 2007; Sharma et al. 2002; Tuli et al. 2007), which were not terminated once the solution was handed over. There are a number of possible activities in this post-deployment stage that enable the Solution Provider to create

additional value. Compared to the systems seller, the Solution Provider has a different mindset toward services, which features:

- A shift from reactive, input-based to proactive, output-based services (Challagalla et al. 2009; Ulaga and Reinartz 2011): instead responding to a failure (e.g. repairing a machine), the Solution Provider takes all necessary measures to ensure the contracted availability or a specific performance level. This requires information about the offering's current status, which can be accomplished by means of remote monitoring services. The value to the customer of this *downtime prevention* increases with the offering's importance to the customer's core business (Cohen et al. 2006).
- Additionally or alternatively: a shift from services to support the product (SSP) to services supporting the client (SSC) (Mathieu 2001), which goes along with taking over customer processes (Ulaga and Reinartz 2011), such as *managed services* for vehicle or truck fleets.

Post-deployment support activities are also imaginable for service-based solutions. This applies particularly for consulting services with operational elements or BPO solutions.

While the offering is part of the customer relationship history for the Systems Seller after deployment, it is part of present and future for the Solution Provider. The Systems Seller considers the underlying problem as static and solved after its implementation. From the Solution Seller's viewpoint, the customer's requirements toward the offering are dynamic and might develop or change. Consequently, the solution must be adapted to these evolving needs, for instance through updates, upgrades or additional offerings (e.g. trainings). Therefore, the Solution Provider must steadily track customer requirements, proactively seek feedback and inform the customer about functional improvements (Challagalla et al. 2009), also by using backchannel technologies.

These actions reflect the "benevolent" RM approach where customers are treated as partners and relationships are characterized by mutual trust, balanced power and shared goals (Morgan and Hunt 1994). However, firms can also enforce these relationships – or more precisely: lock up the customer – by means of proprietary

interfaces for hardware, software, or services, or through a “black-box” design. This practice is common for consumables (e.g. for printers or diagnostic devices, also see study II) or technical services (e.g. by using proprietary error protocols for engines).

The Solution Provider is included in a great number of typologies but is sometimes named differently (Backhaus 1997; Bennet et al. 2001; Davies et al. 2006; Doster and Roegner 2000; Hax and Wilde II 1999; Johansson et al. 2003; Matthyssens and Vandenbempt 2008; Penttinen and Palmer 2007; Roegner and Gobbi 2001; Stremersch et al. 2001; Turner 2009). The literature does not differentiate between systems and solutions as explicitly as the SPCM does. As described earlier, research on systems evolved to research on solutions as a result of the emergence of relationship marketing. A few conceptualizations, however, contain a “depth of relationship” dimension (Kleinaltenkamp 2001; Penttinen and Palmer 2007; Richter 2001).

Examples for product-based B2B solutions: MRI (magnetic resonance imaging) solution including scanner, IT infrastructure, training, proactive maintenance for guaranteed up-time; customized marine diesel engines with remote diagnosis services

Examples for service-based B2B solutions: Revenue management solution; complex data processing or warehousing

3 Study Ia: Configurations of Complex B2B Offerings - A Cross-Industries Perspective

3.1 Objectives of the Study

The objectives of study Ia are twofold: First, the Solution Process Chain Model (SPCM) is subjected to empirical testing. In the previous section, five independent dimensions based on relational processes according to Tuli et al. (2007) were identified (requirements definition, customization, integration, deployment, post-deployment support). Each dimension is represented by two opposing approaches to handle these processes, either in a component / conventional or a solution-oriented manner. This results in 32 different configurations that describe how B2B firms market their offerings. Out of these 32 configurations, five were identified as ideal types for complex B2B offerings (Mass Customizer, Resource Integrator, Remote Connector, Systems Seller and Solution Provider) plus a sixth, *component-oriented* type. The Solution Provider is expected to outperform other sellers of complex offerings with regard to functional added value, willingness to pay a price premium and perceived differentiation. The first two requirements for typology research by Doty and Glick (1994) are herewith met (identifying dimensions and ideal types, specifying relationships among constructs), the third – empirical testing – follows. Second, descriptive analyses of the configurations give insights into the prevalence of solution providers and other types of vendors of complex offerings.

3.2 Methodology

3.2.1 Methodological Considerations

It's like ten thousand spoons when all you need is a knife.

Alanis Morissette

Canadian singer (1974 -)

Configural Research: The Third Way

As outlined earlier, the academic B2B marketing research community is roughly divided in two camps: the qualitative-oriented interpretivists and quantitative-oriented positivists. However, there is a third way between these two research strategies: *configural research*⁶⁸ (Woodside 2010; Woodside and Baxter 2013) combines characteristics from both approaches. Interpretivist and configural research commonly consider cases as primary sources of knowledge; both aim at accuracy and explicitly allow several ways that lead to a goal (principle of *equifinality*, cf. Doty and Glick 1994). The key difference is the level of aggregation: Case study research goes down to the level of individual cases (or just one case), configural research focuses on groups of cases or characteristic patterns of attributes that several cases share. Ideally, the underlying data has the same *thickness* of qualitative material; the general study design, however, aims at generalization (figure 14). Configural research also offers statistical procedures to test hypotheses in a positivist way.

The configural approach and its methodological arsenal are particularly well suited for empirical typological research (Fiss 2007). Theory generation and testing are more closely connected (Fiss 2011) than in conventional qualitative and quantitative approaches since configural hypotheses are already formulated on the level of groups or patterns.

⁶⁸ One speaks of *configural* if special quantitative methods for analyzing configurations are involved, otherwise the expression *configurational* is used (von Eye 2002).

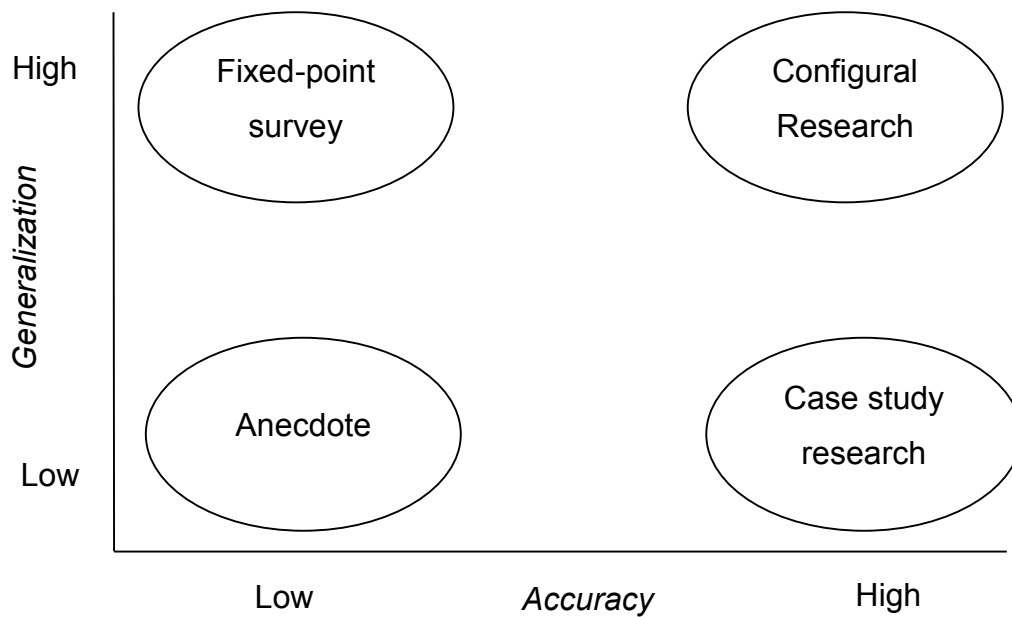


Figure 14: Comparative advantage of configural research (adapted from Woodside 2010)

An additional advantage is that these techniques can be applied to medium-sized samples (Ragin 2003, 2008). However, this led to the misconception that configural methods are appropriate for medium-sized samples *only*⁶⁹. In fact, there are limitations: the sample should not be too small; otherwise the risk of non-existing configurations increases; this might also occur in larger samples with unequal distributions. The sample should not be too large either; otherwise, the researcher loses familiarity with the research objects. Information on individual cases must be available; configural methods should not be applied to “anonymous” secondary data sets (Ragin 2003).

The number of published studies that apply special configural methods is still low in business research (Cheng, Chang, and Li 2013; Ganter and Hecker 2014), both in innovation research). While there are some dissertations (Meuer 2011; Vassinen 2012) and conference presentations (Frambach, Fiss, and Ingenbleek 2010; Frösén et

⁶⁹ In fact, the supposed suitability for medium-n samples results mainly from the gap between qualitative studies (multiple case studies with more than twenty research objects are rare) and quantitative studies (motto: the larger the sample the better). A guiding value is 50-500 cases.

al. 2013; Zacharias, Nijssen, and Stock 2012), there are no publications in the context of complex offerings so far⁷⁰.

Configural Methods to Test Typologies

Most empirical studies based on typologies suffer from a mismatch between theoretical foundations and methods of analysis (Fiss 2007). Cluster analysis, as an exemplary representative of quantitative methods, should not be used to “confirm” hypothesized instances of a typology or to provide types that need to be incorporated into the theoretical framework *a posteriori*. On the other side of the quantitative-qualitative continuum, case study research might help to create typologies on the basis of a limited number of entities that a researcher considers to be prototypical. CSR is also useful to identify real-world *examples* of theoretically hypothesized ideal types but in the end, qualitative methods are not capable to test typology frameworks in a positivist way.

Hence there is a need for a method – or more precisely: research strategy, since both theory building and testing are affected – that meets the following conditions:

- It is suited for theories that focus on *patterns* in the characteristics of empirical entities – in contrast to the focus on variables (see next chapter).
- It “accepts” hypotheses that propose the existence of specific prototypical entities.
- It provides statistical parameters for testing these hypotheses and for the decision whether a single entity shows a significant pattern in its characteristics or whether it emerges randomly.

These criteria are met by **Configural Frequency Analysis (CFA)**. As the name suggests, CFA aims at analyzing the frequency of certain *configurations* (von Eye 2002), i.e. multivariate combinations of constitutive dichotomous variables. For each configuration, the expected frequency is estimated beforehand using a *base model* that includes hypotheses and prior knowledge. If the observed frequency is

⁷⁰ Two conference presentations by the author of this thesis (Zimmer 2013a, 2013b) use configural methods (fsQCA and CFA).

significantly higher than the expectancy, the configuration constitutes a *type*; if it is significantly lower, we speak of an *antitype*. CFA has its roots in clinical psychology and medical science (Kieser and Victor 1999; Krauth and Lienert 1995; Lienert 1968) where it has been used to detect syndromes, i.e. patterns of co-occurring symptoms. Other areas of application are developmental and educational psychology⁷¹. So far, there has been no application of CFA in marketing journal publications.

Qualitative Comparative Analysis (QCA) also belongs to the family of configural methods (Ragin 1989, 2000, 2008; Rihoux 2006). Instead of conventional, probability-based statistics and linear algebra, QCA and its derivative fuzzy-set QCA rely on set membership and Boolean algebra. As a consequence, (fs)QCA is less suitable for research questions that focus on the frequency of patterns. However, a more important argument against QCA is the fact that this approach mandatorily involves causation, i.e. at least one of the variables that define the configural space has to be an outcome variable. CFA, in contrast, can be used for description *and* causation. A more detailed comparison between CFA and QCA can be found in the appendix (table a2).

Profile Deviation Analysis (PDA) has been used frequently in configurational studies (Doty and Glick 1994; Doty et al. 1993; Drazin and Van De Ven 1985). The researcher first formulates multivariate ideal types, mostly with regard to firm performance; then he examines how the deviation from the ideal profile affects the performance. The biggest challenge is the precise numerical, *a priori* definition of the ideal profiles. Taking these values out of the sample, e.g. the mean of the top ten percentile, contradicts the idea of pre-defined hypothesized ideal types. Unfortunately, this is common practice for PDA studies (cf. Fiss 2007). Furthermore, the present study does not primarily focus on fit in regard to an outcome variable.

For these reasons, CFA will be used in this study. Nevertheless, this approach also has some downsides; the most relevant is the restriction to categorical variables. This

⁷¹ These are the research fields of the main contributor to this method during the last 15 years, Alexander von Eye, which might explain the concentration of publications in this field.

disadvantage, however, is counterbalanced by the main benefit of this approach, the closeness to configurational theories: The most sensitive procedure in the empirical validation of typologies – setting up decision rules that assign cases to categories – is by far easier for discrete than for continuous data (especially if the latter are a result of index-building based on multi-item measurement). The resulting challenges, particularly for the measurement process, are discussed in chapter 3.4.1.

Variable vs. Person/Case/Pattern Approach

Quantitative research in social sciences is usually *variable-oriented*: hypotheses suggest either the influence of one or many independent variables on one or many dependent variables, or they imply mean differences between one or many variables⁷². Regression-based analysis methods aim at isolating the net effect of a single variable and maximizing the amount of explained variance. This corresponds to the epistemological goals of positivistic research, in particular the one of generalization. In variable-oriented research, the research objects (cases or persons) are merely seen as interchangeable carriers of information. At its best, the composition of the sample does not affect the result; procedures such as bootstrapping reflect this mindset (von Eye 2006).

In the nineties, an alternative approach in psychology and sociology (here particularly in comparative sociology and political science) was developed (Bergman and Magnusson 1997; Bergman and Trost 2006; Della Porta 2008; Ragin 2004; von Eye 2002). The *person or case-oriented approach*⁷³ focuses on patterns of individual characteristics (Bergman and Magnusson 1997); variables are only used to create profiles or configurations. Unlike the name suggests this case-oriented approach has little in common with the interpretivist qualitative case-*study* approach. There are conceptual overlaps with the postulates for *configural research* as outlined above. However, in this approach, configurations are always manifest, even though the membership of an individual case in a certain configuration can be *fuzzy*. In contrast,

⁷² Theories are of course not based on single variables but on hypothetical constructs. However, single variables come into play during operationalization and measurement.

⁷³ Depending on the research area, this approach bears different names (case-, person-, pattern-oriented)

general *pattern-oriented methods* also comprise latent approaches such as latent class or latent profile analysis (LCA, LPA; also see figure A1 for a synopsis).

According to von Eye and Bogat (2006, p. 394), studies for person/case/pattern-oriented research must meet three conditions:

1. “*A sample is analyzed under the assumption that it was drawn from more than one population*”: Groups exist and differ measurably. This can be done by a natural classification (e.g. male and female); or the method of analysis must allow for grouping data (LCA, CFA...).
2. “*Attempts are made to establish external validity of the groupings*”; e.g. by incorporating variables that not have been used for classification.
3. “*The groups are interpreted based on a theory*”: Meaning of a group must be defined a priori.

All three criteria are met in this study. The typology based on the SPCM predicts the existence of 32 configurations that in turn serve as input for the CFA. The CFA provides information about significant differences from the expected frequency based on the underlying base model. The results are then interpreted in regard to the typology and with the aid of the additional describing variables in the sample.

3.2.2 Configural Frequency Analysis

Basic Procedure

Any CFA includes five steps in which specific decisions must be made (von Eye 2002, p. 8):

1. Selection of a CFA base model that reflects the theoretical assumptions and predicts the estimated cell frequencies
2. Selection of a concept of deviation from independence
3. Selection of a significance test
4. Performance of significance tests and identification of types and antitypes
5. Interpretation of types and antitypes

CFA Base Models

The CFA base model predicts the estimated frequencies. Since types and antitypes emerge from discrepancies between predicted and actual frequencies, the base model must not predict the frequencies too exactly. In fact, it contains all main and interaction effects that are *not* of interest (i.e. it is saturated in these variables) and is expected to fail (von Eye 2002; von Eye and Mun 2012)⁷⁴. Association between variables can only arise because of main and interaction effects, that is, through local contingency (Havránek and Lienert 1984).

In the context of CFA, log-linear modeling is usually applied for the estimation of the frequencies (von Eye 2004):

$$\log E = X\lambda ,$$

where E is the array of the estimated frequencies; X is the design matrix, which reflects the base model, and λ stands for the vector of the model parameters (Christensen 1997; von Eye 2002). In contrast to “conventional” log-linear modeling, which aims at identifying the net effect of variables (and therefore belongs to variable-oriented methods), the use of log-linear models in CFA is limited to the prediction of frequencies; the model parameters – excepting the goodness-of-fit (GOF) indices – are not interpreted. The main advantage of log-linear models is the simple integration of interaction effects. These are incorporated into the model step-by-step: The zero order model takes into account only sample size and the number of configurations. The first order model adds the main effects of the variables. The second order model includes two-way interactions; the fourth order model integrates three-way interactions and so forth.

Since the model must not be saturated, the procedure stops when the GOF parameters indicate a fit. Then the next lower order model will be used for the identification of types and antitypes.

⁷⁴ This follows the same logic as χ^2 -testing in structural equation modeling.

$$\begin{array}{c}
 \text{first order model} \\
 \hline
 \begin{array}{c}
 \text{\#cells / n} \qquad \text{main effects} \\
 \hline
 \log E = \lambda_0 + \lambda_i^A + \lambda_j^B + \lambda_k^C + \lambda_l^D + \lambda_m^E \\
 \text{interaction effects} \left\{ \begin{array}{l}
 + \lambda_{ij}^{AB} + \lambda_{ik}^{AC} + \lambda_{il}^{AD} + \lambda_{im}^{AE} + \lambda_{jk}^{BC} + \lambda_{jl}^{BD} + \lambda_{jm}^{BE} + \lambda_{kl}^{CD} + \lambda_{km}^{CE} + \lambda_{lm}^{DE} \\
 + \lambda_{ijk}^{ABC} + \lambda_{ijl}^{ABD} + \lambda_{ijm}^{ABE} + \lambda_{ikl}^{ACD} + \lambda_{ikm}^{ACE} + \lambda_{ilm}^{ADE} + \lambda_{jkl}^{BCD} + \lambda_{jkm}^{BCE} + \lambda_{jlm}^{BDE} + \lambda_{klm}^{CDE} \\
 + \lambda_{ijkl}^{ABCD} + \lambda_{ijkm}^{ABCE} + \lambda_{iklm}^{ACDE} + \lambda_{jklm}^{BCDE} + \\
 + \lambda_{ijklm}^{ABCDE}
 \end{array} \right.
 \end{array}
 \end{array}$$

Formula 1: Exhaustive model including all possible interaction terms for five variables

Deviation from Independence, Choice of Significance Test, and α -Protection

For the decision, whether a configuration constitutes a type or antitype, the researcher has several options to choose from (von Eye 2002): binominal test (and approximations), χ^2 test (and approximations) and special tests for product-nominal sampling schemes where the probabilities for specific cells are determined by the research design, e.g. by a fixed female/male ratio. Besides the sampling scheme, other criteria are statistical power of the tests and computational effort (Krauth and Lienert 1995).

For this study, *exact binominal testing* was chosen. This non-parametric test is advantageous because it does not require any sampling distributions since all frequencies can be computed:

$$B_i(N_i) = \sum_{j=a}^l \binom{N}{j} p^j q^{N-j}$$

with $q = 1 - p$, and

$$a = \begin{cases} 0 & \text{if } N_i < E_i \\ N_i & \text{if } N_i \geq E_i \end{cases} \text{ and}$$

$$l = \begin{cases} N_i & \text{if } a = 0 \\ N & \text{if } a = N_i \end{cases}$$

Formula 2: Exact binominal test

Because larger sample sizes might lead to large binominal coefficients, exact binomial testing required a considerable computing capacity in the past; but this is no

longer relevant today. Binominal testing in the context of CFA is rather conservative, it tends to support the statistical null hypothesis (von Eye 2002; von Eye, Rovine, and Spiel 1995) and is hence more appropriate in a hypothesis-testing setting. In addition, exact binominal testing is suitable for both small and moderately large sample sizes and it is equally sensitive to types and antitypes (von Eye, 2002, p. 79-80).

Since several significance tests are performed repeatedly on just one sample, the α -level must be protected. This is for two reasons (Krauth and Lienert 1995; von Eye 2002): First, it cannot be excluded that the individual tests are intercorrelated, as shown for χ^2 tests (Steiger, Shapiro, and Browne 1985). Second, since every single test has its own error probability, there is a risk that some of the tests become significant purely by chance, without any possibility of knowing which (“capitalizing on chance”). The probability of committing an α -error, i.e. falsely rejecting at least one correct null hypothesis, increases dramatically with the number of configurations; in case of 32 independent tests with $\alpha = .05$ it will be $1 - (1 - .05)^{32} = .806$. There are several well-established ways to prevent this α -error accumulation. For the same reasons as stated above, the most conservative procedure, Bonferroni protection, is chosen (von Eye and Peña 2004):

Bonferroni $\alpha^* = \alpha / c$ (α^* = corrected α ; c = number of configurations)

Not to be confused with the significance tests for individual configurations is the global goodness-of-fit Pearson χ^2 value for the entire log-linear model.

3.3 Hypotheses

3.3.1 Hypotheses about Types in CFA

The purpose of the study is the empirical validation of the Solution Process Chain Model (SPCM). This model postulates the existence of certain patterns that describe how B2B companies shape their core offerings and the resulting customer relationship. The model is based on five process steps, each of which can be conceptualized as either solution-oriented or component-oriented (see chapter 2.5.6). The entire configural space thus consists of $2^5 = 32$ possible configurations.

However, the SPCM does not make statements about each configuration but only about those that can be expected because of their internal consistency. Such configurations are expected to occur more often than assumed and therefore to be types in the sense of the CFA. Inconsistent configurations, i.e. those in which the orientations of the individual process steps are in a theoretically justifiable contradiction should occur less often than expected. The expected values are predicted in the base model. The CFA is an iterative process, which incorporates more information from run to run into the base model. Therefore, the order of the model should be fixed a priori where deviances from the expectancy make sense from a theoretic perspective. The zero-order model (null model) does not consider any main effects of the process steps (R, I, C, D, P)⁷⁵, i.e. each configuration has the same expectation value of $n/2^k$. Hence, any significant deviation from the uniform distribution would lead to types and anti-types, regardless of the prevalence of – for instance – solution-oriented post deployment support. Therefore, the hypotheses are formulated on the first order level, i.e. including the main effects (= marginal totals of the specific process steps). Following this logic, a full Solution Provider would only constitute a type if the individual frequencies of the process steps R, C, I, D and P is taken into account. The same reasoning as for types also applies to hypotheses on antitypes. Hypotheses about the existence of antitypes should therefore not be confused with hypotheses on the non-existence of types. Consequently, the β -error does not change.

Caveat: Types in CFA do **not** emerge as a function of the **absolute frequency** of a configuration but always in relation to the cell frequencies of the underlying dimensions, in this case the component vs. solution approaches for each of the five relational processes. As a consequence, CFA types can have lower frequencies than other configurations that appear as often as predicted. Figuratively speaking: CFA only identifies “glitches” in the prediction matrix.

⁷⁵ Strictly speaking, the concepts of main and interaction effects come from the variable-oriented approach. They are used here because loglinear modeling is applied to compute the expected frequencies. In the course of analysis the variables lose their importance. The main and interaction effects are the summed cell frequencies of the specific combinations of characteristics (marginal totals).

If the following hypotheses suggest the existence of types and antitypes, they only refer to the use of these terms within CFA: Only statements about significant *differences between expected and empirical frequencies* are made. Thus the null hypothesis is always that the underlying base model accurately predicts the frequencies:

$$H_0: E[N_i] = E_i$$

with: $E[\dots]$ is the expectancy (for a certain base model), N_i indicates the observed frequency for configuration i (Dumouchel 1999)

These hypotheses are not to be confused with *existential hypotheses* in the sense of the predicate logic (this would be: *there is at least one configuration, for which applies...*; ergo $\exists c \in \mathbf{C} P(c)$). According to Popper existential statements are verifiable, but they do not meet the criterion of empirical falsifiability (Popper 1959): there is no singular strict existential statement that contradicts the sentence „there is at least one solution seller“. That could only do a *universal statement*: *there is no solution seller*. However, universal statements have a different connotation: this configuration could generally exist, but if it is not in the sample of this study, nothing has been proven so far (since it could emerge in a follow-up study). The hypotheses in this study are therefore probabilistic assumptions about frequencies, not deterministic statements about the existence of specific configurations.

The following hypotheses for types and antitypes are formulated on the basis of a first order model. The zero order model does not contain any information apart from sample size and the number of classification and is hence expected to fail immediately. The first order model additionally implies the mutual independence of all variables. If types and antitypes emerge, they do so because of local associations (i.e. interaction effects) between the variables. Since these interaction terms are not part of the typology – for example, in the sense of “types emerge due to the co-occurrence of solution-oriented deployment and post-deployment support” – the first order model is the last model that is expected to fail: the subsequent second order model, which contains all two-way interaction terms, is assumed to describe the estimated frequencies correctly. The same holds true for other higher order models:

Zero order model (not interpreted):	$\log E = \lambda_0$
First order model (misfit expected):	$\log E = \lambda_0 + \lambda_R + \lambda_C + \lambda_I + \lambda_D + \lambda_P$
Second order model (fit expected):	$\begin{aligned} \log E = & \lambda_0 + \lambda_R + \lambda_C + \lambda_I + \lambda_D + \lambda_P \\ & + \lambda_{RC} + \lambda_{RI} + \lambda_{RD} + \lambda_{RP} \\ & + \lambda_{CI} + \lambda_{CD} + \lambda_{CP} \\ & + \lambda_{ID} + \lambda_{IP} \\ & + \lambda_{DP} \end{aligned}$

Higher order models (including three and four-way interactions): not further pursued since fit for second order model already expected.

3.3.2 Type Hypotheses

The Solution Process Chain Model (section 2.5.6) predicts six *typical* approaches of how B2B companies market their core offering. These configurations are expected to appear more frequently than predicted based on the component/conventional vs. solution style execution of the underlying five relational processes *requirements definition, customization, integration, deployment, post-deployment support*.

Therefore, the emergence of the following **types** is expected:

- **H1a:** Configuration CCCCC = Component Seller; component (standardization) approach throughout all five processes
- **H1b:** Configuration CSCCCC = Mass Customizer, attempts to strike the balance between standardization and individualization
- **H1c:** Configuration CCSCC = Resource Integrator, assembles system-like offerings from standardized modules
- **H1d:** Configuration CCCCS = Remote Connector, deepens relationship through backchannel technologies
- **H1e:** Configuration SSSSC = (One-off) Systems Seller, provides systemic offerings that are not embedded into deep relationships
- **H1f:** Configuration SSSSS = (Full) Solutions Provider, offers customized, integrated solutions with comprehensive post-purchase support

with “C” referring to a conventional or component-oriented and “S” to a solution-oriented execution of the specific SPCM process.

All types are expected to emerge in the first order model because the SPCM claims the independence of all five dimensions, as theory does not predict the systematic co-occurrence of patterns across all (!) configurations⁷⁶.

3.3.3 Antitype Hypotheses

B2B vendors constantly face the fundamental decision between standardization and individualization, respectively the associated cost / benefit trade-offs, i.e. economies of scale vs. higher customer satisfaction and willingness to pay (Fornell et al. 1996; Franke et al. 2009; Lampel and Mintzberg 1996; Stäblein, Holweg, and Miemczyk 2011). Firms must choose a strategy on how to handle this tension and must allocate their resources accordingly. The aforementioned types represent *coherent* strategic decisions; these firms are expected to strike the balance between the standardization and customization. Thus, successful systems seller and solution provider should be able to enforce monetary compensation from their customers for their additional efforts during customer-specific requirements definition, customization, integration and deployment. Other configurations, however, are *incoherent*: There is no inter-strategy fit between the single processes of the SPC. This should primarily apply to configurations with the maximum number of changes between component and solution orientation. From a RBV perspective, these firms fail to align resources to de facto contradicting goals (organizational ambidexterity), namely those for *exploitation* (optimizing of routines, which equals standardization) and *exploration* (abandoning routines) (Duncan 1976; Gibson and Birkinshaw 2004; Tushman and O'Reilly III 1996).

Therefore the following configurations are expected to be antitypes; they should appear less frequently than the base rates of the underlying processes predict:

- **H_{2a}**: Configuration CSCSC

⁷⁶ The original concept by Tuli et al. (2007) combined customization and integration into one process. This could be such a hypothesis on higher order interactions. This question will be discussed later (without raising it to the rank of a hypothesis).

- **H_{2b}**: Configuration SCSCS

3.3.4 Outcome Hypotheses

As explained in section 2.4.9, solution selling is associated with a number of positive outcomes compared to other offerings: solution offerings are expected to have a higher functional value due to the processes of customization and integration (Sawhney 2006). In return, the customer is willing to pay a price premium for this functional added value. Solutions are also a means for the vendor to differentiate from the competition. Since full solutions are embedded in deep customer relationships, the quality of these relationships is expected to be better (Li 2011) than for other offerings. Solution Providers should outperform Systems Sellers and vendors of other modified offerings (Mass Customizer, Resource Integrator, and Remote Connector) on these dimensions while Component Sellers are expected to score lowest (Doster and Roegner 2000).

Hence, the following hypotheses assume a linear increase in the mean scores⁷⁷ from the pure Component Seller (configuration CCCCC) over the Modifier Configurations CSCCCC, CCSCC, and CCCCS, to the Systems Seller SSSSC and finally to the Solution Provider SSSSS for⁷⁸:

- **H_{3a}**: Functional value of the offering
- **H_{3b}**: Ability to achieve a price premium for the integration of single products and services into a solution
- **H_{3c}**: Uniqueness of the offering
- **H_{3d}**: Quality of customer relationship, in which the offering is embedded

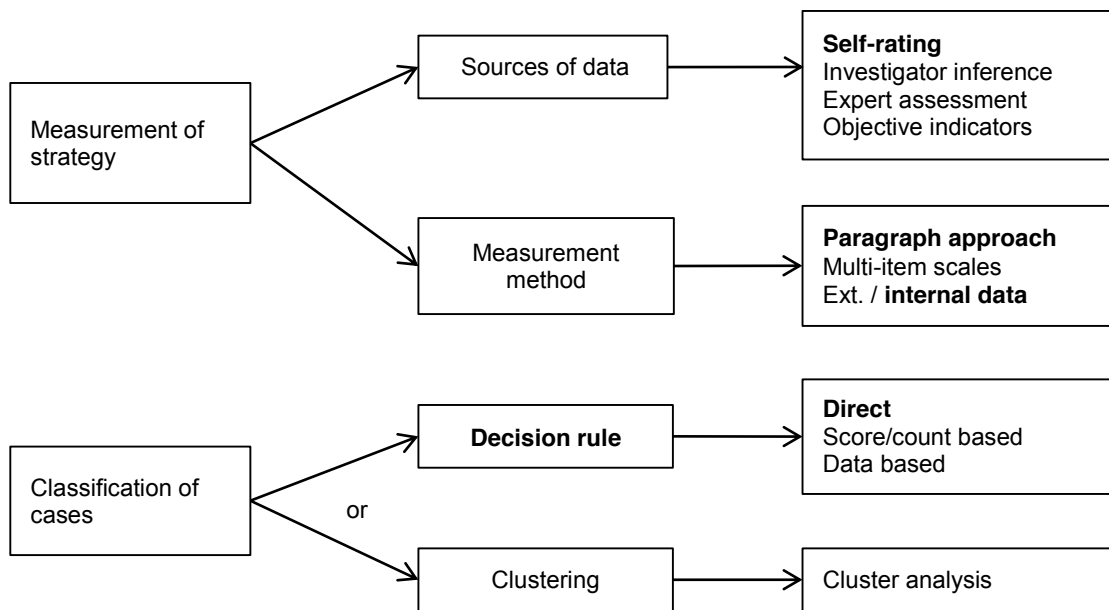
⁷⁷ $mean_{CCCCC} < (mean_{CSCCC} \text{ and } mean_{CCSCC} \text{ and } mean_{CCCS}) < mean_{SSSSC} < mean_{SSSSS}$

⁷⁸ All these outcomes will be later operationalized as perceptions from the sellers' perspective in relation to the competition.

3.4 Study Design

3.4.1 Basic Concept

Empirically testing a typology requires a number of decisions (Speed 1993): The first set of choices concerns the measurement strategy, the second set deals with the actual classification (figure 15).



Adapted from Speed (1993), decisions made for this study in bold

Figure 15: Operationalizing strategy typologies

The decision in favor of a configural approach determines a classification scheme using *decision rules* since the configural space is defined by theory prior to the data collection (in contrast to a clustering approach, where clusters are formed *a posteriori* based on empirical evidence). Defining the decision rules, however, reveals a dilemma: A major issue of classification studies is the handling of conflicting indicators, which regularly occur when multi-item scales are used⁷⁹ (Speed 1993). If cases with conflicting indicators are handled as remainders (i.e. as

⁷⁹ When items are aggregated using factor analysis, this issue occurs conceptually (not mathematically!) both on item and on factor level. This applies to non-classification studies as well, but leads here at worst to a poor factor solution. Since classification studies derive knowledge from cases instead of latent constructs, the consequences of a misclassification are more serious.

middle or residual category), the precision of the classification scheme and thus the clarity of the typology suffer. However, if these cases are assigned to one of the types without a sound empirical justification, the validity of the classification is jeopardized. For these reasons, conventional multi-item measurement is abandoned in favor of the so-called *paragraph approach* (Snow and Hrebiniak 1980; Speed 1993). Following this approach, participating managers were given two short scenarios (one for the C-style, one for the S-style approach) for each of the five SPC steps with the request to select the option that best describes their company. Companies are then assigned to one of the 32 manifest configurations based on these choices. The major drawback of this method is obvious: the scenarios are idealized, prototypical descriptions and might include facets that do not apply to the respondent's situation. Therefore, content and wording of the scenarios is crucial to reduce confounding issues. The main benefit of this approach lies in the fit between theory (in form of a typology), measurement process and analysis method. For this fit, however, a price must be paid: Condensing complex theoretical relationships into ideal-typical scenarios leads to a loss of accuracy during the measurement process, since real world phenomena often lie in-between (Speed 1993). In return, the underlying classification scheme is theory-compliant, explicit and transparent during the measurement process. It produces information about the membership in a specific configuration that can be directly analyzed by means of configural analysis without loss of information through factor analysis and index building.

In order to survey a large cross-section of B2B companies, self-reporting through an online survey was chosen.

3.4.2 Design Procedure

First, respondents read a more general scenario description mainly referring to standardization, which is put in front of the actual SPC scenarios (*requirements definition, customization, integration, deployment, and post-deployment support*). This scenario is not part of the configural space; instead, it serves as an opening question to make the respondents familiar with the scenario method.

Next, two contrasting scenarios were created based on the SPC typology for each process step: Scenario 1 represents the ideal-typical “conventional” vendor of

components or standardized services, whereas scenario 2 stands for a typical solution provider.

The scenarios do not describe the corporate strategy but the **offering that contributes most to sales of the company** (in the case of small or medium-sized companies) or of the strategic business unit (in the case of large companies) to account for the fact that companies – especially larger ones – might pursue different strategies at the same time (Prahalad and Hamel 1990; Storbacka et al. 2011), for instance, they sell single components but also integrate these into larger solutions⁸⁰. Therefore, the following rules apply:

- A small or medium-sized (SME) firm pursues a solution-approach if a solution offering has the largest share of sales⁸¹.
- In the case of larger enterprises, the classification is limited to the SBU or larger divisions. Since they operate strategically independent by definition, a spillover to other divisions or the existence of a company-wide solution strategy is possible, but not guaranteed.⁸²

Next, these scenarios were presented to six practitioners and three academic researchers, each with several years of B2B marketing experience. They were asked to comment on the scenarios and to give special attention to the balance of the formulations and the weights of the arguments. That is, both scenarios – the component and the solution version – should sound equally attractive. In particular, the solution scenarios are in danger of sounding more modern and more compatible

⁸⁰ This definitory issue – is a company a solution provider if it *also* or *mainly* sells solutions? – has not yet been addressed in research on business solutions. While publications on servitization, e.g. (Fang et al. 2008) focus on the *service ratio* of a company, i.e. a continuous variable; configural research requires an unambiguous classification of companies into categories.

⁸¹ The same applies to all other “intermediate forms” (Component Seller, Systems Seller, etc.). An alternative to turnover would be profit; however, the profitability of solutions is even harder to assess. A costly long-term service contract can jeopardize the profitability of a solution even after years.

⁸² Assuming the medical division of GE or Siemens would be classified as a solution provider. This implies neither that other company divisions also offer solutions, nor that an effective corporate strategy for solutions exists. Labeling GE or Siemens at corporate level as “solution sellers” is rather a question of definition than a matter of empirical facts.

with the *business zeitgeist*. Since there are good reasons not to pursue a solution strategy (see section 2.4.10), the C-style scenarios require a thoughtful wording.

The experts' feedback – mainly to wording, phrasing, and to the balance of both scenarios – was then incorporated into the questionnaire. The final questionnaire, including additional and control variables (see chapter 3.4.4), was then pre-tested with a sample of 79 business managers. Since the only criticism was referring to the high abstraction level, the introductory text and the explanation of the term *offering* have been revised. Due to these changes, the pretest sample is not part of the final sample.

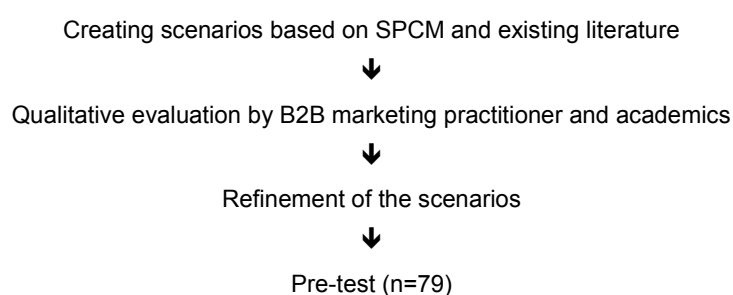


Figure 16: Survey design procedure

3.4.3 Survey Structure

The survey starts with a brief presentation of the aims of the study, followed by four screening questions (see table 10). Respondents were screened out if they indicated three or less points on at least one of the six-point rating scales for familiarity with the portfolio of offerings, sales processes, and typical customers. Only participants whose customers are mostly business customers were retained in the sample.

Then follows the explanation of the term *offering*⁸³. Respondents are instructed to relate their subsequent answers to the offering with the highest contribution to sales of the company (SME) or SBU (large enterprise). Subjects were then asked about their offering and about their company/SBU. These questions were adjusted to the size of the respective company. Respondents were asked to describe the offering in a few words and to indicate the typical sales price of this offering or the typical

⁸³ “*Offering* is an umbrella term for what you offer to your customers. This can be products, services or solutions.”

volume of projects based on this offering. They were also asked to assess the service ratio of the offering (percentage of sales price or project volume). Then follow questions on the sales structure for this offering (number of tiers) and about the number of persons that are typically involved in the sales process, both on the customer's and the vendors' side.

In the main part of the survey, subjects were presented two scenarios for each of the five steps of the SPCM, followed by additional exploratory items, which will later serve to describe the configurations. The participant is also given the opportunity to comment on the scenarios and the additional questions using text boxes.

Then respondents are requested to compare their offering with the competition concerning product and service quality, uniqueness, price, price/performance ratio, functional value, and quality of the customer relationship. The survey continues with questions about the company in which the participant works and about the professional background. On the last page the respondent has the opportunity to give feedback on the topic and the questionnaire.

Table 10 details the survey structure.

Introduction, purpose of the study
Screening questions <ul style="list-style-type: none"> • Familiarity with: <ul style="list-style-type: none"> – Portfolio of offerings – Sales processes – Typical customers • B2B vs. B2C customers
Explanation of the term <i>offering</i> Selection of the offering that contributes most to sales
Information about offering with the highest turnover <ul style="list-style-type: none"> • Description of the offering (open question) • Sales price or project volume (in EUR) • Service ratio (percentage of sales prices or project volume)
Information about sales structure and customers <ul style="list-style-type: none"> • Sales structure (tiers) • Size of buying center • Size of selling center (persons involved in selling)
Introduction to scenarios General scenario (standardized component vs. individual solution) + additional exploratory items + feedback option
Requirements definition (RD) + additional exploratory items + feedback option
Customization (C) + additional exploratory items + feedback option

Integration (I) + additional exploratory items + feedback option
Deployment (D) + additional exploratory items + feedback option
Post-deployment support (PDS) + additional exploratory items + feedback option
Outcome relative to competition (assessment by respondent) <ul style="list-style-type: none"> • Product quality • Service quality • Uniqueness • Price • Price/performance ratio • Functional value • Quality of the customer relationship
Information about respondent's company Industry, number of employees, turnover, sphere (local, regional, national, global), number of competitors
Personal information about respondent Department, hierarchy level, industry experience, years in this company
Feedback

Table 10: Survey structure of study I

3.4.4 Scales and Measures

The main part of the survey consists of the scenario descriptions for the five processes of the SPCM (requirements definition, customization, integration, deployment, post-deployment support), which is in turn based on the conceptual paper by Tuli et al. (2007). The verbalization of the scenarios in the survey is as close as possible to the original wording outlined in section 2.5.6. Figure 17 visualizes the basic idea; the full description including references can be found in part A of the appendix (tables A3-A8). The conventional / component approach is depicted on the left side (scenario 1), the solution approach on the right side (scenario 2) of the online survey page. Respondents were asked to mark their assessment of the situation *today* on a six-point bipolar scale. This procedure is repeated twice for the situations *five years ago* and *in five years* (figure 18).

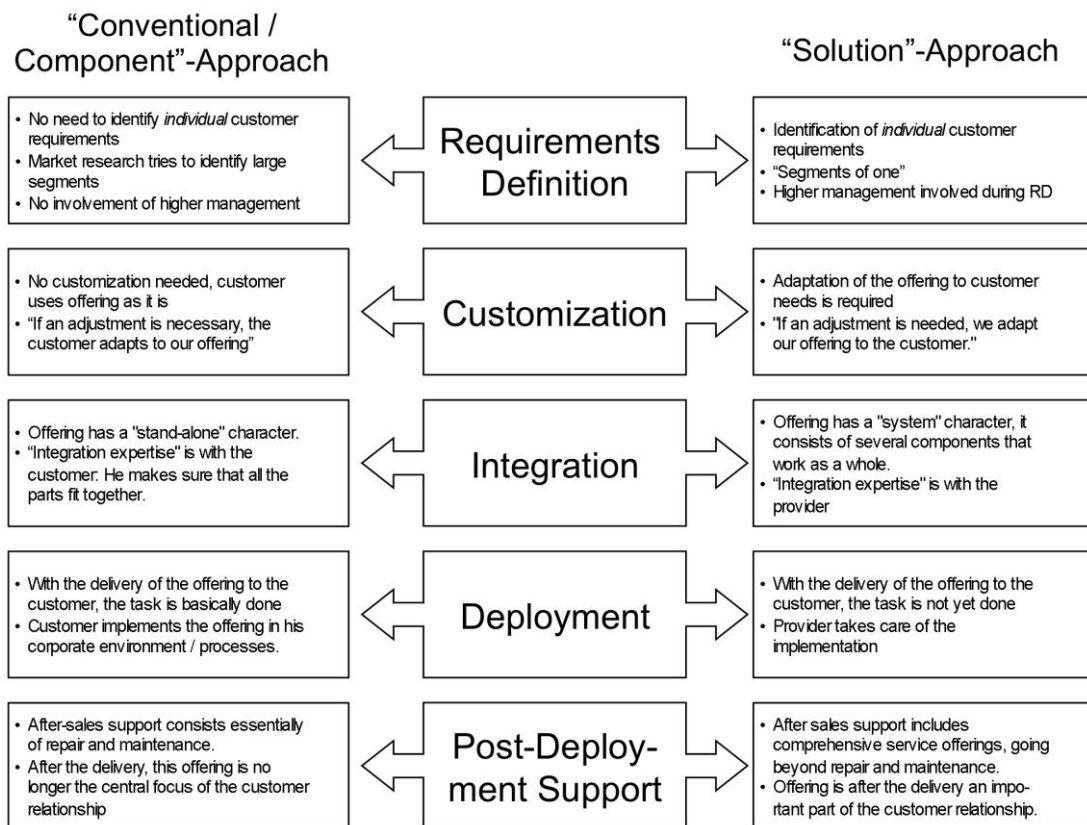


Figure 17: Scenarios descriptions

Several exploratory items follow the scenarios; they were excluded for two reasons: 1) Some of those focus on theoretical aspects that might distract respondents if they were included in the scenario (e.g. gestalt principle); 2) others only refer to a specific ideal type (e.g. data collection and processing for remote services in the case of the remote connector). If they were included, the scenario would not describe all configurations equally well.

Since the study pursues a pattern / case-oriented approach and neither the typology nor the derived hypotheses include latent constructs, multi-item measurement was not required; it even might have deteriorated the clarity of the typology as explained earlier. Instead, the scenarios, the additional exploratory and the outcome variables were measured using single items.

Please read each of the two scenarios carefully. Which of the two scenarios describes best the "offering" with the highest sales contribution?

If a scenario does not fully apply, choose a location closer to the center.

If the scenarios do not apply to your offering at all or if you want to give us further information about your assessment, please use the comment boxes below the scenarios.

<p>For our offering ...</p> <p>... we don't need to identify <i>individual</i> customer requirements.</p> <p>... no background information about <i>individual</i> customer problems is required.</p> <p>With our offering ...</p> <p>... market research tries to identify the requirements of preferably large <i>customer segments</i>.</p> <p>... customers are aware of their needs and the offering's requirements.</p> <p>... on the customer side, mainly the purchasing department is involved.</p> <p>... no additional in-house resources and skills are necessary to realize the customer request.</p>	<p>For our offering ...</p> <p>... we identify <i>individual</i> customer requirements.</p> <p>... background information about <i>individual</i> customer problems is required.</p> <p>...</p> <p>With our offering ...</p> <p>... market research tries to identify the requirements of <i>individual</i> customers.</p> <p>... the exact needs of the customers and their requirements of the offering have to be identified.</p> <p>... on the customer side, there are several specialist departments and - if necessary - the senior management involved.</p> <p>... the development of additional internal company resources and capabilities might be necessary to realize the customer request..</p>				
<p>Scenario 1 applies to us today. Scenario 2 applies to us today.</p>					
Fully Scenario 1	Basically Scenario 1	Rather Scenario 1 than 2	Rather Scenario 2 than 1	Basically Scenario 2	Fully Scenario 2
Scenario 1 has applied to us 5 years ago.		Scenario 2 has applied to us 5 years ago.			
Fully Scenario 1	Basically Scenario 1	Rather Scenario 1 than 2	Rather Scenario 2 than 1	Basically Scenario 2	Fully Scenario 2
Scenario 1 will apply to us in 5 years .			Scenario 2 will apply to us in 5 years .		
Fully Scenario 1	Basically Scenario 1	Rather Scenario 1 than 2	Rather Scenario 2 than 1	Basically Scenario 2	Fully Scenario 2
Comments					

Figure 18: Sample page from survey (requirements definition)

As shown by Rossiter and Bergkvist (Bergkvist and Rossiter 2007; Rossiter 2011a, 2011b), the predictive validity of “one good item” is as good as the corresponding multiple item option presupposed that the object and the attribute (= topic) are

specified and sufficiently concrete⁸⁴. Since these conditions cannot be checked statistically, experts should evaluate the items. That was accomplished, as described earlier, through pretesting.

⁸⁴ Rossiter (2011b) emphasizes that the decision in favor of a single-item measurement must be made prior to data collection (p. 46-47). He sarcastically notes that most studies referring to his 2007 paper (coauthored with Lars Bergkvist) obviously “postrationalize” a failed multi-item measurement.

3.5 Data Collection and Processing

3.5.1 Data Collection

Data were collected using an online questionnaire (QuestBack Enterprise Feedback Suite, EFS) in November and December 2012 over a period of three weeks. Since this study takes the vendor's perspective, managers were chosen as target persons to give information about management practices of their companies (cf. Homburg, Hoyer, and Fassnacht 2002a). Two online access panel providers, Research Now and Lightspeed Research, contributed their entire B2B panels for German manufacturing and service firms⁸⁵. Respondents needed to have an above-average knowledge (self-rated) about the portfolio of their firm's offerings, typical sales processes, and customers to qualify as *key informant* (Phillips 1981). As a result, 2290 of the initial 3946 participants were screened out (58.0%). Of the remaining 1656 respondents, 901 did not finish the survey (54.4%).

3.5.2 Data Screening and Preparation

Missing Values and "Speeders"

All rating-based items in the online questionnaire were compulsory; answers to feedback blocks were voluntary. Respondents should describe the core offering of their firms in a few words. However, 199 participants did not comply with this request and left the item unanswered; or they typed meaningless words or random character strings. 22 participants finished the survey in less than 200 seconds. Given the median duration of 613 seconds for completion, these persons were considered as "speeders". 22 persons had an EFS quality index value of below .10. The online survey tool computes this index by comparing the person's median time spent on each survey page to other participants (Questback 2012). The index ranges from 0 to 1.00; low values indicate cases with suspicious temporal patterns. Another 27 participants gave obviously incorrect answers, e.g. for the value of the offering (e.g., 0 EUR). Thus, a total of 228 cases were removed from the raw sample (= 755). Most

⁸⁵ The participants' IP addresses were saved and checked. One respondent was a member in both panels and was therefore removed from the sample.

of the removed cases showed several abnormalities (speeding, low quality index, no offering indicated).

Outliers

Multivariate outlier detection was applied (Tabachnick and Fidell 2007), based on self-reported outcome variables. Even though 12 cases had χ^2 -values above the critical value of 24.32 ($p < .001$, $df = 7$), the cases did not display any suspicious response patterns and were consequently retained⁸⁶. The SPSS anomaly detection routine (DTECTANOMALY) did not detect any suspicious cases. Since the study aims at covering as many different offerings as possible, the offering value (or project value) has an extraordinary wide span by nature (see below for sample description) and was therefore not included into outlier detection.

Thus, **the final sample comprises 527 cases.**

There are no computational rules (e.g. based on effect size) for optimal sample sizes for multiway categorical analysis. The recommended size (Tabachnick and Fidell 2007) is five times the number of cells in the design ($32 \times 5 = 160$), this lower limit is clearly exceeded.

Dichotomization and Testing the Extreme Configurations

Each case was assigned to one of the 32 configurations using the dichotomized scenario items (score 1-3: C-style; 4-6: S-style). Since an alternative explanation for the occurrence of the “extreme” configurations CCCCC and SSSSS are response patterns caused by speedy respondents, *t*-test were carried out with the DVs *time to complete* and *quality*. In the case of the configuration CCCCC (against the rest of the sample), *time to complete* was not significant (*Welch-T for inhomogeneous variances* = -.44; $df = 31.65$; $p = .67$), *quality* was significantly lower than for other configurations ($mean_{CCCC} = .43$; $mean_{rest} = .52$; $T = 2.47$; $df = 525$; $p < .01$); albeit on a non-critical level (critical *quality*-values are below .10). The SSSSS configuration did not significantly differ from the rest of the sample in terms of *time*

⁸⁶ Regression of the outcome variables as IV and a dummy variable (participant ID) as dependent variable was conducted. The χ^2 -values of the residual Mahalonobis distances are uncorrelated with *time to complete survey* ($r = .003$; $p = .94$) and *quality index* ($r = .001$; $p = .99$) for the so far adjusted sample.

to complete ($T = -.31$, $df = 525$, $p = .76$) and quality (Welch-T for inhomogeneous variances = .73; $df = 491.79$; $p = .46$).

3.5.3 Method effects

Since all answers stem from one source and were collected using the same survey, common method bias (Podsakoff et al. 2003) and particularly single source bias (Campbell and Fiske 1959) cannot be excluded. *Harman's Single Factor Test* produces a forced one-factor solution that explains 27.79% of the variance (all scenarios, descriptive and outcome variables), which can be regarded as non-critical. Even if the strongest single factor or an unrelated marker variable (number of competitors) is partialled out (Lindell and Whitney 2001), significant correlations among the variables of interest still exist. These procedures have been criticized heavily (MacKenzie and Podsakoff 2012; Podsakoff et al. 2003) and can neither confirm nor disconfirm a potential common method bias. Despite their drawbacks, they give no clear indication of problems with common method bias in this study.

As data was collected by means of two access panels, the number of non-respondents and the response time to the invitation to participate in the survey is not available. For this reason the usual (and disputed) comparison of early and late respondents for the detection on non-response bias (Armstrong and Overton 1977; Kanuk and Berenson 1975) cannot be conducted.

3.5.4 Sample Description

The median value of the core offering, respectively the project volume is $md = 3,000$ EUR⁸⁷. The service share of the offering is $md = 50\%$ ($mean = 5.50$; $sd = 3.12$; 0 – 10 rating scale). The companies in the sample have on average $md = 150$ employees and an annual turnover of $md = 23$ million EUR. 91 % of the companies have a local focus for their business, 73% a regional, 66% a national and 49% an international

⁸⁷ $mean = 1,545,000$ EUR, $sd = 1,8251,400$ EUR. Outliers are e.g. large infrastructure projects for several hundred million EUR.

focus (multiple answers allowed; 12% have more than one focus). The companies have on average $md = 6$ competitors⁸⁸.

The companies use direct sales as their main distribution channel (62%), followed by one-tier (11%) and two-tier distribution (9%). Five percent of the companies have three or more stages and 13% use multiple channels with varying number of tiers. Most of the companies have small buying centers (2 – 4 persons) on the customers' side (34%), 13 % sell to just one person, 24% to 5 – 9 persons and 19% of the companies have to deal with large buying centers (10 or more persons). Selling is also organized in teams: 2 – 4 persons are in 45% of the companies involved in selling an offering, 22% have teams of 5 – 9 persons, 18% have large selling centers (10 or more persons). Just one sales person is responsible in 11% of the cases.

The respondents have $md = 10$ years of professional experience and have been working for $md = 9$ years for the current company. Most of the respondents belong to the general management (25%) or sales department (16%; for other affiliations see appendix). 25% of the participants are on a lower hierarchical level (task execution), 16% are team leaders, 36% belong to the middle management and 23% to the top management level.

⁸⁸ The number of competitors does not significantly correlate with company size (employees, SBE status) and degree of standardization of the offering.

3.6 Results: Static View – Current Situation

3.6.1 Software

Three computer programs were used to perform the CFA (also see Lautsch, von Eye, and von Weber (2003)):

- Configural Frequency Analysis, Revision 2008 (von Eye 2007, 2000, 2001). This is a Fortran-based program for Windows, written by one of the main authors in the field of CFA. It was used for testing the base models, GOF indices, and descriptive measures (RR, $\log P$) and composite tests.
- CFA package for R, version 0.9-2 (Funke et al. 2011), used for hierarchical CFA, bootstrapping CFA, and cross-checking conventional CFA results
- SPSS 19 + 20 (module GENLOG), used for stepwise, variable-oriented log-linear models and GOF indices
- Customer dialogue CFA for SPSS by Grüner (Grüner 2011). This dialogue builds upon the SPSS GENLOG module; it was used for cross-checking CFA results and the design matrices.

All programs for standard CFA use log-linear modeling based on the Newton-Raphson algorithm (IBM 2012; von Eye 2002) for the prediction of the estimated cell frequencies and GOF indices and come exactly to the same results. Hence, partial results from different programs can be combined. Additional computations to assess the external validity and to describe the types and antitypes (von Eye, Mair, and Mun 2010) were carried out with SPSS.

3.6.2 Numerical Results of the Confirmatory CFA Base Model Tests

Zero Order Model

As expected, the zero order model $\log E = \lambda_0$ fails ($\chi^2 = 2698.07$; $df = 31$; $p < .001$).

Since it does not include any information except of sample size and number of configurations, it will **not** be interpreted.

Zero order model				
Bonferroni-adjusted $\alpha = .00156250$; exact binominal testing				
Configuration	f_0	f_e	p	
CCCCC	32	16.47	.00035281	Type
CCCCS	7	16.47	.00686743	
CCCSC	2	16.47	.00000878	Antitype
CCCSS	4	16.47	.00023917	Antitype
CCSCC	11	16.47	.10172723	
CCSCS	7	16.47	.00686743	
CCSSC	5	16.47	.00086776	Antitype
CCSSS	11	16.47	.10172723	
CSCCC	14	16.47	.32183381	
CSCCS	2	16.47	.00000878	Antitype
CSCSC	0	16.47	.00000005	Antitype
CSCSS	7	16.47	.00686743	
CSSCC	12	16.47	.15978153	
CSSCS	7	16.47	.00686743	
CSSSC	10	16.47	.05987414	
CSSSS	15	16.47	.41876741	
SCCCC	7	16.47	.00686743	
SCCCS	1	16.47	.00000097	Antitype
SCCSC	2	16.47	.00000878	Antitype
SCCSS	1	16.47	.00000097	Antitype
SCSCC	11	16.47	.10172723	
SCSCS	4	16.47	.00023917	Antitype
SCSSC	3	16.47	.00005287	Antitype
SCSSS	10	16.47	.05987414	
SSCCC	18	16.47	.38414950	
SSCCS	7	16.47	.00686743	
SSCSC	4	16.47	.00023917	Antitype
SSCSS	22	16.47	.10715157	
SSSCC	31	16.47	.00072577	Type
SSSCS	21	16.47	.15605174	
SSSSC	20	16.47	.21884071	
SSSSS	219	16.47	.00000000	Type
$\chi^2 = 2698.07$	$df = 31$	$p < .001$	$n = 527$	

Table 11: Zero order CFA Model

First Order Model

The first order model includes the main effects of the solution process steps by taking marginal totals into account:

$$\log E = \lambda_0 + \lambda_R + \lambda_C + \lambda_I + \lambda_D + \lambda_P$$

Marginal Totals		
	Conventional	Solution
Requirements Definition	146	381
Customization	118	409
Integration	130	397
Deployment	192	335
Post Deployment Support	182	345

Table 12: Marginal totals, 1st order

The null hypothesis for the first order model must also be rejected ($\chi^2 = 1329.90$; $df = 26$; $p < .001$). Since the second order model, which includes the first order interaction terms, fits ($\chi^2 = 25.15$; $df = 16$; $p = .07$), the first order model is used for interpreting types and antitypes. As the first order model is saturated in the main effects, the emerging types and antitypes stem from local association (= interactions) between the process step variables.

Model Fit			
	Zero order	First order	Second order
Information	Sample size + Number of configurations	+ All main effects (R, C, I, D, P)	+ All 1 st order interaction effects (R x C, R x I, R x D, ...)
Pearson χ^2	2698.07	1329.90	25.15
<i>df</i>	31	26	16
<i>p</i>	< .001	< .001	.07

Table 13: Model fit of the CFA base models

First Order CFA Model for Configuration of Complex Offerings

Bonferroni-adjusted $\alpha = .0015625$; exact binominal testing

Configuration	f_0	f_e	p	Type	Hypothesis			Descriptive Measures				
					pred.	conf.	Boot.	Rel. Risk	Rank	log P	Rank	
CCCCC	32	1.02	.00000000	T	T	✓	10000	31.54	1	35.65	1	
CCCCS	7	1.92	.00360394		T	-		3.64	3	2.43	9	
CCCSC	2	1.77	.52866500					1.13	11	0.29	29	
CCCSS	4	3.36	.43221121					1.19	9	0.39	27	
CCSCC	11	3.10	.00036168	T	T	✓	10000	3.55	4	3.42	6	
CCSCS	7	5.87	.37328542					1.19	10	0.47	25	
CCSSC	5	5.41	.54468450					0.93	15	0.28	30	
CCSSS	11	10.25	.44828032					1.07	14	0.45	26	
CSCCC	14	3.52	.00001776	T	T	✓	9998	3.98	2	4.71	4	
CSCCS	2	6.67	.03720918					0.30	26	0.47	24	
CSCSC	0	6.14	.00208682		AT	○		0.00	32	0.00	32	
CSCSS	7	11.63	.10426783					0.60	17	0.48	23	
CSSCC	12	10.74	.38938042					1.12	12	0.51	22	
CSSCS	7	20.36	.00051049	AT			9868	0.34	25	2.06	11	
CSSSC	10	18.74	.01931018					0.53	18	1.01	18	
CSSSS	15	35.52	.00005626	AT			9998	0.42	20	3.06	7	
SCCCC	7	2.65	.01845522					2.64	5	1.73	15	
SCCCS	1	5.02	.03915400					0.20	30	0.37	28	
SCCSC	2	4.62	.15933296					0.43	19	0.20	31	
SCCSS	1	8.76	.00144762	AT			9927	0.11	31	1.20	17	
SCSCC	11	8.09	.19122394					1.36	8	0.76	20	
SCSCS	4	15.33	.00058864	AT	AT	✓	9952	0.26	27	1.83	14	
SCSSC	3	14.11	.00038494	AT			9952	0.21	29	1.88	13	
SCSSS	10	26.74	.00014597	AT			9997	0.37	24	2.60	8	
SSCCC	18	9.18	.00597707					1.96	7	2.21	10	
SSCCS	7	17.40	.00379677					0.40	22	1.41	16	
SSCSC	4	16.01	.00034361	AT			9956	0.25	28	2.01	12	
SSCSS	22	30.35	.06599876					0.73	16	0.85	19	
SSSCC	31	28.03	.30772625					1.11	13	0.70	21	
SSSCS	21	53.13	.00000015	AT			9998	0.40	23	5.22	3	
SSSSC	20	48.90	.00000101	AT	T	-	9999	0.41	21	4.55	5	
SSSSS	219	92.70	.00000000	T	T	✓	9999	2.36	6	28.26	2	

$\chi^2 = 1329.90$ $df = 26$ $p < .001$ $n = 527$ 10,000 bootstrapping drawings

Table 14: Zero order CFA model

As can be seen in Table 14, the following types and antitypes can be identified:

- CCCCC = (pure) Components Seller as proposed by hypothesis H_{1a}
- CCSCC = Resource Integrator (H_{1c})

- CSCCC = Mass Customizer (H_{1b})
- SSSS = (Full) Solution Provider (H_{1f})
- Antitype SCSCS as proposed by hypothesis H_{2b}

These types and antitypes do **not** emerge, hence these hypotheses are not supported:

- CCCCC = Remote Connector (H_{1d})
- SSSSC = (One-off) Systems Seller (H_{1e}) is an expected type but emerges as an antitype.
- Antitype CSCSC (H_{2a}). In fact, the sample does not contain a single case with such a configuration, but the expected frequency for this configuration was already low. However, the hypothesis must be formally rejected.

In order to check the sample-specificity, data were re-analyzed using bootstrapping. Significant results could be replicated for nearly all 10,000 drawings, only the (not expected) antitype CSSCS emerges less frequently than other antitypes.

The descriptive measures⁸⁹ Relative Risk Ratio (RR, f_o / f_e) and $\log P$ ($\log f_o - \log f_e$) both identify CCCCC (pure Components Seller) as the configuration with the largest discrepancies between empirical and expected frequencies, followed by the Solution Provider (SSSSS) respectively the Mass Customizer (CSCCC). As outlined earlier, types and antitypes do not reflect the *absolute* configural frequencies. The Solution Provider is in fact the most frequent configuration (41.6% of all cases) and emerges even more frequent than estimated. However, the third largest configuration (behind Solution Provider and Component Seller) SSSCC can be found about as often as expected and is hence inconspicuous in the CFA sense.

The majority of the unexpected configurations are antitypes. Most of these emerge in configurations with solution-style requirements definition followed by a component-oriented customization (ergo standardization). A second striking pattern emerges around the SSSxx configurations including the hypothesized Systems Seller type,

⁸⁹ They are *descriptive* because they are not based on distributional assumptions. RR and $\log P$ tend to describe different characteristics for large estimated frequencies (von Eye 2002). $\log P$ (or *partition coefficient*) is an established measure in chemistry to describe the concentration of a mixture.

which was, however, identified as an antitype. The SCxxx and SSSxx “conflicts” will be interpreted later in section 3.7.2.

Composite Confirmatory Testing

The first order model produces a set of types and antitypes: among these, some were expected, others not; some that were expected did not surface. Since the hypotheses were formulated as a coherent set (same null hypothesis, same sample), they must be tested set-wise. Therefore, Stouffer z for combined tests is computed (Hedges, Cooper, and Bushman 1992; von Eye 2002), whose primary area of application is meta-analysis⁹⁰.

$$z = \frac{\sum_{i=1}^t Z_i}{\sqrt{t}}$$

for:

$$Z_i = \frac{N_i - Np}{\sqrt{Npq}}$$

with: N_i = observed cell frequency of configuration i , Np = estimated cell frequency, $q = 1 - p$, and t the number of cells tested, assumption of independent z_i and normally distributed z (von Eye 2002).

Testing the whole set of type and antitype hypotheses ($H_{1a-f} + H_{2a+b}$) produces highly significant results (Stouffer $z = 17.41$; $p < .001$), the same holds true for the type hypotheses H_{1a-f} only (Stouffer $z = 22.32$; $p < .001$) and the antitype hypotheses H_{2a+b} only (Stouffer $z = -3.84$; $p < .001$). Thus, **the hypothesis framework can be considered confirmed as a whole**. This also includes configuration CCCCS (connected offerings) and the hypothesized antitype CSCSC, even though both cannot be confirmed in the individual (local) tests.

⁹⁰ Stouffer z has received criticism; however, most of the criticism is limited to meta-analysis, e.g. publication bias (Darlington and Hayes 2000). Other procedures (Hedges et al. 1992; Kraemer and Andrews 1982) rely on variance-based effect sizes and are thus non applicable to categorical data.

3.6.3 Checking for Redundant Configurational Attributes

If a configurational variable does not contribute to the explanation of variability, i.e. reducing global χ^2 , it can suppress other variables and prevent configurations to exceed the threshold to become a type or antitype. Two procedures can be applied for detecting superfluous attributes: pattern-oriented hierarchical CFA (hCFA) and variable-oriented hierarchical general log-linear regression analysis.

The hierarchical CFA provides information about combinations of variables that contribute most to the overall χ^2 -reduction by recursively eliminating one variable (Funke et al. 2011; Krauth and Lienert 1995). Global χ^2 tests are then computed for all possible sub-tables. Table 15 shows the most effective combinations in descending order.

Hierarchical CFA						
Process Steps				Overall χ^2	df	Order
R	C	D	P	628.43	11	4
R	I	D	P	604.17	11	4
R	C	I	D	598.81	11	4
C	I	D	P	569.78	11	4
R	C	I	P	501.58	11	4
I	D	P		324.93	4	3
C	D	P		298.39	4	3
R	D	P		295.13	4	3
R	C	D		263.37	4	3
R	C	I		246.43	4	3
R	C	P		228.35	4	3
R	I	D		206.01	4	3
C	I	D		197.66	4	3
D	P			176.02	1	2
R	I	P		166.66	4	3
C	I	P		162.18	4	3
R	C			116.92	1	2
I	D			72.81	1	2

All elimination steps are significant on a $p = .001$ level
 Only 18 out of 26 combinations are shown, the remaining are n.s.

Table 15: Results of the hCFA

The five quadruple variable combinations (4th order) explain most of the variability. The decrease in overall χ^2 -reduction is smaller for any lower order combination than

for eliminating one variable in the 4th order steps. Thus, all five process elements of the SPCM should be retained in the analysis.

Hierarchical general log-linear regression can be used to determine the best fitting model for frequency estimation (Agresti 2002; Azen and Walker 2010). In contrast to conventional, causative logit models, *general* log-linear regression models detect relationships between categorical variables without a dependent variable⁹¹. As shown above (table 13), the second order model, which includes all pairwise interactions, describes the data sufficiently. In contrast to CFA, model fit is desired in log-linear modeling.

General Log-linear Model Including Main Effects and Pairwise Interactions				
Parameter	log odd ratios	s.e.	Z	p.
Constant	5.35	.07	80.25	< .001
R	-2.21	.18	-12.19	< .001
C	-2.74	.22	-12.62	< .001
I	-2.28	.19	-12.25	< .001
D	-2.15	.18	-11.94	< .001
P	-2.01	.18	-11.88	< .001
C * D	0.86	.30	2.85	< .01
C * I	0.49	.27	1.79	.07
C * P	0.46	.30	1.55	.12
R * C	1.88	.25	7.39	< .001
I * D	1.12	.27	4.13	< .001
D * P	2.35	.24	9.85	< .001
R * D	0.58	.28	2.05	.04
I * P	0.54	.27	2.02	.04
R * I	0.81	.26	3.13	< .01
R * P	0.56	.28	2.02	.04
LR χ^2 (G^2) = 25.84	df = 16	p. = .06	n = 527	
Pearson χ^2 = 25.15	df = 16	p. = .07		

Table 16: General log-linear model to detect variable-oriented associations

The main effects are usually not interpreted if interactions exist (Azen and Walker 2010; von Eye and Mun 2013). Each of the five process variables is included in the interaction terms and should therefore remain in the analysis. The final equation is:

⁹¹ In fact, there are several „auxiliary“ DVs during the estimation process, namely the expected cell frequencies. The overall model, however, does not contain a DV.

$$\log E = \lambda_0 + \lambda_R + \lambda_C + \lambda_I + \lambda_D + \lambda_P + \lambda_{RC} + \lambda_{RI} + \lambda_{RD} + \lambda_{RP} + \lambda_{CD} + \lambda_{ID} + \lambda_{IP} + \lambda_{DP}$$

The interaction C*I is not significant. The lack of association between these variables and the confirmation of the hypothesized types Mass Customizer and Resource Integrator support the decision to handle customization and integration as two separate processes, as opposed to in the original framework by Tuli et al. (2007). Interpreting the remaining interaction effects and linking these to the research questions is challenging, particularly because these expressions are additive; thus they must be viewed as a whole. Since this study pursues a pattern-oriented approach, the results of variable-oriented log-linear modeling will not be inspected any further.

3.6.4 Outcome Hypotheses

The outcome hypotheses H_{3a-d} suggest linear increasing ordered effects for the type configurations from components seller to solution provider regarding functional value, customer's willingness to pay a price premium, perceived uniqueness and relationship quality. To test these hypotheses, analyses of variance (ANOVA) with a priori contrasts are applied. Prior to the analyses, the sample was resized to the six originally hypothesized type configurations (303 out of 527 cases, 57.5 %), respectively to the actual four types (276 out of 527 cases, 52.4%), because SPSS computes the Levene statistics for homogeneity of variances for the entire sample and not only for those factor groups included in the contrast analysis. In both sub-samples, only the relationship variable has inhomogeneous variances; homogeneity can be assumed for all other variables. Outcome variables are bipolar 6-point single item ratings (inferior vs. superior in comparison to competition), except achieving a price premium, which is measured using a unipolar 6-point single item.

Table 17 shows the contrast weights. The Object Modifier configurations (CCCCS, CCSCC, and CSCCC) are grouped, i.e. they are contrasted jointly against the Component Seller and the Solution Provider.

Contrast Weights for Testing Outcomes Depending on Configurations						
Configurations	CCCCC	CCCCS	CCSCC	CSCCC	SSSSC	SSSSS
Hypothesized Types Sub-Sample						
Contrast Weights	-1	-0.5	-0.5	-0.5	1	1.5
n	32	7	11	14	20	219
Confirmed Types Sub-Sample						
Contrast Weights	-0.5	n.a.	-0.25	-0.25	n.a.	1
n	32	n.a.	11	14	n.a.	219

Table 17: ANOVA contrast weights for outcome tests

In comparison to other vendors, Solution Providers are convinced that their offering has a higher functional value (H_{3a}) than the direct competition. There is a significant linear contrast effect for the original type set ($t = 3.37$; $df = 297$; $p < .01$) and a highly significant effect for the confirmed types set ($t = 5.00$; $df = 272$; $p < .001$).

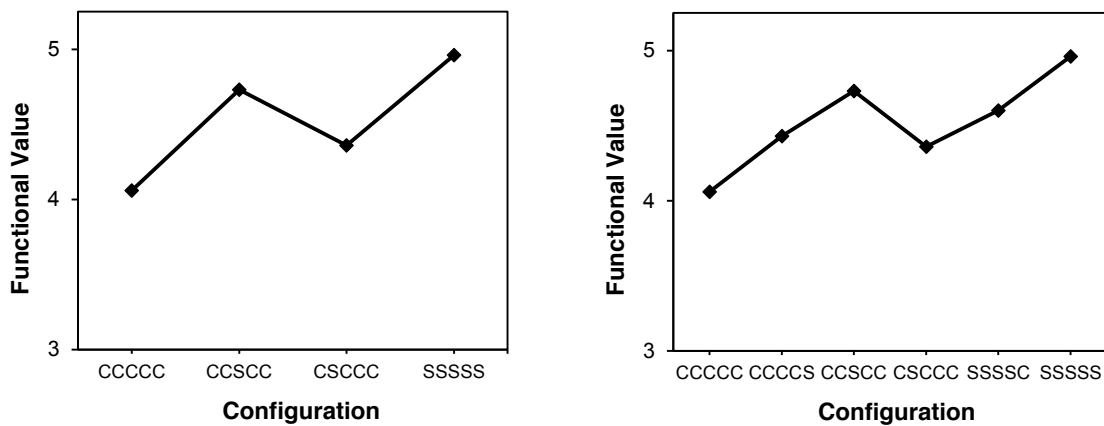


Figure 19: Mean plots for relative functional value

Solution Providers can achieve a price premium with customers (H_{3b}) as the significant linear contrast effect for both the original type set ($t = 5.03$; $df = 297$; $p < .001$) and for the confirmed types set ($t = 6.38$; $df = 272$; $p < .001$) reveals.

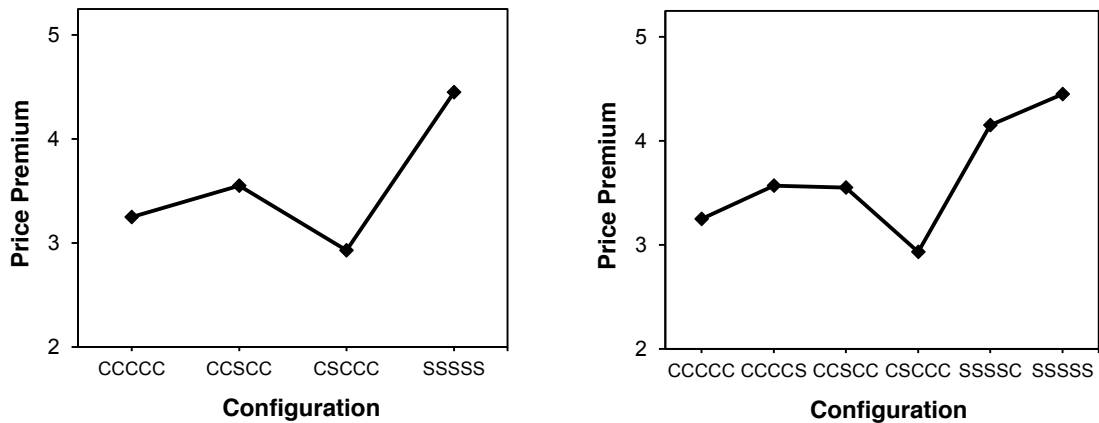


Figure 20: Mean plots for the provider's ability to achieve a price premium

Vendors of solution offerings can better differentiate from the competition than other types (H_{3c}). Linear contrast analysis produces a significant result for the original type set ($t = 2.83$; $df = 297$; $p < .01$) and a highly significant result for the confirmed types set ($t = 4.74$; $df = 272$; $p < .001$).

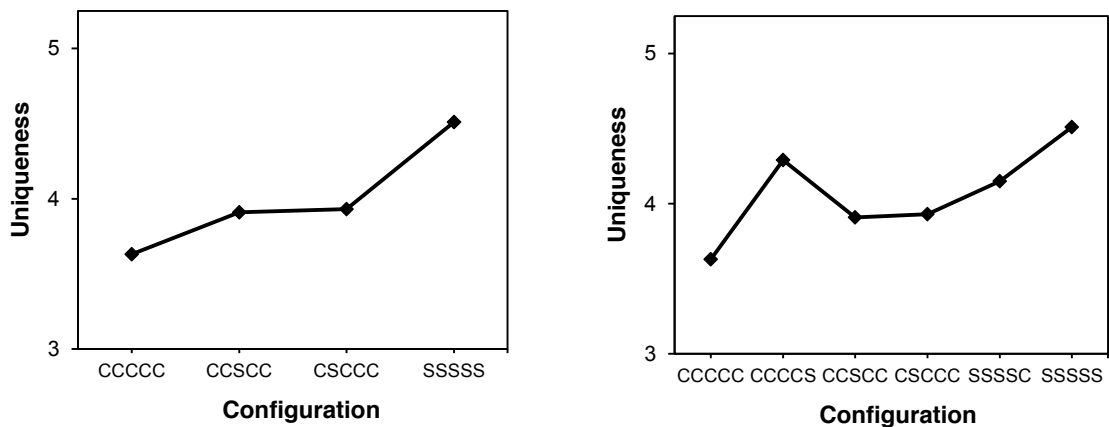


Figure 21: Mean plots for perceived uniqueness

The quality of the relationship, in which a solution offering is embedded, is perceived significantly better than for offerings in other configurations (H_{3d}). This applies for the original type set ($t = 4.13$; $df = 38.93$; $p < .001$) and also for the confirmed types set ($t = 5.41$; $df = 71.94$; $p < .001$).

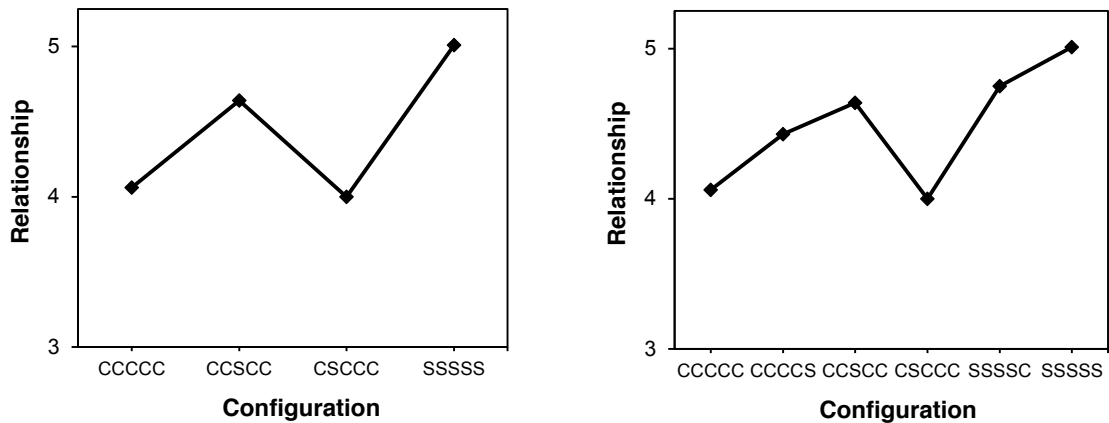


Figure 22: Mean plots for relative relationship quality

The outcome hypotheses H_{3a-d} can be considered supported. No hypotheses have been formulated for the differences between the Object Modifier configurations. However post-hoc tests using the rather conservative Tukey's procedure (Field 2013) do not reveal any significant differences between these types. Moreover, the tests show that for all outcome variables the differences between Solution Provider and Component Seller are responsible for the omnibus significances (all $p < .001$); excepting price premium and relationship quality, where also significant differences between Solution Sellers and Mass Customizers exist ($mean_{SSSSS-CSCCC} = 1.52$; $p < .001$; respectively: $mean_{SSSSS-CSCCC} = 1.01$; $p < .01$ for the hypothesized set and $p < .001$ for the confirmed set).

Several conceptual and case study-based publications (Cornet et al. 2000; Matthyssens and Buyl 2005; Sharma et al. 2002; Zimmer et al. 2010) suggest that a successful solution selling strategy presupposes healthy relationships between customer and vendor. Therefore, moderated regression analysis (Hayes 2013) is conducted, which examines differences between SSSSS and the remaining configurations regarding the outcome variables functional value, price premium, and uniqueness. However, no significant moderating effect of relationship quality can be found. Instead, this variable mediates the impact between solution selling and the outcomes (ratio of approximately 1:10 direct vs. indirect effect).

3.6.5 Effect of Solution Selling Practices on Outcomes

While in the previous analyses the relationship between the configurations and the outcomes associated with solution selling was examined (pattern-oriented approach), the following variable-oriented analyses focus on the impact of solution-oriented practices along the solution process chain on the outcome variables functional value, price premium, and uniqueness. The independent variables in the following linear regression analyses are the original “raw” continuous ratings from 1 to 6 (higher scores = solution style). Three control variables are included in a subsequent step: company size (small- and medium-sized companies vs. large enterprises), the share of services in the price of the offering or in the project volume (ten point scale), and direct sales vs. other forms of distribution.

Table 18 displays the results. The functional value (relative to the competition) is significantly influenced by requirements definition ($b = 0.08$; $p < .05$). Contrary to expectations, neither customization nor integration has as significant impact on the functional value. Requirements definition ($b = 0.08$; $p < .05$) and post deployment support ($b = 0.12$; $p < .01$) have a significant positive effect on relationship quality. A price premium can be achieved through integration ($b = 0.12$; $p < .05$) and a solution-oriented approach during deployment ($b = 0.13$; $p < .01$). Solution-orientated requirements definition ($b = 0.09$; $p < .05$) and deployment ($b = 0.11$; $p < .01$) lead to higher perceived uniqueness. This influence persists if the direct effects of two control variables are taken into account: Large enterprises achieve higher levels of self-perceived uniqueness than their small and medium-sized counterparts ($b = 0.28$; $p < .01$); also direct sales foster uniqueness ($b = 0.29$; $p < .01$). Further analyses do not reveal any moderating effect of company size (SME vs. large enterprises) and direct sales. Also the number of competitors as additional control variable is not significant and does not improve the model.

The explicatory power of the regression models is rather low, only 8 to 13 % of the independent variables' variances can be explained.

The results will be discussed in conjunction with the customers' perspective (study II) in section 7.7.

Coefficients of Linear Regression of Solution Selling Processes (Scenario Ratings, Continuous Versions) and Control Variables on Outcomes

Model	Independent variables	Functional value		Relationship quality		Price premium		Uniqueness	
		<i>b</i> (s.e.)	stand. β	<i>b</i> (s.e.)	stand. β	<i>b</i> (s.e.)	stand. β	<i>b</i> (s.e.)	stand. β
1	Constant	3.67 (0.17) ***		3.54 (0.17) ***		2.03 (0.24) ***		3.28 (0.21) ***	
	Requirements definition	0.08 (0.04) *	.12	0.08 (0.04) *	.12	0.09 (0.05)	.10	0.09 (0.04) *	.12
	Customization	0.05 (0.04)	.08	0.01 (0.04)	.02	0.06 (0.05)	.06	0.02 (0.04)	.03
	Integration	0.03 (0.03)	.04	0.06 (0.03)	.09	0.12 (0.05) *	.12	0.00 (0.04)	.00
	Deployment	0.03 (0.03)	.06	0.01 (0.03)	.02	0.13 (0.05) **	.16	0.11 (0.04) **	.15
	Post-deployment support	0.06 (0.03)	.10	0.12 (0.04) **	.19	0.05 (0.05)	.06	0.01 (0.04)	.01
2	Constant	3.64 (0.18) ***		3.48 (0.19) ***		2.14 (0.05) ***		3.11 (0.22) ***	
	Requirements definition	0.08 (0.04) *	.12	0.08 (0.04) *	.12	0.08 (0.05)	.09	0.09 (0.04) *	.11
	Customization	0.05 (0.04)	.07	0.01 (0.04)	.02	0.06 (0.05)	.07	0.002 (0.04)	.02
	Integration	0.02 (0.03)	.04	0.06 (0.03)	.08	0.12 (0.05) **	.12	0.00 (0.04)	.00
	Deployment	0.03 (0.03)	.06	0.01 (0.03)	.02	0.13 (0.05) **	.16	0.10 (0.04) **	.15
	Post-deployment support	0.06 (0.04)	.10	0.12 (0.04) **	.19	0.06 (0.05)	.07	0.00 (0.01)	.00
	SME vs. Large Enterprises (= 1)	0.16 (0.09)	.08	0.09 (0.09)	.05	-0.12 (0.12)	-.04	0.28 (0.11) **	.11
	Service share	-0.01 (0.01)	-.05	0.00 (0.01)	.01	-0.03 (0.02)	-.06	0.01 (0.02)	.00
	Direct sales (= 1)	0.13 (0.09)	.07	0.07 (0.09)	.04	0.13 (0.12)	.04	0.29 (0.10) **	.12
	R^2 for step 1		.082		.110		.132		.065
	R^2 for step 2		.094		.113		.138		.090
	ΔR^2		.011		.003		.006		.025 *
	$VIF_{\max} = 1.94$								
	$n = 527$								

* = significant at the $p < .05$ level ** = significant at the $p < .01$ level *** = significant at the $p < .001$ level

Table 18: Coefficients of linear regression of scenarios ratings on outcomes

3.7 Descriptions of the Configurations

It is better to be vaguely right than exactly wrong.

Carveth Read
British philosopher and logician (1848–1931)

Configural research is not finished with the identification of types and antitypes. Rather, they must be validated and interpreted. There is no standard procedure for validation in configural research; von Eye et al. (2010) recommend assessing the validity by analyzing differences in “external” variables that have not been used to derive the configurations. In terms of common conceptualizations of validity, this comes closest to criterion validity.

In order to characterize the significant types and antitypes of this study, the additional descriptive variables of the survey are used. Only significant differences are reported in the validation section if not indicated differently. The respective type / antitype is contrasted with the mean of all configurations using two-tailed⁹² t -tests or – for categorical variables – χ^2 tests. If the variances of both groups are not homogenous⁹³ – which is rather likely considering the large differences in the sub-sample sizes – corrected parameters (t , df_{adjusted} , p) will be used. Although the t -test is sufficiently powerful for very small sample sizes (even to $n \leq 5$) as long as effect sizes are large (de Winter 2013), antitypes with very low cell counts that show similar patterns are analyzed jointly. The “dynamic” section is limited to descriptive statements; a comprehensive analysis of the pseudo-longitudinal data (scenario five years ago, today, in five years) is in the focus of study Ib.

⁹² Even though directed hypothesis could be formulated in most cases, two-tailed probabilities will be considered to allow for contradicting results. See Field (2013, p. 66-67) for more reasons to prefer two-tailed testing.

⁹³ Assumption of heterogeneity if the Levene test fails at $p = .10$ (higher value for β -failure compensation).

We start with the hypothesized configurations; then the non-hypothesized but significant configurations will be considered. For the purpose of clarity, the numerical results can be found in tabular form in appendix A.

3.7.1 Types

CCCCC – Component Seller

Configuration	f_0	f_e	p		Rel. Risk	Rank	log P	Rank
CCCCC	32	1.015	<.0001	Type	31.54	1	35.65	1

CFA descriptives: In contrast to the estimated count of just one Component Seller ($f_e = 1.015$) we find 32 in the sample. This strong discrepancy is reflected in the high Relative Risk Ratio and log P values and is a clear indication of the violation of local independency and hence the existence of the hypothesized type.

Validation: As expected, the needs of the Component Sellers’ customers are met mainly by standard components (see table A24). The customer wants – figuratively speaking – the matching puzzle pieces instead of the whole puzzle solved. Component Sellers seem to face proficient customers since they tend to have a smaller knowledge advantage than sellers in other configurations. The customers’ needs are rather short term; the seller does not include possible future needs into his offering. Consequently, the customer satisfaction – that is the assessment of the providers – primarily depends on the quality of their single products and services instead of a potential integrative advantage of a business solution. Due to this lower perceived integrative benefit the Component Sellers are less able to justify a price premium for complex offerings; they also find difficult to differentiate from the competition by going beyond the pure product or service⁹⁴. The responsibility to make the offering fully functional lies with the customer. With regard to post-sales activities, the Component Sellers opt for problem solving instead of problem prevention.

⁹⁴ See previous section for more results on achieving a price premium.

In contrast to what one would expect, Component Sellers do *not* differ significantly from the rest of the sample with regard to the service share (cliché of the screw seller) and number of competitors. The percentage of SMEs among the component sellers is the same as in the residual sample.

Outcomes: The Component Sellers evaluate their offering compared to the competition as less attractive than the firms in other configurations⁹⁵ in terms of product and service quality, uniqueness, functional value, and the relationship in which it is embedded.

Exemplary offerings in the sample: Offerings with a low service share are e.g. metal hardware, chemicals, microchips and construction material. Interestingly we also find offerings with a low service share even though they are services by nature, e.g. milling on a contractual basis (“Lohn-/ Auftragsfräsen”), surface coating or IT network services. These could be described as *commoditized industrial services* (professional but interchangeable because of well-defined tasks). Exemplary offerings with a higher service share are paper products or pharmaceuticals.

Dynamic: 20 out of the 32 Components Sellers state that they will remain pure Components Sellers within the five next years. No clear pattern is recognizable for the remaining 12 companies. Changes are subtle; just one Component Seller plans to become a full Solution Provider (from CCCCC to SSSSS). 19 companies were Component Sellers five years ago; three firms moved back from solution to component selling (one pharmaceutical producer and two larger service firms).

⁹⁵ Caveat: The Component Seller consider their offering still better than the competition – and so do the other firms (*Lake Wobegon* effect – everyone is better than the average). However, the component seller see their offerings significantly *less above average* than the other configurations.

The Component Seller in a Nutshell

Customers of the Component Seller are well informed and have specific, short-term needs that they can articulate. Component Sellers adapt to those needs – at the expense of perceived differentiation from the competition and the option to achieve a price premium. The relationship between seller and customer is based on transactions but it is the customer who has the power in this relationship.

This situation applies to products and services equally – professional and industrial services may also suffer from commoditization (or *productization*) with the same consequences that goods-based components sellers have to face.

SSSSS – Solution Provider

Configuration	f_0	f_e	p		Rel. Risk	Rank	log P	Rank
SSSSS	219	92.696	<.0001	Type	2.36	6	28.26	2

CFA descriptives: The configuration Solution Provider is the largest in the sample ($f_0 = 219$) and exceeds the expected frequency ($f_e = 93$) by far. Also in this case, the Relative Risk Ratio and log P values indicate a violation of local independence and the existence of a type.

Validation: As expected, the requirements of the customer are not met by components; instead, they request solutions or – put differently – “the whole puzzle solved” (table A25). The vendors are convinced to have a knowledge advantage over their customers and include future requirements into the offering. The respondents see a higher functional value in their solution offerings than the sum of the parts suggests. The Solution Providers can better differentiate from the competition in terms of how their products and services parts work together. This integrative capability is also a more important source of customer satisfaction for solution providers than for firms in other configurations. For the integration process, the customers are willing to pay a price premium. In contrast to the average of other configurations, the solution providers are deeply involved in the deployment of the offering: only with their help the customer is able to use the offering effectively and efficiently. Solution Providers have a proactive post-purchase strategy: they focus on problem prevention, inform their customers proactively about new products and services in context of the offering and request feedback on the offering from their customers proactively.

Other characteristics: The service share among Solution Providers is higher than in the rest of the sample. They do not differ from other configurations in the sample in terms of firm size (SMEs vs. LEs, employees, turnover), geographical focus (regional, local, national, and international), and price / project volume of the offering. In other words: solution selling is not limited to large multinational companies, as case study research implies. Solution Providers have a distribution structure based on direct sales significantly more often than other firms in the sample. Solution Providers collect remote data significantly more often than firms in other configurations.

Outcomes: Solution Providers see themselves more superior to the competition than firms in other configurations do. This applies to product quality, service quality, uniqueness, price-performance-ratio, functional value, and quality of the customer relationship, but not to price.

Exemplary offerings in the sample: The sample contains a wide range of solution offerings (see figure 23). The majority of product-based solutions can be assigned to machinery and manufacturing; among service-based solutions, we find a high percentage of industry-oriented professional services (e.g. engineering and construction, IT-solutions, financing). However, we also find service solutions with a relatively low service share (e.g. financial or IT services). A possible explanation is that these solutions contain productized service components (e.g. standardized credit instruments).

Dynamic: Most of the Solution Providers were in the same situation five years ago. However, three configural changes are worth mentioning:

- Nine Solution Providers were pure Component Sellers five years ago (CCCCC → SSSSS).
- Three professional service providers (IT, outsourcing, engineering) have moved from an Integrator (SSCSS) configuration to Solution Providers. It is possible that they diversified their service portfolio and hence were capable to integrate several services into a service-based solution.
- Five Systems Sellers (SSSSC) have become solution seller (business financing, HRM software, business consulting, water filters, dental supply).

Selected comments:

Subjects in the Solution Provider configuration frequently used the commentary function to give feedback on the scenarios. Three topics emerge: individualization vs. costs, segmentation strategies to serve both component and solution customers, and a critique of the latent nature of the demand for solutions.

Participants confirm the need for individualization, at the same time they are aware of the associated costs:

“Individualization: YES. BUT: costs must remain within reasonable limits”
(top level manager, dental supply).

“Area of conflict in the coming years: more individualization required, but increasing competitive pressure. The question is how to remain competitive despite of the extra work of individualization” (middle level manager, employee survey consulting).

Respondents also state that they have customer segments both for standardized offerings and customized solutions (cf. Matthyssens and Buyl 2005):

“It fits both. Our customer buys both normal standard products, as well as customized ones for specific applications” (lower level manager, hydraulic clutches).

“We try to standardize our business coaching by means of online seminars and webinars for SME” (top level manager, business consulting).

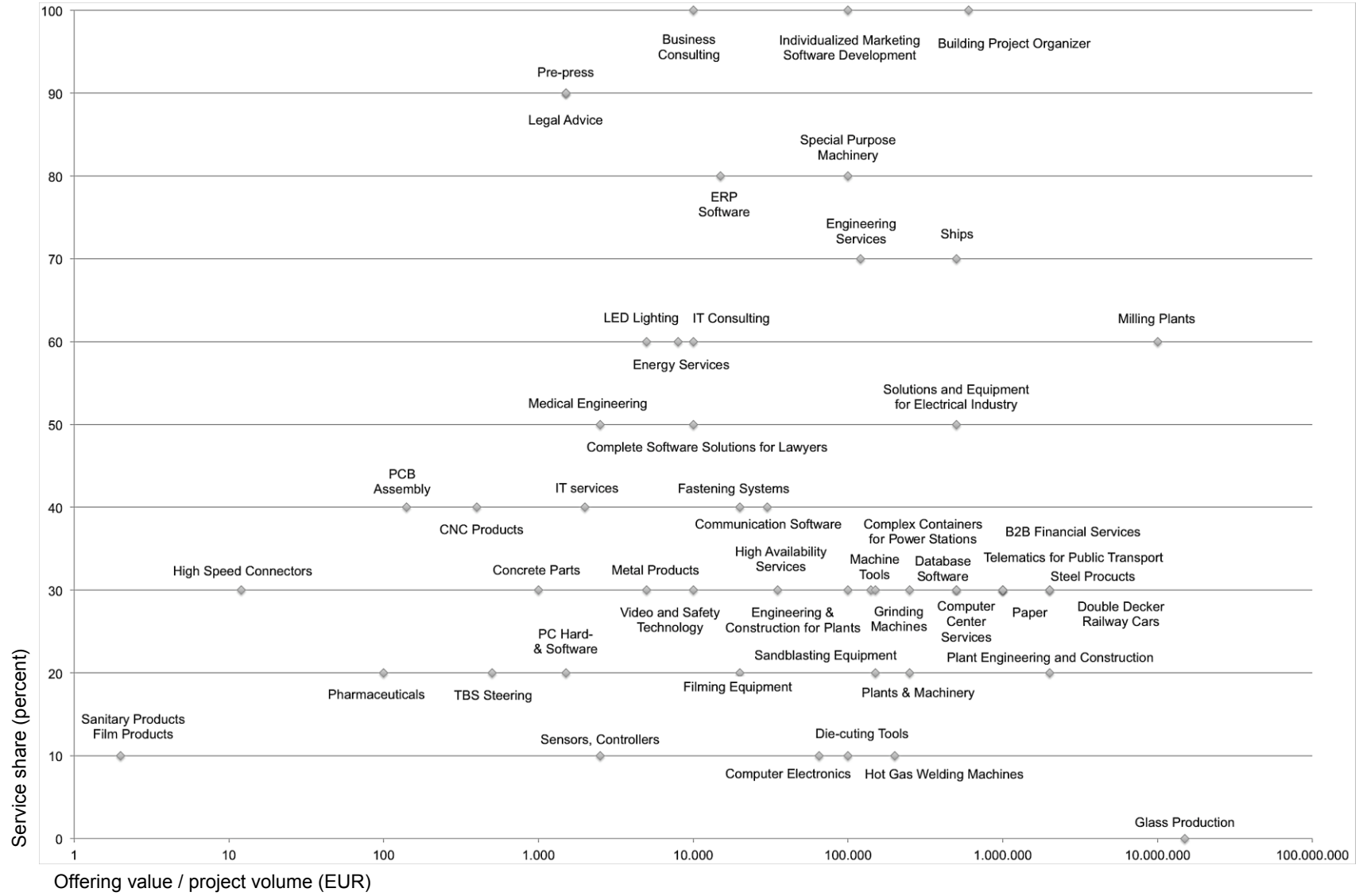
“The mass market might be the main pillar of our company, but it has been evolving towards a project business for the last 2 to 3 years” (lower level manager, safety clutches).

A few respondents reject the latent nature of customer demand for solution offerings:

“Today, customers know exactly what they need” (employee, IT solutions).

“The customer usually knows where he wants to go, but he needs support on the way there” (middle manager, machine tools).

Figure 23: Random selection of 50 solution offerings



The Solution Provider in a Nutshell

The Solution Providers in the sample fit very well in the picture drawn by previous research: Solutions are embedded in close long-term relationships, in which also future customer requirements are considered and in which the provider takes an active role during implementation and even after the purchase. Customers usually have highly individual requirements, which cannot be met by standardized offerings. The “integration expertise” is one of the core competences of Solution Providers; the degree to which the individual parts of the solution interact is more important than the quality of the single products and services. The reward for this: the Solution Provider can charge higher prices and can better differentiate from the competition.

Business solutions are – as a strategy approach – not limited to large enterprises. Small and medium-sized enterprises can be equally effective in solution selling.

CSCCC – Mass Customizer

Configuration	f_0	f_e	p		Rel. Risk	Rank	log P	Rank
CSCCC	14	3.52	< .0001	Type	3.98	2	4.71	4

CFA descriptives: Even though the Mass Customizer is one of the smaller configurations in the sample, the discrepancies between expected and empirical frequencies are among the largest, as high *Relative Risk Ratios* and log P values and their corresponding rank values attest.

Validation: At first glance, the deviation pattern of the Mass Customizer vs. the other configurations does not differ much from the Component Seller (see table A26). Both cannot achieve differentiation from the competition through the integration of several components due to a lack of a functional benefit. Also, the individual product and service parts instead of their integration mainly determine the quality of the offering. Likewise, the quality of the implementation process depends on the customer; the Mass Customizers does not feel responsible for this. Similar to the Component Seller, the Mass Customizer pursues a reactive after-sales strategy. However, there are significant differences, when these two types are compared directly. In contrast to component buyers, the requirements of the Mass Customizers’ customers are not met by standard components. The Mass Customizer also includes further developments of customer needs into the offering.

Outcomes: Mass Customizers perceive themselves inferior to other configurations (except the Component Seller) with regard to the quality of the customer relationship and a potential price premium for the integration of several components. However, there are no significant differences if compared directly to the Component Seller.

Exemplary offerings: In the sample are manufacturers (e.g. for displays or cardboard boxes), automotive suppliers for customized stamped parts but also small service providers, e.g. for printing.

Dynamic: 8 out of 14 Mass Customizers were in the same position five years ago and will be in five years. No clear change pattern is recognizable for the remaining 6 firms.

The Mass Customizer in a Nutshell

The Mass Customizer is a variation of the Component Seller. They share essential characteristics, but the requirements of the Mass Customizer's customers cannot be met by standard components.

CCSCC – Resource Integrator

Configuration	f_0	f_e	p	Type	Rel. Risk	Rank	$\log P$	Rank
CCSCC	11	3.10	.0004		3.55	4	3.42	6

CFA descriptives: Similar to the Mass Customizer, the Resource Integrator is configuration with a low absolute count but it emerges significantly more frequently than estimated.

Validation: In comparison to the residual sample (table A28), the customers of the Resources Integrator rather ask for standard components. The Integrator seeks proactive feedback from its customers to a lesser extent. Also, the service share is lower than in other configurations. Contrary to expectations, the Resource Integrator is convinced to differentiate from competitors through the quality of the individual products and services rather than through how the products and services work together as a whole. If directly compared to the Component Seller, the Integrators' customers do not want the “fitting puzzle piece”, they expect him to “solve the whole

puzzle” (table A29). The key differentiator between Integrator and Mass Customizer is customization; the customers of the latter are not satisfied with standard components while customers of the Integrator require standard parts. The CCSCC configuration has a low cell count, but since effect sizes (Cohen’s d between 0.62 and 1.10) are large and variances are homogenous, the results of the t-tests can be trusted (de Winter 2013).

Outcomes: The Resource Integrator does not significantly differ from other configurations regarding the perceived outcome characteristics.

Exemplary offerings: In the sample, we can find a supplier for the automotive industry (water pumps) and other manufacturers (e.g. for boilers or ventilation equipment) but also service provider, e.g. for logistics.

Dynamic: 5 out of 11 companies did not change the configuration. No striking pattern for the other cases can be identified.

The Resource Integrator in a Nutshell

The Resource Integrator, the second confirmed Object Modifier type, focuses on standardized components, which are then integrated into more complex offerings in order to meet customer requirements.

3.7.2 Antitypes

SSSSC – Systems Seller

Configuration	f_0	f_e	p		Rel. Risk	Rank	$\log P$	Rank
SSSSC	20	48.90	< .0001	Antitype	0.41	21	4.55	5

CFA descriptives: The Systems Seller was expected to be a type, but turns out to be an antitype. High values of $\log P$ (which is more sensitive to antitypes than Relative Risk Ratio) indicate large discrepancies between expected and actual frequencies and hence the violation of local independence.

Validation: If contrasted to all other configurations (table A31), the satisfaction of the Systems Sellers’ customers depends more on the interaction between product and service parts than on their individual quality. However, more relevant – in terms of discriminant validity – is the direct comparison to the Solution Provider (table A32): The Systems Seller handles post-purchase activities such as seeking feedback or informing customers about new products and services in the context of the offering less proactively. The Systems Seller also is less convinced than the Solutions Provider to know better than the customers themselves what they really need.

Outcomes: Systems Sellers perceive their offerings less superior in terms of product and service quality than Solution Providers.

Exemplary offerings: In the sample are aerospace and military technology, medical devices, textile machinery, and equipment for canteen kitchens. Examples for service-based Systems Sellers are building project organizers (developer) or engineering service providers. The descriptions of the offerings and some comments suggest that these companies are involved in project-based businesses with a limited duration.

Dynamic: For 13 out of 20 Systems Sellers, the situation has not changed for the last five years and is not expected to change during the next five years. Four companies plan to become Solution Providers.

The Systems Seller in a Nutshell

The System Seller is a derivate of the Solution Seller and relies on “turn-key” offerings, which presumably do not need comprehensive proactive support once they are handed over to the customer.

SSSCS – “Pick-up” Solution Seller

Configuration	f_0	f_e	p		Rel. Risk	Rank	log P	Rank
SSSCS	21	53.13	< .0001	Antitype	0.40	23	5.22	3

CFA descriptives: According to the log P value, SSSCS is the antitype configuration with the largest discrepancies between expected and empirical

frequencies and – behind the Component Seller and the Solution Provider – the third most outstanding configuration in the sample.

Validation: The configuration SSSCS was not expected to be a type or an antitype. It is characterized by a rather solution-oriented handling of all processes except for deployment (table A33): The vendor is neither involved in the implementation of the offering, nor does he interfere with the customer's processes, nor does he take responsibility for the customer receiving the desired benefit from the offering. Instead, the customer – figuratively or literally – “picks up” the solution and takes care of the implementation. As a consequence, the quality of this process depends on the customer, who is then also less dependent on the vendor to use the offering effectively and efficiently than customers of the Solution Provider (table A34). The “pick-up” solutions also have a lower functional value than “full” solutions and are therefore less capable to achieve a price premium or to serve as a differentiating element.

Outcomes: In comparison to the “full” Solution Provider, “pick-up” Solution Sellers see their offerings less superior in terms of product quality, service quality, perceived uniqueness, price, and price/performance ratio.

Exemplary offerings: The SSSCS subsample is dominated by small and medium-sized professional service providers (e.g. for IT, advertising, customer relationship management, tax counseling and other types of management consulting) and larger automotive suppliers and producers of medical devices that offer sub-systems.

Selected comments: Participants underline the specificity of the customer requirements and the need for customization despite the potential costs and efforts.

“We intend to develop standard components and formally we have a ‘building block system’. However, our product is so highly technical and customer requirements are so diverse, that this is hardly feasible” (lower level manager, automotive supplier).

“Every job is individual but draws on experience and existing algorithms” (mid-level manager, engineering services)

We deliver cut-to suit communication services. These are highly individual and aim at the solution of a very specific problem [...] standardization is possible only to a limited extent. The customer is not willing to pay for that.
 (top level manager, communication services)

Dynamic: 14 out of 21 firms have been in the same configuration five years before and will remain there for the coming five years; three plan to become Solution Providers.

The “Pick-up” Solution Seller in a Nutshell

The “Pick-up” Solutions Seller is another infrequent variant of the Solution Seller. The implementation process is up to the customer; nevertheless, both parties stay in touch after the purchase. It is not clear, whether the sellers are not willing or not capable to deploy the offering by themselves; in any case, these firms achieve less positive outcomes (quality and uniqueness perceptions, price markups) than their “full solution” counterparts.

SCSXX / SCCXX Antitypes

Configuration	f_0	f_e	p		Rel. Risk	Rank	log P	Rank
SCSCS	4	15.33	.0006	Antitype	0.11	31	1.20	17
SCSSC	3	14.11	.0004	Antitype	1.36	8	0.76	20
SCSSS	10	26.74	.0001	Antitype	0.26	27	1.83	14

CFA descriptives: A cluster of three antitypes is found in configurations with solution-oriented requirements definition, component-oriented customization (= standardization), and solution-style integration (SCSXX). Only the configuration with component-oriented deployment and post-deployment support emerges as frequent as expected, all other combination – among these is also the hypothesized antitype SCSCS – fall short of their predicted frequencies.

A second cluster with SCCXX configurations includes just one antitype (SCCSS), but this cluster has strikingly low cell counts, which applies both for predicted and empirical frequencies.

Apparently, there is a certain friction between solution-style requirements definition, which aims at the needs of individual customer needs, and a subsequent

standardization of the offering. This “SC-conflict” intensifies when the offering goes through an integration process. We return to this “conflict” in the discussion section.

Validation: Compared to all other configurations, the SCSXX antitype firms try to standardize their offerings to a greater extent (table A35). The respondents are convinced that already their standard products and services meet the expectations of their customers. If contrasted to Solution Providers, the satisfaction of the antitype firms’ customers depends less on the integration between products and services (table A36).

Exemplary offerings: The sample predominantly contains firms from the IT and electrical industry (e.g. CAD software, check-in systems)

Dynamic: Only four out of the seventeen companies in the sample did not and will not change the configuration; no clear direction for the “movers” is recognizable. Compared to other configurations, the SCSXX antitypes are rather labile.

CSSXS Antitypes

Configuration	f_0	f_e	p		Rel. Risk	Rank	log P	Rank
CSSCS	7	20.36	.0006	Antitype	0.34	25	2.06	11
CSSSS	15	35.52	.0006	Antitype	0.42	20	3.06	7

CFA descriptives: Two non-hypothesized antitypes emerge from configurations that combine component-oriented requirements definition followed by customization, integration and proactive post-deployment support, regardless of whether deployment is conventional or solution-oriented (CSSXS). Since direct effects in a 1st order CFA model are fixed, discrepancies between expected and empirical frequencies are caused by pairwise or higher order interactions, in these cases most likely by post-deployment support (the other two CSS configurations also emerge less frequent than expected but not significantly less).

Validation: Compared to all other configurations, the customers of the CSSXS antitype firms actually require less solution-style offerings (table A37). A more detailed picture emerges by looking at the direct comparison between the CSSXS

antetypes and the “inconspicuous” (i.e. non-significant) CSSXC configurations (table A38): The antetype companies rely on proactive problem prevention and can achieve higher perceptions of functional value and relationship quality.

The CSSXS firms share essential similarities with the Solution Providers in core solution processes, namely customization, integration, and proactive post-purchase activities. The direct comparison supports the assumption that the CSSXS firms indeed have less solution-oriented customers. Even though CSSXS firms also integrate their offerings, they are inferior to their full solution counterparts in terms of customer satisfaction, the willingness to pay for the integration process and the “gestalt” benefit (“the whole is greater than the sum of its parts”). Put differently: integration is less effective for CSSXS firms – which do not identify individual customer needs – than for full Solution Providers.

Exemplary offerings: There is a slight accumulation of large service firms in the sample (e.g. for office or financial services), but this difference is not significant.

Dynamic: 9 out of 22 firms within this antetype cluster remain stable over the period of 10 years.

Non-outstanding Configuration SSSCC

Configuration	f_0	f_e	p	Rel. Risk	Rank	$\log P$	Rank
SSSCC	31	28.03	.307	1.11	13	0.70	21

The types and antetypes detected by CFA emerge through *relative* discrepancies between predicted and observed frequencies; the *absolute* frequencies of configurations do not play any role as long as they comply with the base model. The fact that the two largest configurations (Solution Provider and Component Seller) are also CFA-types is a coincidence. The third largest configuration (SSSCC) is not outstanding; the observed frequency does not differ significantly from the predicted frequency. This conformity makes the interpretation of the “pick-up” Systems Seller (labeled analogously to the “pick-up” Solution Seller SSSCS) less straightforward. This configuration differs from the rest of the sample in three aspects (table A40): First, the customers have a strong preference for customized solutions over standard

components; consequently SSSCC firms strive less for standardization than other firms. Second, the participants are more convinced than others that the customer is primarily responsible for an accurate implementation of the offering. Third – in accordance with the CFA profile – these firms have a reactive post-sales strategy.

Despite of this consistent profile, SSSCC companies do not differ in the outcome variables from all other configurations. The direct comparison with the full Solution provider, however, reveals that SSSCC firms cannot claim a price premium for the integration of the offering (table A41).

Exemplary offerings: This configuration includes comparatively many service firms (consulting, IT, finance).

Dynamic: The configuration is relatively stable, 22 out of 31 firms are “stayers”.

Note: While this configuration is inconspicuous in CFA, latent class analysis will later identify this configuration as a “marker” descriptor for the Modifier class (table 27).

3.7.3 Further Explorative Analyses

Share of Service

As already mentioned in the introduction section, there is a lack of research on service-based solutions. The service share (percentage of services in the price of the offering or the entire project volume) has already been used as a control variable in this study. Further explorative correlation analyses reveal that the service share is significantly related to a solution-oriented handling of the SPCM processes excepting customization (original 6-point continuous measures; requirements definition $r = .119$; $p < .5$; integration $r = .101$; $p < .05$; deployment $r = .116$; $p < .01$; post-deployment support $r = .175$; $p < .001$). Other notable correlations are between service share and the customer’s demand for solutions ($r = .159$; $p < .001$), the gestalt benefit (customer satisfaction rather depends on how products and services work as whole $r = .125$; $p < .01$; the same for uniqueness $r = .123$; $p < .01$); the implementation quality ($r = .165$; $p < .001$); proactive failure prevention ($r = .143$; p

< .01), and proactive feedback request ($r = .131$; $p < .01$). Among the outcome variables, only price is significantly correlated with service share ($r = .098$; $p < .05$).

All these correlation coefficients indicate only small effect sizes (Cohen 1977). More important than these numerical relationships is the fact that a large number of service-based Solution Providers would not have been considered if this study's focus were primarily on manufacturers, which is common practice in academic B2B marketing research. Among those service-based Solution Providers are a number of companies whose offerings have a high monetary value, e.g. developers and software firms (figure 23).

Small and Medium-sized vs. Large Enterprises

Since data was collected in Germany, the proportion of small and medium sized enterprises is comparatively high. However, there are only a few significant differences (see table A42); these have only small effects (Cohen's $d \approx 0.2 - 0.3$). SMEs have a significantly higher service share. Respondents in LEs are more convinced that even their standard offerings meet their customers' needs. They also rate their offering's product quality, uniqueness and functional value higher but price lower than their SME counterparts do. Respondents from LEs hold significantly less often top management positions ($\chi^2 = 14.87$; $df = 1$; $p < .001$).

3.8 Discussion of the Results

3.8.1 The Solution Process Chain Model – Summary of the Findings

The SPCM proposes a typology for complex B2B offerings and firms that sell these offerings. Drawing upon Doty and Glick's (1994) framework for typology building, first central theoretical constructs were identified, namely the solution process chain elements. Then internal and external relationships between these central elements were specified. Six hypothesized ideal types embody the internal associations, while the external relationships specify the supposed performance of these ideal types with regard to outcome variables.

Finally, the SPCM was tested using Configural Frequency Analysis drawing upon a sample of 527 B2B firms. Four out of six hypothesized configurations (H_{1a} - H_{1f}) emerge as *types*, i.e. they have significantly higher empirical cell frequencies than the underlying base model predicts. One out of the two hypothesized configurations (H_{2a} + H_{2b}) is indeed an antitype, it emerge less frequent than expected.

Three omnibus tests examine composite hypotheses, i.e. all six type hypotheses as one set (H_{1a} - H_{1f}), the two antitype hypotheses as a second set (H_{2a} + H_{2b}) and all eight hypotheses as a third set (H_{1a} - H_{2b}). All these composite hypotheses are supported (table 19); hence the internal structure of the original SPCM typology can be considered confirmed. The refined SPCM typology comprises the types Component Seller, Mass Customizer, Resources Integrator and Solution Provider.

Hypothesis H_{3a} - H_{3d} specify the external associations of the typology: The Solution Provider should score highest on the outcome variables functional value, price premium, uniqueness and quality of the customer relationship, followed by the Systems Seller the Modifier configurations (Mass Customizer, Resources Integrator, Remote Connector). The Component Seller is expected to score lowest.

Summary of Hypothesis Tests				
Types				
Hypothesis	Configuration	Label	Confirmation	Comment
H _{1a}	CCCCC	Components Seller	yes	highest risk ratio and logP
H _{1b}	CSCCC	Mass Customizer	yes	
H _{1c}	CCSCC	Resources Integrator	yes	
H _{1d}	CCCCS	Remote Connector	no	only very low cell count
H _{1e}	SSSSC	Systems Seller	no	turned out to be an antitype
H _{1f}	SSSSS	Solution Provider	yes	highest cell count in sample
Composite (omnibus) test for all types			yes	
Antitypes				
H _{2a}	CSCSC	-	no	cell count = 0 but no antitype (f_e low)
H _{2b}	SCSCS	-	yes	
Composite (omnibus) test for all antitypes			yes	
Composite (omnibus) test for all types + antitypes			yes	
Outcomes				
Hypothesis	Variable		Confirmation	Comment
H _{3a}	Functional value		yes* / yes **	* original linear contrast hypothesis set: SSSSS > SSSSC > [CSCCC, CCSCC, CCCC] > CCCCC
H _{3b}	Price premium		yes* / yes **	** actual linear contrast hypothesis set: SSSS > [CSCCC, CCSCC] > CCCCC
H _{3c}	Uniqueness		yes* / yes **	
H _{3d}	Customer relationship		yes* / yes **	

Table 19: Summary of hypothesis tests for the SPCM typology

These hypotheses could be confirmed both for the original and the refined set of types using analyses of variance with *a priori* defined linear contrasts.

Conclusion: The typology based on the Solution Process Chain Model can be considered confirmed in toto.

The primary goal of the CFA was to subject the SPCM to empirical tests. However, the analysis – and the subsequent validation procedures using additional descriptive variables – provided further findings that have not been covered by the priori defined hypotheses. These will also be discussed in the following.

3.8.2 Type and Antitype Configurations

Types

All four types that emerge during CFA have been hypothesized prior to the analysis and thus support the hypothesis framework. There are, however, large *quantitative* and *qualitative* differences between these types. *Quantitative* differences refer to the absolute empirical frequencies of the type configurations, i.e. the “cluster” sizes (without reference to cluster analysis). *Qualitative* differences point to the extent of extraordinariness, i.e. the degree to which these types defy expectations. These qualitative discrepancies – and also the *antitype tensions* – require interpretation.

The Component Seller and its Derivates

The Solution Provider has by far the largest cell count (= 219; 41.6% of the sample) and dominates – from a quantitative perspective – the other type configurations. The most outstanding configuration, however, is the Component Seller: The base model predicts, based on multivariate marginal frequencies under the assumption of local independence, the existence of just one firm; the actual frequency of 32 clearly exceeds this estimation. This strong violation of local independence points to the literal “abnormality” of this type. Why are there so many companies in this configuration? From an organizational population perspective, it is an unattractive niche: The customers have specific short-term needs that they can articulate, which renders requirements definition and customizing efforts as value generating processes useless. The component offerings do not provide any integrative value when combined with other parts or the customers are not willing to pay for it because they can do that themselves. Put differently: Knowledgeable and proficient customers in conjunction with a “trivial”, exchangeable offering are a poor basis for solutions (Adamson et al. 2012; Ghosh et al. 2006). Additionally, Component Sellers suffer from harsh competition and cost pressure; as a consequence, they keep their specific investments into the relationship low and avoid any deployment and post-deployment support activities. All this makes the Component Seller the perfect candidate for all types of transformation concepts (*Add services! Bundle, customize and integrate! Deepen customer relationships!*). Indeed, the majority of conceptual research and practitioner publications define the Component Seller as their point of

origin (also see section 5.2.1). However, this study exhibits low change rates for this type configuration – the Component Seller is caught in this niche. That fits in the picture of the reported low success rates for transformations toward solutions (Krishnamurthy et al. 2003; Roegner and Gobbi 2001) and leads to a rather resigning preliminary conclusion: The need for transformation might be greatest for Component Sellers, but their weak position makes these change processes challenging.

On the contrary, Mass Customizers are in a slightly more promising position: The requirements of their customers are not met by standardized components. The mere customization, however, does not immediately lead to the desired outcomes in form of significantly higher margins or higher uniqueness. Mass Customizers, however, also include future customer requirements into the offering, which might serve as a basis for deeper customer relationships in the future. This might also be the reason, why the Mass Customizer configuration exhibits somewhat more dynamic than the Component Seller.

The customers of the Resource Integrator are hybrid in the sense that they request standardized offerings, which in turn share similarities with solutions by addressing rather holistic needs. As the profiles of the describing variables suggest, both the Resource Integrator and the Mass Customizer are sub-types of the Component Seller⁹⁶. However, out of all today's Mass Customizers and Resource Integrators, just one firm was in the Component Seller configuration five years ago. This implies that these three types operate in separate ecological niches, which complicates simple transformations.

Solution Selling as a “Gestalt” Strategy

The Solution Provider is the configuration with the highest absolute frequency; at the same time it is the type with the second largest relative discrepancies between expected and observed frequencies (according to the log *P* values).

⁹⁶ As will be shown in the methodological addendum, an LCA classifies these configurations into the same latent class.

The typical Solution Provider complies with the hypothesized profile: Solution Providers have customers that require customized and integrated offerings. Through the integration process, Solution Providers create something that has more value than the sum of its parts. They are also actively involved in the implementation of the offering and proactively support the customer even after purchase. Solution Providers can achieve a price premium for their offerings' integrative added value, but there are also superior to other firms in relation to overall relationship quality. Finally, Solution Provider can differentiate better from the competition than firms in other configurations.

The full Solution Provider has three subtypes, which do not implement the offering into the customer's business environment and / or do not proactively support the offering after delivery. Although these four configurations share a solution-oriented handling of three processes that are commonly referred to as central elements for solution selling – individualized requirements analysis, customization and integration (Sawhney 2006) – the most effective configuration is the one that pursues a solution orientation through all five processes. Put differently: Not only the Solution Providers' offerings have a *gestalt* benefit, but also the strategy of these firms has a *gestalt* character (Mintzberg 1978). A solution strategy is highly synergistic; it only delivers the desired outcomes if it is implemented as a whole.

Antitypes

Antitypes have significantly lower observed frequencies than predicted by the base model. There are three possible explanations for these discrepancies: 1) Due to a lack of a consistent strategy, these firms are less effective and disappear; or 2) the corresponding niches are so unattractive that only few companies enter these niches; or 3) the firms have managed to establish themselves in the virtually unattractive niches by productively solving the goal conflicts between solution- and component-orientation. The first two options should be accompanied by a lower performance and higher dynamic; the latter should go along with higher performance and stability.

Only one of the two hypothesized antitypes emerged as expected. The SCSCS configuration is characterized by an alternating sequence of solution- and component-oriented handling of the SPC processes. In the sample there are only four firms in this configuration; interpretation is difficult since no statements based on

significant differences in the describing variables can be made. Therefore, this antitype is grouped with other SCXXX antitypes and will be discussed jointly.

The CSCSC antitype is the only configuration with an empirical frequency of zero. Since the expected frequency is already very low, the antitype hypothesis must be formally rejected. However, the mere fact that the observed frequency is zero implies that firms with such an intra-strategy inconsistency struggle to survive – if they have ever existed.

More antitypes than anticipated emerged during the CFA. Although it is not the primary purpose of CFA to detect (latent) structures, several patterns could be identified. These patterns are caused by *tensions* or *conflicts* between the solution- and component-oriented at specific stages of the SPCM.

SSSSC / SSSCS Antitypes

The Systems Seller (SSSSC) and the “pick-up” Solution Seller (SSSCS) are both derivatives of the “full” Solution Provider (SSSSS). The existence of these antitypes implies that if firms pursue a solution-orientation for requirements definition and if they customize and integrate their offering, then they will most likely also implement this offering and provide proactive post-purchase support. Relying on rather reactive post-sales activities (= SSSSC, Systems Seller) **or** not implementing the offering (= SSSCS, hence “pick-up” Solution Seller) contradicts the expectations.

The Systems Seller was originally expected to be a type but turned out to be an antitype. In contrast to other antitypes, Systems Sellers are relative stable and successful; they are inferior to Solution Providers only in perceived product and service quality. This speaks for a successful *niche occupier*. The offerings in the sample point to project-based businesses with a limited duration and a fixed project end at which the offering is handed over and the job is essentially done. This idea is best embodied by developers (in constructing), which offer “turnkey solutions” in the literal sense: If things go well, there is no reason for buyers and sellers to stay connected after the building is erected, unless the developer also offers facility management services⁹⁷. This however, would be a significant strategic move, which

⁹⁷ As outlined earlier, there is a variety of contract forms such as build-operate-transfer (BOT) models.

makes the developer a (formal) Solution Provider. Indeed, if Systems Sellers will change their configuration at all in the near future, then in order to become Solution Providers (four out of six “movers”).

In case of the “pick-up” Solution Seller, the buyer is responsible for the implementation of the offering. Firms in this configuration are less successful than “full” Solution Providers, e.g. in achieving a price premium through integration or perceived uniqueness. The participants’ comments suggest that these companies face both cost pressure and the need for customization. This seems plausible; several firms in this configuration supply sub-systems for the automotive or medical technology industry. Deployment activities for suppliers are equivalent to a downstream extension in the vendor’s value chain, which are usually difficult or even unfeasible when the buyer holds a powerful position (Auramo 2005; Hobday et al. 2005; Wise and Baumgartner 1999). A second cluster in this antitype configuration includes smaller professional services firms. As outlined earlier, “deployment” in a professional services context aims at implementing the results of the service and ensuring the desired outcomes in the long run (Aarikka-Stenroos and Jaakkola 2012; Gounaris 2005). For instance, market researchers are often requested to offer consulting services or to implement long-term managerial decision support systems on top of their core business (Zimmer, Scherer, and v. Wangenheim 2009). Extending the value chain through implementation might be a viable transformation path for service firms too.

SCXXX-Tensions

A cluster of three antitypes emerged among firms that pursue a solution-oriented requirements definition but do not customize the offering. A solution-style requirements definition process comprises identifying individual customer needs – i.e. focusing on market segments with the size of one, and building up specific capabilities if this is necessary to handle the customer’s request. These activities can be interpreted as specific investments into the relationship with this customer since they cannot easily be adapted to other customers. Thus, solution-oriented requirements definition inhibits or deteriorates economies of scales (Davies and Brady 2000). But exactly these economies of scales are the goal that firms attempt to achieve through standardization (= component-oriented customization process).

These conflicting goals lead to tensions which weakens the seller's efficiency in two possible ways: If the seller aims at standardizing its offerings or if the offering does not allow customization, then identifying individual customer's needs is resource-inefficient; instead, the seller should target larger customer segments. In turn, identifying individual needs but then putting the buyer off with standardized offerings might result in customer dissatisfaction or lower willingness to pay (Lampel and Mintzberg 1996; Minculescu and Kleinaltenkamp 2013). The empirical findings support these assumptions: Firms in the SCXXX antitype configurations have a significantly lower relationship quality than Solution Providers. The goal conflict between individualization and standardization also stimulates the dynamic in these configurations; they are highly labile (only four out of 17 are "stayers"). This instability can already be seen in the Backhaus typology (figure 10), although the author does not explicitly refer to the dynamism of the cells. The SCXXX antitypes can be located in the "Investment Business", which is characterized by a focus on individual customers and individual buying transactions. This however results in high quasi-rents for the customer, i.e. high specific investments in conjunction with high risk that these investments do not deliver the expected ROI, but low quasi-rents for the buyer. The customer's commitment to the relationship is low; he can threaten to leave the relationship, thus lowering prices. Consequently, sellers try to escape this uncomfortable position.

CSSXX Tensions

The interpretation of the CSSXS antitypes is not as straightforward. In general, CSSXX providers try to combine a solution-oriented approach in the two core processes customization and integration with aggregated customer requirements in order to cover larger market segments. The configurations CSSSS and CSSCS are antitypes, while CSSSC has lower, albeit not significantly lower, frequencies than expected; the CSSCC configuration more or less complies with the prediction. Hence, targeting larger segments with customized and integrated offerings is feasible but with less potential for intensive customer relationships. In general, CSSXS sellers benefit less from customization and integration than full Solution Providers, which can be seen particularly in the lack of the "gestalt" benefit. In contrast to buyers of full solutions, however, CSSXS customers require standardized offerings.

These offerings are obviously less effective, but seem to meet the customers' requirements. It is possible that these *mass market solutions* are predominantly "industry solutions" ("Branchenlösungen"). In this case, the customers have a strong interest in standardization to avoid a lock-in (Zimmer et al. 2010). Sellers must ensure compatibility and interoperability with offerings from the competition. That, however, leaves fewer opportunities for differentiation.

CSSXX configurations are also consistent with the predictions derived from Backhaus' typology: vendors that operate in the "systems business" have lower quasi-rents due to lower asset-specific investments. In turn, customers have high relation-specific investments (= systemic lock-in), thus they are usually bound to the seller. This explains the antitype status of the CSSXS configurations, i.e. why CSSXX configurations with proactive post-deployment support emerge less frequent than expected: The sellers do not need to offer comprehensive post-purchase activities because their customers either stay anyway or their defection is not critical.

4 Methodological Addendum: Configuration

Frequency Analysis vs. Latent Class Analysis

“Give a small boy a hammer, and he will find that everything he encounters needs pounding. It comes as no particular surprise to discover that a scientist formulates problems in a way which requires for their solution just those techniques in which he himself is especially skilled.”

Abraham Kaplan

U.S. American philosopher (1918 – 1993)

(1964, p. 28)

4.1 Latent Class Analysis as Alternative Approach

4.1.1 Objective

In the following, the data from study Ia is re-analyzed under the **assumption that an unknown latent structure exists**, which reflects heterogeneity in the population. Therefore, a short introduction in Latent Class Analysis (LCA) will be presented, since this method has similar objectives as CFA. Similarly, LCA belongs to the family of pattern-oriented methods.

This chapter serves two purposes: First, the results of CFA and LCA will be compared with regard to their explanatory power given the diverging assumptions of these two approaches. This also helps to assess the performance and the limitations of CFA since this method has never been applied before in academic marketing research. In addition, no comparison of the two methods can be found in the literature. Second, this chapter lays the foundations for the techniques applied in study Ib (dynamic aspects of B2B solution selling).

4.1.2 Latent vs. Manifest Pattern-oriented Methods

Pattern- (or case-/person-) oriented methods generate knowledge by detecting relations between objects or groups of objects (Bergman and Magnusson 1997;

Bergman and Trost 2006). The underlying assumption is that the objects in the sample originate from more than one population (von Eye 2006, also see section 3.2.1). This heterogeneity results in associations between variables that are used to classify the objects. The observed measurement variables are usually assumed to be independent of each other, this is also called *stochastic, conditional, or local independence* (Collins and Lanza 2010). The violation of this auxiliary assumption and the existence of local associations is the starting point for most pattern-oriented techniques.

The family of pattern-oriented methods (also see figure A1) can be roughly classified into descriptive and model-based procedures. Since only the latter allow for assessing the inferential statistical quality of the results (e.g. using GOF indices), the purely descriptive methods (such as cluster analysis) are not pursued any further here. Model-based methods in turn are based either on manifest or latent variables that express the membership in a group of similar objects⁹⁸. CFA belongs to the family of manifest variable methods: All cells of a multidimensional cross-classification are examined in order to identify exceptional configurations that then are interpreted with reference to an a priori defined base model. On the contrary, the goal of a Latent Class Analysis (LCA) is the identification of unobserved latent classes by fitting a model that *minimizes* the discrepancies between expected and empirical frequencies. The handling of these discrepancies constitutes the key differentiating element between these two approaches (von Eye, Mun, and Bogat 2008): LCA aims at reducing cell frequency residuals, while they are the actual object of analysis in CFA.

4.1.3 Fundamentals of Latent Class Methods

Latent Class Analysis and Latent Profile Analysis allow groups of objects to deviate from the sample mean by assigning these objects to latent classes, which express the probability that an object is part of a hypothetical unobservable subpopulation. This family of methods is also called *Latent Variable Mixture Modeling* (LVMM). The

⁹⁸ Caveat: The latent vs. manifest distinction refers to the membership in a (manifest) configuration or a (latent) class. It does not refer to the nature of the variables that are used for measurement. In traditional LCA, the measurement variables are also manifest.

term mixture modeling⁹⁹ refers to the assumption of multiple, coexistent distributions in the sample. Heterogeneity and the resulting abnormal sample distributions are not regarded as violations of assumptions in LVMM. This is in contrast to most conventional covariance-based methods, for which heterogeneity and its consequences are considered as to threat to validity (e.g. non-normality in regression analysis or heterogeneous variances in ANOVA). The heterogeneity, however, is not directly observable: It is not known *a priori*, from how many populations the sample was drawn. Instead, the number of classes and the class memberships of the objects must be estimated *a posteriori* based on the best fitting model.

Methods based on latent classes had their first peak during the mid 1970ties (Clogg 1995) and have been used predominantly in sociology and clinical psychology, public health and medical research. Their breakthrough in business research is still pending. While methods based on latent *factors* (factor analysis, structural equation modeling for latent variables) belong to the tool kit of nearly any quantitative business researcher, latent *class* methods are still considered somewhat exotic (Wang and Hanges 2011). This is mainly due to the variable-centered research tradition (see chapter 3.2.1) in business research and particularly in marketing research.

4.1.4 Mathematical Model

A latent class model is a special form of a latent variable model (Collins and Lanza 2010). As such, the latent class model shares more similarities with factor analysis (which combines variables) than with traditional cluster analysis (which classifies cases), even though classification plays an important part in LCA. While the unobserved latent variable is continuous in factor analytic approaches, it is categorical in the latent class model. The latent variable L is measured reflectively by several indicator variables (in the example in figure 24 by three variables x_1 - x_2) and

⁹⁹ Mixture modeling – or more precisely finite mixture modeling – is a more recent umbrella term for methods that account for unobserved heterogeneity by means of latent classes (Muthén and Muthén 2000). In fact latent class analysis stands for a large family of methods, including latent class regression analysis, latent profile analysis, latent class clustering and latent class growth modeling. See Berlin, Williams, and Parra (2013) for a recent overview.

is assumed to be error-free; the observed variables have the error terms ε_1 - ε_3 . The indicator variables are also categorical in the original latent class model.

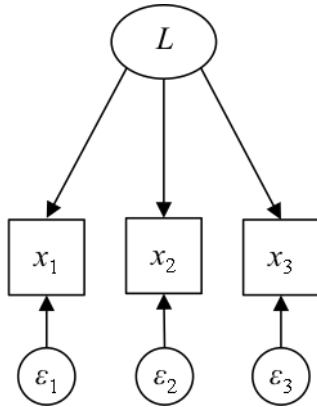


Figure 24: Basic latent class model with three indicator variables

Basis of any LCA is the cross-tabulation of the observed variables and their frequencies, which has a similar role as a covariance or correlation table in factor analysis or covariance-based SEM (Collins and Lanza 2010): the latent class model should replicate the response patterns as exact as possible. If j is the number of observed variables ($j = 1, \dots, J$), which have $r_j = 1, \dots, R_j$ response categories, then the cross table has $W = \prod_{j=1}^J R_j$ cells (for this and the following formulae see Collins and Lanza 2010). To each of the W cells, there is a vector $\mathbf{y} = (r_1, \dots, r_j)$ that contains the responses to the J variables (= response pattern). \mathbf{Y} is an array of all response patterns \mathbf{y} with W rows and J columns. Thus, the frequency of any response patterns depends on the array \mathbf{Y} : $P(\mathbf{Y} = \mathbf{y})$ with $\sum P(\mathbf{Y} = \mathbf{y}) = 1$.

The measurement parameters of a latent class model are the *conditional probability* ρ and the *latent class prevalence* γ . The conditional probability ρ , also called item-response (IR) probability, is the probability for a specific response conditional on latent class membership. The latent class prevalence γ represents the probability of membership in a specific latent class, i.e. the probability of the latent variable L with $c = \dots C$ categories. Since the latent classes are exhaustive and mutually exclusive, each object is member in just one latent class. Both γ and ρ (conditional on a latent class c) sum up to 1.

The probability of a specific response pattern \mathbf{y} can now be calculated as a function of the latent class prevalences γ_c and the conditional probabilities $\rho_{j, r_j | c}$ (formula 3).

$I(y_j = r_j)$ is an auxiliary function that equals 1 if the response to variable j is r_j , otherwise $I = 0$ (Collins and Lanza 2010, p. 41).

$$P(\mathbf{Y} = \mathbf{y}) = \sum_{c=1}^C \gamma_c \prod_{j=1}^J \prod_{r_j=1}^{R_j} \rho_{j,r_j|c}^{I(y_j=r_j)}$$

Formula 3: Basic equation for the probability of observing a particular response pattern

This procedure is repeated for all response patterns \mathbf{y} of the array \mathbf{Y} . An iterative algorithm using maximum-likelihood estimation (usually EM but also Newton-Raphson) modifies the parameters until model fit is reached and the discrepancies between estimated and observed frequencies are minimized (McCutcheon 2002). The number of latent classes is not estimated and must be set by the researcher. Usually multiple models are calculated and compared based on fit indices and information criteria.

The final classification probabilities for the cases are computed using Bayes' theorem (Collins and Lanza 2010), where $P(L = c | \mathbf{Y} = \mathbf{y})$ represents the Bayesian posterior probability $p(\theta | x)$. Nevertheless, basic LCA is usually not considered as a Bayesian method in the strict sense.

Although latent class techniques are usually associated with explorative modeling approaches in which the number and structure of classes is not known in advance, LCA can also be performed in a confirmatory way using parameter restrictions. There are three basic forms (Finch and Bronk 2011; McCutcheon 2002): *Equality constraints* can be applied for testing hypothesized associations between two or more variables by – for instance – forcing their error terms to be equal. If they are assumed to be ordered, then we speak of *inequality constraints*. *Deterministic constraints* test the hypothesis that a particular conditional probability takes a specific value (usually 0 or 1). It is also possible to restrict the latent class prevalences instead of the conditional probabilities. This is seldom done, mainly because hypotheses concerning cluster sizes are rare. Parameter restrictions also serve two other purposes: Since they reduce the number of parameters that need to be estimated they are a last resort if models run out of degrees of freedom without converging. It is also advisable to constrain error terms if large bivariate residuals

remain. Although some of the hypotheses that have been tested by means of CFA in the previous chapters could also be re-examined using confirmative LCA (e.g. through specifying deterministic response patterns for the SPCM prototypes) it is more promising (in terms of theoretical and managerial contributions) to contrast the CFA results with those of a “traditional” explorative LCA. Parameter constraints, however, will only be applied to test if the process variables customization and integration should be treated independently.

The LCM described above follows the *probabilistic parameterization* (McCutcheon 2002). Using log-linear models is also possible but less common (Collins and Lanza 2010). Unrestricted models with the same number of classes are equivalent for both parameterizations. Restrictions, however, affect different sets of parameters for both model types, thus different kinds of hypotheses can be tested. There is clear conceptual (and mathematical) overlap between LCA based on restricted log-linear parameterized models and CFA that apply log-linear models as base models to estimate cell frequencies. This has not been addressed by research so far but is beyond the scope of this thesis.

4.2 Latent Class Clustering of B2B Offerings

4.2.1 Model Generation

The primary purpose of a basic LCA on a set of variables is “to arrive at an array of latent classes that represents the response patterns in the data, and to provide a sense of the prevalence of each latent class and the amount of error associated with each variable in measuring these latent classes” (Collins and Lanza 2010, p. 27). This technique is also called *Latent Class Cluster Analysis* (LCCA) (Vermunt and Magidson 2002, 2005b) or *explorative LCA*. It is not causative, i.e. none of the observed variables has the status of a dependent variable. In terms of SEM, an LCCA is a *measurement model*; only relationships between latent variables and indicators but no relationships between several latent variables are modeled. Again: Despite of the name *cluster analysis*, LCCA has methodologically nothing in common with clustering techniques such as *hierarchical cluster analysis* or *k-means clustering*; as mentioned earlier it is more similar to factor analysis.

Starting point is the cross-classification of the R, C, I, D, and P variables, i.e. the full set of complete response patterns table 20). This is basically the same table as for CFA, with only one exception: Response pattern 0, 1, 0, 1, 0 (which is the CFA configuration CSCSC) is not found in the sample and must be excluded for LCA.

Response pattern	Frequency	Response pattern	Frequency
(0, 0, 0, 0, 0)	32	(1, 0, 0, 0, 0)	7
(0, 0, 0, 0, 1)	7	(1, 0, 0, 0, 1)	1
(0, 0, 0, 1, 0)	2	(1, 0, 0, 1, 0)	2
(0, 0, 0, 1, 1)	4	(1, 0, 0, 1, 1)	1
(0, 0, 1, 0, 0)	11	(1, 0, 1, 0, 0)	11
(0, 0, 1, 0, 1)	7	(1, 0, 1, 0, 1)	4
(0, 0, 1, 1, 0)	5	(1, 0, 1, 1, 0)	3
(0, 0, 1, 1, 1)	11	(1, 0, 1, 1, 1)	10
(0, 1, 0, 0, 0)	14	(1, 1, 0, 0, 0)	18
(0, 1, 0, 0, 1)	2	(1, 1, 0, 0, 1)	7
(0, 1, 0, 1, 0)	0	(1, 1, 0, 1, 0)	4
(0, 1, 0, 1, 1)	7	(1, 1, 0, 1, 1)	22
(0, 1, 1, 0, 0)	12	(1, 1, 1, 0, 0)	31
(0, 1, 1, 0, 1)	7	(1, 1, 1, 0, 1)	21
(0, 1, 1, 1, 0)	10	(1, 1, 1, 1, 0)	20
(0, 1, 1, 1, 1)	15	(1, 1, 1, 1, 1)	219

1 = solution-oriented

Table 20: LCCA response pattern for B2B offerings

The first step is setting up a series of unconstrained models. No restrictions concerning the local independency are imposed on the variables; they only depend on the latent class variable L (formula 4). The goal of the models is to replicate the probabilities for all response patterns π^{RCIDP} as exact as possible.

$$\pi_{ijklmc}^{RCIDPL} = \sum_c \pi_c^L \pi_{ic}^{R|L} \pi_{jc}^{C|L} \pi_{kc}^{I|L} \pi_{lc}^{D|L} \pi_{mc}^{P|L}$$

Formula 4: Basic latent class model (Goodman's notation) with the five SPCM process steps as indicator variables (see Goodman 2002)

Thus, the cell frequency of a specific configuration equals the sum of the estimated conditional item response probabilities multiplied by the sample size ($n = 527$). The test statistics express the summarized differences between predicted and actual frequencies. Table 21 displays the results:

Model Summaries for Unconstrained Latent Class Analysis, 1-6 Classes (n = 527)											
Classes	$L^2 (G^2)$	BIC(L^2)	AIC(L^2)	# Par.	df	p.	LL	BIC(LL)	AIC(LL)	Class. Err.	Entropy
1	512.09	349.14	460.09	5	26	< .001	-1570.98	3173.30	3151.97	0	n.a.
2	80.91	-44.43	40.91	11	20	< .001	-1355.39	2779.73	2732.79	.06	.76
3	43.90	-43.84	15.90	17	14	< .001	-1336.89	2780.32	2707.78	.12	.76
4	10.43	-39.71	-5.57	23	8	.24	-1320.15	2784.45	2686.31	.12	.79
5	4.50	-8.03	0.50	29	2	.11	-1317.19	2816.12	2692.38	.12	.86
6	1.92	26.99	9.92	35	-4	n.a.	-1315.90	2851.15	2701.80	.18	.87

Entropy values were computed in Mplus, all other values taken from Latent Gold.

Table 21: Summary table for Latent Class Cluster Analysis (situation today)

All models converged within the limit of 250 iterations; no issues were reported. Model number 6 could – as expected – not be fully identified (see below).

4.2.2 Model Selection

One of the main advantages of Latent Class Clustering over conventional clustering (hierarchical, k-means) is that the decision for the number of clusters is based on fit indicators and information criteria that are known from standard structural equation modeling. The information criteria (BIC, AIC) allow for comparing models with different number of classes and penalize the test statistics for the increase in parameters. However, the final decision should not only depend on numerical values but also incorporate theoretical considerations. Therefore, a “shortlist” is created based on the most common indices, and then the selected solutions are examined in detail.

χ^2 -based $L^2 (G^2)$ Statistics

χ^2 -based statistics are generally only available if all variables are categorical; which is the case for this analysis. The L^2 goodness of fit value represents the residual association among the variables; hence, the lower the better¹⁰⁰. The p -value for L^2 is χ^2 -distributed with the indicated degrees of freedom. The null hypothesis stands for a

¹⁰⁰ In the context of categorical data analysis, L^2 is often referred to as G^2 (Agresti 2002) or Likelihood Ratio χ^2 (Muthén and Muthén 2012)

model fit; hence a fitting model cannot be assumed for values below .05. As a rule of thumb (Vermunt and Magidson 2005a), L^2 should not be substantially higher than the degrees of freedom for a given model. In LCA, the maximum number of parameters to be estimated is limited by the number of configurations minus one. With five dichotomous variables, this results in $2^5 = 32$ configurations (the same as before in CFA) with a maximal number of 31 parameters that can be estimated (equals maximum degrees of freedom). For this reason, model 6 has a negative df of -4 and can be discarded.

The AIC in context of LCA penalizes the L^2 value by two times the number of degrees of freedom: $AIC = L^2 - 2df$; the BI criterion also considers the sample size: $BIC = L^2 - df [\ln(n)]$ (McCutcheon 2002). Lower values imply better model fit.

LL Statistics

The log-likelihood (*LL*) and the corresponding BIC and AIC values provide additional information, particularly if L^2 is not χ^2 -distributed or not available when continuous variables are included. Given the relatively large, non-sparse dataset, L^2 parameters can be used. However, for nested LC models and latent profile analysis with continuous variables (i.e. non-dichotomized scenario ratings, see appendix), *LL* statistics must be considered. Lower absolute *LL* values indicate better fit.

Preliminary Decision

Only the four and the five-class solution are on the “shortlist”; the null hypothesis of model fit must be rejected for the one-, two-, and three-class solutions ($p < .05$); the six-class solution is not identifiable. The five-class solution has lower L^2 and *LL* and values; the four-class solution has a lower AIC and BIC (L^2 and *LL*), a slightly lower classification error and is more parsimonious¹⁰¹. A bootstrapped $-2LL$ difference test – where the 4-class model is nested into the 5-class model – is not significant ($-2LLD = 5.93$; $p = .28$; $s.e. = .02$); indicating no improvement over the 4-class solution. The *entropy*, a measure for the quality of latent class separation (Collins and Lanza 2010; Hagerty, Carman, and Russell 1988), is also acceptable ($> .8$) for

¹⁰¹ The BIC was shown to perform best among the information-based criteria (BIC, AIC, and derivatives) in Monte Carlo simulations (Nylund, Asparouhov, and Muthén 2007).

both solutions but slightly better for the 5-class option. Up to this point, no clear decision can be made in favor of the 4- or 5-class model.

Bivariate Residuals and Parameter Constraints

The bivariate residuals represent the differences between empirical and estimated frequencies based on posteriori probabilities and are therefore measures for *local* fit (in contrast to the before mentioned *global* fit indices). Both the 4-class and the 5-class solution show uncritical values, i.e. far below 1.0 (Vermunt and Magidson 2005a).

Bivariate Residuals				
Indicators	RD	C	I	D
4-class solution				
Requirements Def.	.			
Customization	.0042	.		
Integration	.0043	.0003	.	
Deployment	.0043	.0067	.0007	.
Post-Depl. Support	.0013	.0168	.0897	.0052
5-class solution				
Requirements Def.	.			
Customization	.0068	.		
Integration	.0020	.0352	.	
Deployment	.0006	.0014	.0005	.
Post-Depl. Support	.0008	.0684	.0002	.0003

Table 22: Bivariate residuals for the 4 und 5-class solution

High bivariate correlations also indicate a strong violation of local independence that cannot be explained by the latent class variable. This should be counteracted by constraining parameters (Collins and Lanza 2010; Vermunt and Magidson 2005b). However, given the low residuals in both models (table 22), there is no *evident* need for parameter constraints.

One of the theoretical extensions of the Solution Process Chain Model was the separation of the processes *customization* and *integration*, which have been combined in the original conceptualization by Tuli et al. (2007). Fixing the bivariate residuals between the two measurement variables *C* and *I* and adding a direct combined effect (Vermunt and Magidson 2005b), which is equivalent to relaxing the

assumption of local independence between these indicators, does not yield a significantly better fit for the 4-class model ($-2LL$ difference $< .001$; $p = .95$; $L^2(G^2) = 10.43$; $BIC (L^2) = -33.43$; $AIC (L^2) = -3.57$; $LL = -1320.15$; $BIC (LL) = 2790.72$; $AIC (LL) = 2688.30$) nor for the 5-class model ($-2LL$ difference = $.13$; $p = .74$; $L^2(G^2) = 4.37$; $BIC (L^2) = -1.90$; $AIC (L^2) = 2.37$; $LL = -1317.12$; $BIC (LL) = 2822.26$; $AIC (LL) = 2694.25$). Furthermore, the null hypothesis of model fit must be rejected for the modified 5-class model.

Variable-wise Contributions: Communalities Between Classes and Variables

	4-class		5-class	
	Loadings	R^2	Loadings	R^2
Requirements Def.	.83	.68	.90	.81
Customization	.60	.36	.57	.33
Integration	.52	.27	.62	.39
Deployment	.80	.64	.79	.62
Post-Depl. Support	.72	.52	.74	.54

Loadings are the square roots of the R^2 value, which represent the shared variance of all classes regarding the variable. They can be interpreted as standardized regression coefficients (Vermunt and Magidson 2005b).

Table 23: Shared variance among classes and variables

Although customization and integration share the least variance across all classes (see table 23), it is therefore advisable to treat *customization* and *integration* independently.

Local maxima

Latent class and other finite mixture methods assume the existence of various sub-populations, each with its own distribution. Hence, it cannot be excluded that the iterative algorithm has reached only a local maximum of such a mixed distribution (figure 25).

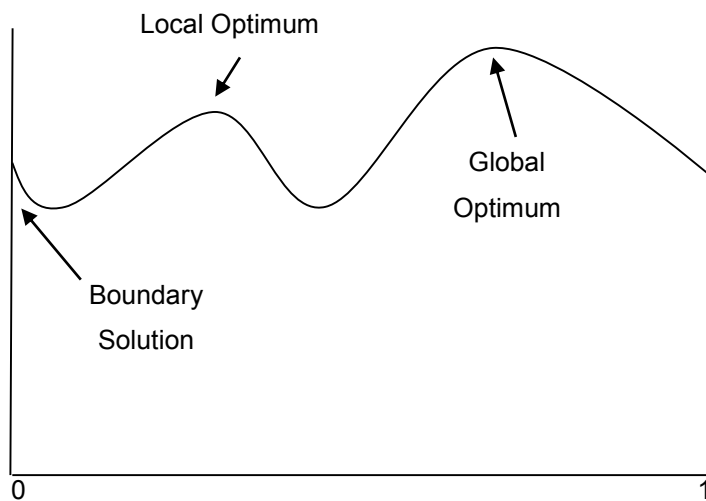


Figure 25: Optima in finite mixture modeling (McCutcheon 2002, p.65)

Most LCA applications feature a random start value option and / or bootstrapping to tackle this issue.

To check for local maxima, the recommendations by Uebersax (Uebersax 2000) and Geiser (Geiser 2011) were followed for the two shortlisted solutions:

- Tight convergence criterion: the settings for the change in LL from iteration to iteration were reduced from $1 E^{-8}$ (factory setting) to $1 E^{-10}$.
- Multiple start values: each solution was computed at least five times; iteration statistics were examined and seed values for the best solutions were compared. Each time, the model converged within the iteration limits (250 for EM, 50 for Newton-Raphson in Latent Gold) with the same LL values at different seed values.
- Bootstrapping (1000 drawings) was used for L^2 , supporting the fit hypothesis for both models ($p_{4\text{-cluster}} = .48$, $p_{5\text{-cluster}} = .73$).
- Replication by a second software: LCA (mixture analysis) in Mplus 7.11 came to similar results: $LL_{4\text{-class}} = -1319.84$; $BIC (LL_{4\text{-class}}) = 2783.82$; $AIC (LL_{4\text{-class}}) = 2685.68$; $LL_{5\text{-class}} = -1316.67$; $BIC (LL_{5\text{-class}}) = 2815.10$; $AIC (LL_{5\text{-class}}) = 2691.35$ Mplus did not report any issues during convergence either.
- Keeping the number of latent classes low: Adding latent classes is the main source for issues with local maxima (Uebersax 2000). Although a number of

criteria speak for the 5-class model (see table 24 for additional statistics), the more parsimonious 4-class model will not be discharged at this point in time.

Boundary solutions (item-response probabilities near close to zero or one) were found three times in three iterations for the 4-class solution and seven times in two iterations for the 5-class solution. Given 1000 computed iterations in Mplus, these values are acceptable.

Conclusion: Convergence on a local maximum does not seem to be a problem for both models.

LCA Model Comparison				
	4-class Model		5-class Model	
Number of parameters	23		29	
χ^2 statistics		<i>p</i> (s.e.)		<i>p</i> (s.e.)
<i>df</i>	8		2	
L^2 (G^2)	10.43	.24	4.50	.11
Bootstrapped L^2		.48 (.02)		.73 (.01)
Pearson χ^2 ^{a,b}	7.16	.52	2.92	.23
Cressie-Read (lower better)	8.33	.40	3.87	.14
Likelihood χ^2 ^b	9.80	.28	3.47	.18
Classification statistics				
Classification errors	.12		.12	
Reduction of errors (Lambda)	.75		.74	
Standard R^2	.71		.73	
AWE (lower better) ^c	3376.33		3446.22	

^a Not comparable across solutions with different number of clusters.

^b Obtained from Mplus LCA, all other values from Latent Gold

^c AWE (average weight of extraction): similar to BIC, takes classification performance into account, lower = better

Table 24: Comparison of the 4- and 5-class solutions

4.2.3 Description of the Latent Classes

Since a clear decision for the four- or five-class solution based merely on test statistics and model parameters cannot be made, the two solutions will be compared in terms of the interpretability of the classes. Finally, both models will be contrasted with the results from CFA.

The notation for the LCA results follows Collins and Lanza (2010). The conditional probability ρ for the solution-style answer (scenario 2) is indicated; the

conventional/component-style probability would be $1 - \rho_{\text{solution}}$. The item-response probabilities will be used to describe the latent classes, similar to factor loadings in explorative factor analysis. In contrast to factor loadings or regression coefficients, IR probability values close to zero are as meaningful as values close to one. Probabilities higher than .5 are in bold for better interpretability.

Additionally, the typical response pattern (corresponding to the equivalent configuration in CFA notation) is indicated. During the estimation of the LCA models, each response pattern was iteratively assigned to the most probable latent class; the tables will show the final classification based on the modal assignment of patterns to classes.

Model with Four Latent Classes

The largest class (class 1) comprises about the half of the sample and has constantly high solution-style IR probabilities across the five process stages (table 25). Since a second, smaller class exists that has a rather component/conventional-style requirements definition (class 3) but follows a solution approach in the remaining processes, class 1 is labeled *Solution Provider* (corresponding to the CFA type SSSS), firms in class 3 are *Mass Market Solution Seller* corresponding to the CFA antitype CSSS). The IR probability for customization (.57) is close to the cut-off value of .5; thus it is the most “fuzzy” in class 3.

Firms in the second largest class (number 2) identify their customers’ requirements in a way solution sellers do; they also tend to customize and integrate their offerings. However, they deploy their offerings in a conventional manner, thus it is up to the customer to draw the maximum benefits out of the offering and handle their post-purchase activities in rather reactive way. This response pattern is equivalent to the SSSCC configuration, which is neither a type nor an antitype in CFA; it is labeled *Modifier*.

Conditional Probabilities and Latent Class Prevalences for 4-Class LCA

	Latent class			
	1	2	3	4
Label	Solution Provider	Modifier	Mass Market Solution Seller	Components Seller
Probability of membership	.52	.21	.16	.12
Conditional probability of a solution-style answer (IR probability)				
Requirements Definition	.99	.83	.20	.06
Customization	.97	.76	.57	.23
Integration	.91	.65	.78	.21
Deployment	.94	.14	.74	.02
Post-Deployment Support	.94	.20	.70	.14
Typical CFA “marker” configuration that describes the response pattern best	SSSSS (T)	SSSCC	CSSSS (AT)	CCCCC (T)
Manifest configurations with a modal assignment to this class	SSSSS SSSCS SSSSC SSCSS SCSSS	SSSCC CSSCC SCCCC SCCCS SCCSC SCSCC SCSCS SCSSC SSCCC SSCCS SSCSC	CSSSS CCCSC CCCSS CCSCS CCSSC CCSSS CSCSS CSSCS CSSSC SCCSS	CCCCC CCCCC CCSCC CSCCC CSCCS
Class sizes based on posterior classifications	292	100	69	66

Table 25: Summary for LCA with four classes

The smallest class (number 4) has component-style IR probabilities throughout all SPCM steps; hence it is labeled *Component Seller*, corresponding to the CFA type CCCCC.

The Solution Provider is the largest class based on the modal assignments, which is not surprising given the 219 manifest SSSSS configurations. No class is smaller than the recommended size of 50 cases (Muthén and Muthén 2000). All manifest “marker” configurations are correctly classified into their corresponding classes. The quality of the classification is discussed below.

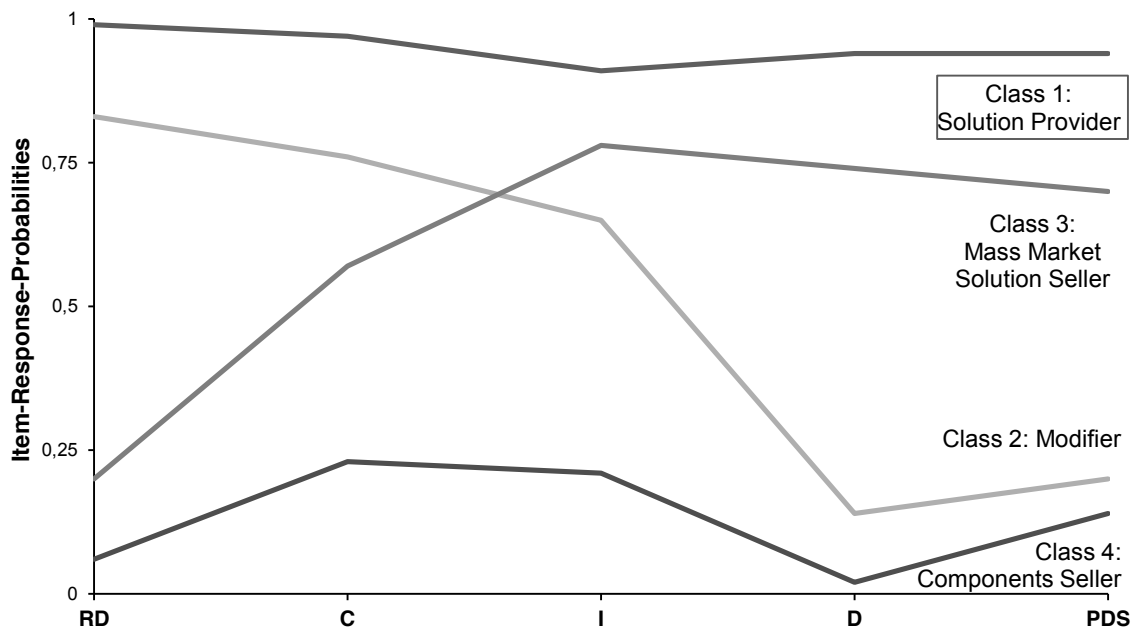


Figure 26: Four-class solution (probabilities towards solution-style response)

Model with Five Latent Classes

A fifth class emerges in the 5-class model (table 26 and figure 27); the four previously identified classes remain the same. This class is characterized by customization and integration while the other processes are carried out in a component / conventional manner, thus it is labeled Mass Customizing Integrator. The CFA antitypes for Mass Customizer and Resource Integrator, however, are assigned to the Component Seller class.

In LCA, the quality of the class separation – a concept similar to simple structure in factor analysis – cannot be assessed immediately by statistical parameters. A low *entropy* value usually indicates issues with class separation. These values are acceptable for both the four and the five class models (.79 and .86; potential range 0 to 1.00). However, a number of item response probabilities in the classes 4 and 5 of the 5-class model are close to the value of .5, indicating almost equal probabilities for both the component and the solution scenarios. This does not imply a formal weak class separation, but the explanatory power of these classes is lower. Also the class sizes become smaller with every class added; the classes 4 and 5 are below the recommended size of 50 cases.

Conditional Probabilities and Latent Class Prevalences for 5-Class LCA

Label	Latent class				
	1 Solution Provider	2 Modifier	3 Components Seller	4 Mass Customizing Integrator	5 Mass Market Solution Seller
Probability of membership	.51	.18	.13	.12	.06
Conditional probability of a solution-style answer (IR probability)					
Requirements Definition	1.00 ^a	.98	.06	.21	.11
Customization	.97	.77	.28	.61	.59
Integration	.91	.62	.15	.99	.59
Deployment	.95	.17	.04	.49	.95
Post-Deployment Support	.95	.21	.16	.44	.99
Typical CFA configuration that describes the response pattern best	SSSSS (T)	SSSCC	CCCCC (T)	CSSCC	CSSSS (AT)
	SSSSS	SSSCC	CCCCC	CSSCC	CSSSS
	SCCSS	SCCCC	CCCCS	CCSCS	CCCSS
	SCSSS	SCCCS	CCCSC	CCSSC	CCSSS
	SSCSS	SCCSC	CCSCC	CSSCS	CSCSS
Manifest configurations with a modal assignment to this class	SSSCS	SCSCC	CSCCC	CSSSC	
	SSSSC	SCSCS	CSCCS		
		SCSSC			
		SSCCC			
		SSCCS			
		SSCSC			
Class sizes based on posterior classifications	293	88	68	41	37

^a four-digit value is .9961

Table 26: Summary for LCA with five classes

Overall, the more parsimonious 4-class model provides better interpretable results – at least in terms of number, sizes and discriminatory power.

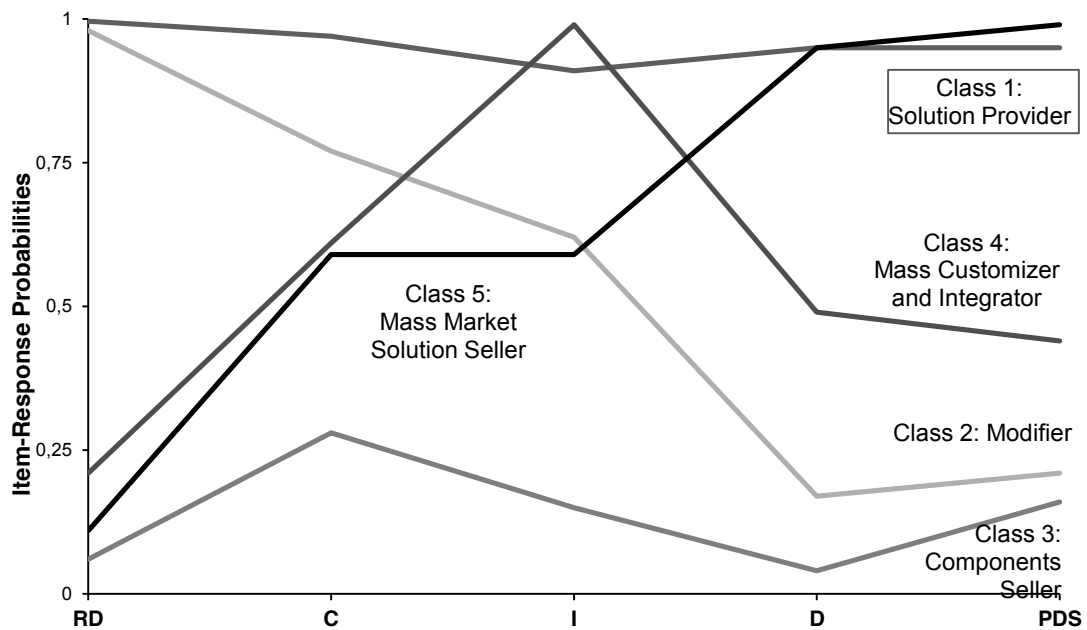


Figure 27: Five-class solution (probabilities towards solution-style response)

4.2.4 Comparing the Results: LCA vs. CFA

CFA and LCA have different objectives: LCA attempts to identify a latent categorical variable that structures the observed response patterns and reduces heterogeneity. In CFA there is no such latent structure. Instead manifest configurations are analyzed, particularly those that significantly differ from the predictions of a base model. Thus, CFA is a residual analysis and de facto the opposite of LCA. Yet just because of the diverging goals, it is reasonable to compare the results in order to evaluate the instruments' capabilities as research instruments within the pattern/person/case-oriented approach.

Both methods identify the Solution Provider as an outstanding configuration or response pattern: It is a hypothesized and confirmed CFA type, and a distinct SSSSS response profile can be identified in both latent class models. The Solution Provider class, however, also contains other configurations, among those CFA antitypes such as the Systems Seller (SSSSC), the "pick-up" Solutions Seller (SSSCS) and the SCSSS configuration, for which CFA attested the SCXXX conflict. Further analyses using describing variables identified the SSSSC and the SSSCS configurations as variants of the Solution Provider.

Classification Results: First-order CFA vs. LCA

Config.	f_0	T/AT	CFA		Modal assignment for	
			Comment	4-class LCM	5-class LCM	
CCCCC	32	T	Confirmed Component Seller	Component Seller	Components Seller	
CCCCS	7		Hypothesized Remote Connector	Component Seller	Components Seller	
CCCSC	2			Mass Market Solution Seller	Components Seller	
CCCSS	4			Mass Market Solution Seller	Mass Market Solution Seller	
CCSCC	11	T	Confirmed Resources Integrator	Component Seller	Components Seller	
CCSCS	7			Mass Market Solution Seller	Mass Customizing Integrator	
CCSSC	5			Mass Market Solution Seller	Mass Customizing Integrator	
CCSSS	11			Mass Market Solution Seller	Mass Market Solution Seller	
CSCCC	14	T	Confirmed Mass Customizer	Component Seller	Components Seller	
CSCCS	2			Component Seller	Components Seller	
CSCSC	0		Hypothesized AT	n.a.	n.a.	
CSCSS	7			Mass Market Solution Seller	Mass Market Solution Seller	
CSSCC	12			Modifier	Mass Customizing Integrator	
CSSCS	7	AT	CSSXX-conflict	Mass Market Solution Seller	Mass Customizing Integrator	
CSSSC	10			Mass Market Solution Seller	Mass Customizing Integrator	
CSSSS	15	AT	CSSXX-conflict	Mass Market Solution Seller	Mass Market Solution Seller	
SCCCC	7			Modifier	Modifier	
SCCCS	1			Modifier	Modifier	
SCCSC	2			Modifier	Modifier	
SCCSS	1	AT	SCXX-conflict	Mass Market Solution Seller	Solution Provider	
SCSCC	11			Modifier	Modifier	
SCSCS	4	AT	SCXX-conflict	Modifier	Modifier	
SCSSC	3	AT	SCXX-conflict	Modifier	Modifier	
SCSSS	10	AT	SCXX-conflict	Solution Provider	Solution Provider	
SSCCC	18			Modifier	Modifier	
SSCCS	7			Modifier	Modifier	
SSCSC	4	AT		Modifier	Modifier	
SSCSS	22			Solution Provider	Solution Provider	
SSSCC	31			Modifier	Modifier	
SSSCS	21	AT	Pick-up Solution Seller	Solution Provider	Solution Provider	
SSSSC	20	AT	Hypothesized Systems Seller	Solution Provider	Solution Provider	
SSSSS	219	T	Confirmed Solution Provider	Solution Provider	Solution Provider	

"Marker" response patterns in bold.

Table 27: Comparison of the classification results: CFA vs. LCA (4 + 5 classes)

If researchers want to achieve similar results within a latent class approach, they would have to “decompose” the classes. This is not only against the basic idea of this method; it is also doubtful that this can be accomplished because – as we know from

the CFA base model – the types and antitypes are caused by complex higher order interactions.

The same applies to the Component Seller: it is both a clear CFA type and typical response pattern of a distinct latent class. But once again, other configurations are added to the Component Seller class, among those the CFA types Resources Integrator and Mass Customizer. These have also been identified as subtypes of the component seller during the validation analyses that followed CFA (see section 3.7).

The second largest latent class is characterized by a SSSCC response pattern, which stands for firms that identify individual customer needs, and accordingly customize and integrate the offering. The implementation is up to the customer and post-purchase activities are limited to reactive repair services. The corresponding configuration is the third largest in CFA but does not stand out because the empirical frequencies are in line with the predicted. The latent class, however, also contains two SCSXX antitypes, which point to the conflicts between solution-oriented (i.e. individual) customer requirements definition and standardization.

The marker pattern for the Mass Market Solution Seller (CSSSS) is also one of the CFA antitypes that highlight potential tensions between mass-market oriented requirements definition and subsequent customization and integration. The 5-class LCM identified an additional class that is characterized by a combined solution-style customization and integration while the remaining processes are component-oriented. The corresponding CFA configurations are inconspicuous.

4.3 Methodological discussion

In the following, LCA and CFA will be contrasted in order to highlight the comparative advantages.

Both approaches identify the Solution Provider and the Component Seller as somehow exceptional. Beyond this, they have little in common: LCA identifies several “marker” response patterns that CFA identifies as antitypes (e.g. CSSSS). CFA also identifies tensions for a number of configurations and thus points to outstanding cross-configural patterns. In contrast, the latent structure that LCA presents remains predominantly nebulous. Although it is not the primary purpose of CFA to uncover coherent outstanding patterns as it works at the level of single manifest configurations, CFA does a better job in revealing structures than LCA – at least with regard to the underlying theory used in this thesis.

The key difference lies in the different handling of local independence: Both methods presuppose local associations between the measurement variables, i.e. violations of the assumption of local independence. The local associations result in discrepancies between observed and predicted cell frequencies. The larger these differences, the greater their diagnostic relevance in CFA¹⁰². In contrast, LCA aims at minimizing these discrepancies by modeling an explanatory categorical variable. Since CFA focuses on a few discrete outstanding configurations, no statements were made on configurations that comply with the base model – regardless of the cell count. On the contrary, LCA “sacrifices” local associations – which might be interesting for research – in favor of the higher-level goal of reducing complexity. Figuratively speaking: LCA attempts to draw the “big picture” using as few brushstrokes as possible; CFA points to something that does not fit into the picture.

¹⁰² Kieser and Victor (Kieser and Victor 1999; Victor and Kieser 2003), however, argue that the (desired) violation of *local* independence renders procedures for frequency estimation and hypothesis testing useless that rely on the assumption of *total* independence, e.g. conventional log-linear models. They propose an iterative procedure that at first declares emerging types or antitypes as structural zeros; thus they assumption of total independence can be maintained through the next iteration. Hypothesis testing in their CFA approach is consecutively instead of simultaneous. Two configural analyses using modified log-linear models that account for structural zeros can be found in the appendix.

Hence, the two methods – if applied confirmatively – address different questions in typology research: LCA tests if a *coarse scheme* describes reality sufficiently adequately. CFA tests if *highly specific prototypes* exist. LCA focuses on *quantitatively dominating*, CFA on *qualitatively distinctive* types.

Comparison of CFA and LCA

	CFA	LCA (LC Clustering)
Primary objective	Identifying outstanding configurations: types or antitypes	Identifying latent categorical structures and classifying objects into these categories
... which is realized through	Analyzing discrepancies between observed cell frequencies and those predicted by a base model	Minimizing discrepancies between observed and estimated cell frequencies by modeling association among indicators
Manifest vs. latent	Manifest indicators, no latent structure assumed	Manifest indicators, assumption of a categorical latent variable.
Level of measurement	Nominal (dichotomous works best, but polytomous possible, limited by number of cross-classifications)	“Classic” LCA: nominal; Latent Profile Analysis for continuous indicators
Sample size recommendations	5 x number of cells	> 500, > 50 per class
Explorative / confirmative	Both	Both
Local independence	Violation expected for types and antitypes	Violation expected, explanation by latent class variable. Issue if this fails (→ residuals)
Scope	Only a few objects are types or antitypes	All objects are assigned to one of the latent classes.
Model fit	Base model is expected to fail (H_0 should be rejected); types and antitypes emerge as a consequence of higher order interactions that are <i>not</i> part of the base model	Model is expected to fit (H_0 should <i>not</i> be rejected), model fit necessary but not sufficient.
Model selection / type determination	For model: Overall significant χ^2 value For types and antitypes: Variety of tests (exact and approximated binomial, χ^2 , ...)	Variety of test statistics (L^2 , LL , χ^2) and information criteria (AIC, BIC, ...); difference testing for nested models
Model parameters to be estimated	Expected frequencies	Latent class prevalences, conditional probabilities (item-response probabilities)
Shared variance and error of variables	Not of interest, but can be estimated via log-linear modeling.	Can be estimated.
Weaknesses	Prototypical configurations are independent of cell counts.	Sacrifices local associations in favor of model fit

Table 28: CFA and LCA: Similarities and differences

5 Study Ib: Transformation Processes

5.1 Problem Description and Research Questions

The mainstream academic and practitioner B2B marketing literature depicts business solutions as a strategic option that is generally superior to selling components or various forms of complex offerings with regard to perceived differentiation, higher profitability and increased customer loyalty (see the synopses in chapter 2.4.2 and for the outcomes section 2.4.9). It is not surprising that publications by practitioners have a prescriptive tone, but also the scientific literature is largely at least implicitly normative: Although conceptual papers mention hurdles and negative outcomes of solutions (such as the need for restructuring the sales force or profitability threatened by long time frames, also see section 2.4.10), there is a strong belief that the potential benefits of solutions should outweigh the associated threats and risks (Nordin and Kowalkowski 2010). Likewise, empirical research – which is predominantly based on case-studies – mainly focuses on challenges that companies had to face on their way towards solutions (Brax and Jonsson 2009; Paiola et al. 2013; Pekkarinen et al. 2012; Salonen 2011) and therefore integrates well in the quasi-paradigm that companies generally *should* move towards solutions.

Besides of this normative tenor in a large number of publications on complex B2B offerings, there is also the assumption of a *general trend* towards solutions, to which researchers usually refer in the introduction section of papers (Brady et al. 2005; Davies et al. 2006; Matthyssens and Buyl 2005; Paiola et al. 2013; Sawhney 2006; Storbacka et al. 2013; Tuli et al. 2007). This assumption is often accompanied by anecdotal evidence (IBM, GE, Nokia, etc.) but to the best knowledge of the author, no empirical study exists that examines this supposed trend towards solutions.

Hence, this section of the thesis focuses on the perceived dynamic of business practices that are usually associated with solutions. This will help to assess the *incidence* of the phenomenon *business solution* and also to evaluate the relevance of transformation research. Therefore, patterns for transitions from one configuration to another are analyzed; in a first step visually, then by means of Latent Transition

Analysis. This longitudinal version of LCA also allows the identification of drivers of change.

This study follows up the analysis of the static situation (*prevalence* of solution selling) as described in the previous chapters of this thesis and uses the same dataset.

5.2 Theoretical Background

5.2.1 The “Transformation Literature”

There is a wide range of statements on how to move towards a solution-based business due to the predominantly normative nature of publications on this topic. In the following, however, only those concepts are considered as part of the *transformation literature in a strict sense* that propose precise steps or pathways toward business solutions or other complex offerings. The majority of the publications included in the synopsis in table 29 are conceptual and normative. Other papers are based on case studies and accompany transforming firms. Originally descriptive, most CSR papers, however, extend their findings and implications beyond their cases, which makes them actually normative. All descriptive papers are success-oriented; none contains a failure story.

Selected Publications on Transition Typologies or Trajectories towards Complex Offerings

Publication	Concept	Type of work	Propositions / Findings
Matthieu (2001)	Servitization	Conceptual normative	<ul style="list-style-type: none"> Two dimensions: service specificity (customer service → product services → service as a product) and organizational intensity (tactic, strategic, cultural), IBM as example for highest level on both dimensions
Large and Conrod (2003)	Solutions	Conceptual normative	<ul style="list-style-type: none"> “Stairstep” model: selling alliances (intra-firm) → bundling → product/service integration → industry-specific solutions → solutions outsourcing (more proactive, industry-wide)
Oliva and Kallenberg (2003)	Servitization	Conceptual normative	<ul style="list-style-type: none"> Continuum model from “service as add-on” to “product as add-on” Measures: Consolidate SSP with the installed base Move from transaction to either relationship-based services (for existing customers) or process-based (new customers) Take over customer’s operations
Auguste, Harmon, and Pandit (2006)	Servitization	Conceptual normative	<ul style="list-style-type: none"> Four-field matrix with dimensions “source of competitive advantage” (economies of skills vs. economies of scales) and “strategic intent” (protect or enhance product vs. expand independent service)

Penttinen and Palmer (2007)	Solutions	Case studies, descriptive	<ul style="list-style-type: none"> • Two dimensions: nature of buyer-seller relationship (transactional vs. relational) and completeness of offering (more vs. less) • Two pathways from basic components seller to integrated solutions: <ul style="list-style-type: none"> • Via integrating components • Via bundling
Matthyssens and Vandenbempt (2008)	Solutions	Case studies, descriptive (+ normative*)	<ul style="list-style-type: none"> • Two dimensions: "technical application integration" and business process integration • Three trajectories, starting at basis products <ol style="list-style-type: none"> 1. Via technical integration towards "tailored systems" 2. Via process integration to process manager (serves as the customer's "back-office") 3. Via both technical and process integration towards a systems integrator, offering turn-key solutions
Helander and Möller (2009)	Solutions / PBC	Case studies, descriptive (+ normative*)	<ul style="list-style-type: none"> • Equipment / material supplier as starting point • Solution provider (based on shared resources agreement) • Performance provider (based on shared revenues agreement)
Matthyssens and Vandenbempt (2010)	Solutions	Case studies, descriptive (+ normative*)	<ul style="list-style-type: none"> • Two dimensions: nature of the added value (product vs. service based) and degree of customization (standardized vs. customized) • Two two-step trajectories from lower left to upper right corner (no labels for stationary situations, only for processes): <ol style="list-style-type: none"> 1. Adding standardized services then tailoring these service add-ons 2. Customizing the product then optimizing customer processes (by means of services)
Probert (2010)	Solutions / PBC	Case studies, descriptive	<ul style="list-style-type: none"> • Four-field matrix with dimensions product vs. customer orientation and relational independence vs. integration • Four contract types: product system support (base type, life cycle product system support (more integrated), functional system support (customer-oriented) and enterprise system support (both)
Paiola et al. (2013)	Solutions	Case studies, descriptive	<ul style="list-style-type: none"> • Four approaches to solutions, not necessarily sequential <ul style="list-style-type: none"> ○ Seller of after-sales services ○ Integrator of after-sales solutions ○ Seller of life-cycle solutions ○ Orchestrator of total solutions
Storbacka et al. (2013)	Solutions	Case studies, descriptive (+ normative*)	<ul style="list-style-type: none"> • Moving along four continua towards solutions: <ul style="list-style-type: none"> ○ Customer embeddedness ○ Offering integratedness ○ Operational adaptiveness ○ Organizational networkedness • Differences for firms with installed base (smooth transition) and asset-heavy "input-to-process" firms (major step)

* Authors extend and generalize their case study findings normatively

Table 29: Selected publications on transition typologies or trajectories

Almost all of these contributions can be divided in either one-dimensional continua or two-dimensional typologies. The continuum models (e.g. Large and Conrod 2003, or Oliva and Kallenberg 2003) propose a number of subsequent compulsory steps that a company has to take in order to become a full solution provider. The typologies are often visualized as matrices with four cells, which offer two (e.g. Penttinen and Palmer 2007) or three (e.g. Matthyssens and Vandenbempt 2008)

alternative trajectories. While the continua also allow intermediate positions, the matrix types have a strong tendency towards “the right upper corner”, thus to the position of the Solution Provider. A number of papers in table 29 stem from the research stream on servitization, which also proposes the Solution Provider as the target position (see section 2.4.7). Accordingly, these concepts propose to establish or to expand the service business. Transition concepts that draw upon the solution literature in a narrower sense recommend enriching the basic offering by means of customization or integration.

5.2.2 Exemplary Concepts

Two typical representatives of the continuum and matrix type models are presented in the following.

Widely cited in the solution literature is the service transition model by Oliva and Kallenberg (2003). The authors describe a continuum (similar to Shostack 1977) where the left pole is determined by services as an add-on and the right pole by tangible products as an add-on (figure 28). Firms should analyze their current and target positions and choose the fitting strategies. In many cases, so Oliva and Kallenberg, companies already offer some product-related transactional services to their installed base, primarily to support their product-based business. The first measure is to consolidate these SSP (e.g. through reporting systems and HRM). Then manufactures can either move towards more relational service with the installed base (e.g. from repair services to preventive maintenance) or towards process-based services that are also offered to new customers (e.g. consulting services). The final stage is reached when the company takes over the end-user’s operation – a position similar to a performance contractor who is in fact a full service solution provider (see chapter 2.4.6).

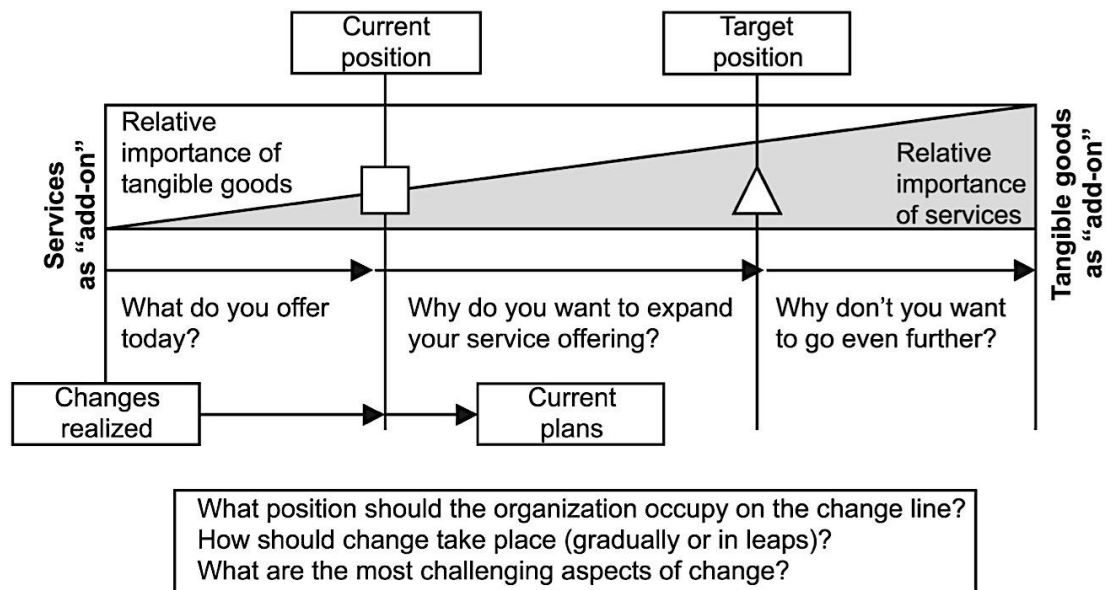


Figure 28: Product-service continuum according to Oliva and Kallenberg (2003)

The typology by Penttinen and Palmer (2007) describes both the static positions and the transition processes between these positions. Two dimensions make up the matrix: the nature of the buyer-seller relationships (from transactional to relational) and the completeness of the offering (from less to more). Although there are some parallels to Doster and Roegner's (2000) typology, Penttinen and Palmer's approach is theoretically deeper grounded, namely in transaction cost economics and social exchange theory (cf. Thibaut and Kelley 1959). The authors exemplify two transition trajectories using case studies. The Swedish ball bearing manufacturer SKF first added monitoring and maintenance services to its standard offerings (increasing completeness), then SKF intensified the relationship by introducing new marketplaces and "intelligent" bearing that feature remote diagnosis. The Finnish elevator manufacturer KONE first switched from transactional to availability-based contracts and then added additional services (such as remote diagnostics). Two other case firms also started with basic components and ended as solution providers, which makes the authors assume that the transitory stages (II and III, see figure 29) are instable, probably due to unilateral asset specificity or unbalanced relationship power.

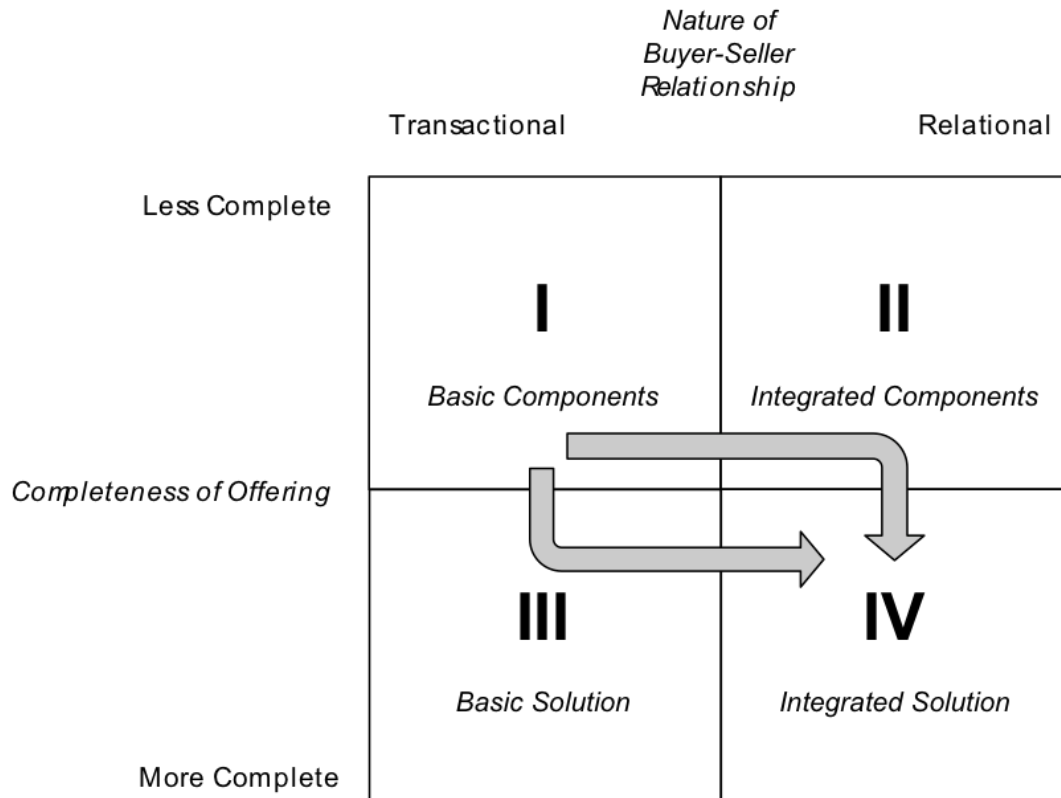


Figure 29: Solution Transition Model by Penttinen and Palmer (2007)

Both examples demonstrate the strengths and weaknesses of conceptual-normative and case-study-based descriptive research. Oliva and Kallenberg’s servitization continuum convinces as an easy to apply framework for business practice but lacks a comprehensive theoretical underpinning. Penttinen and Palmer’s case-study approach is theoretically well founded and explains the measures taken by the four examined firms but it is not capable to extend the findings to other contexts. It also has shortcomings in the precision of assigning actions to one of the dimensions: the purpose of introducing remote diagnosis, for instance, is transforming the relationship in one case, in the other case it is completing the offering. Both approaches however are not capable to draw a bigger picture, i.e. assessing the frequency and the scope of such transformation processes.

The present study fills the void that has been left open by the aforementioned basic types of research on transformation processes towards solution selling: It draws upon a solid theoretical basis (the previously established configural Solution Process Chain model) and uses a sample that is large enough to generalize.

5.2.3 Research Objectives

The primary objective of this study is to gain insights into the dynamics of marketing techniques associated with complex B2B offerings. More specifically, the study will discuss the question whether there is a “trend” towards solution selling or not (*incidence* of solution selling). A second goal is to identify potential driving forces of the change processes.

The theoretical foundation is the Solution Process Chain Model (see section 2.5.6). According to this model, firms must decide between a solution-oriented and a conventional or component-oriented handling of the five processes *requirements definition, customization, integration, deployment* and *post-deployment support*. Firms can then be classified into one of the resulting 32 categories, based on the decisions for the company’s (or the SBU’s) core offering. Some of these 32 configurations are prototypical, including the Solution Provider. The main focus of this study is on perceived changes in the direction of this type, which is characterized by a solution-oriented approach throughout all five processes; but also other configural changes will be considered, i.e. whenever a company modifies one or more of its partial strategies.

The research strategy includes both descriptive and explorative elements. A strict inferential statistical decision whether a trend towards solutions exists would require a threshold as basis for the hypothesis. There are, however, no commonly accepted criteria for such a threshold¹⁰³. Thus, the transformations will be described and subsequently evaluated.

¹⁰³ At least in this context, the word *trend* is vague. Does it imply 40, 50, 60, etc. percent of companies have transformed into solution sellers? On the other hand, defining the null hypothesis as “zero change” is too strict; a rejection would be very likely.

5.3 Measures and Methods

5.3.1 Data and Measurement

Study Ib uses data that were collected for study Ia (see sections 3.4 and 3.5). Respondents were asked to choose between two scenarios that describe their firm's handling of the aforementioned processes. One scenario describes a component-oriented, the other a solution-oriented approach. The participants were also asked to evaluate their company's position five years ago and five years ahead. Including the current position, this results in three measurement points, covering ten years of development. A similar measurement approach can be found in one of the survey studies for the Miles and Snow typology (Snow and Hrebiniak 1980) but was never exploited by the authors. The measures, of course, are not longitudinal in a strict sense, i.e. measured *at* three points in time. Instead they represent perceptions *of* three points in time; hence this type of data will be labeled "pseudo-longitudinal"¹⁰⁴.

One of the 527 subjects indicated in the comments section, that she or he was not employed by this firm five years ago. Nevertheless, this case has not been excluded because other answers led to the conclusion that this respondent knows the company sufficiently enough.

The original level of measurement was continuous (6-point rating scale). Due to the bimodal distribution of the variables (see table A16 et seq.), a dichotomization leads to only little loss of information. This is also supported by the similar profiles provided by LCA (dichotomous indicators) and LPA (continuous indicators, see appendix page 347).

¹⁰⁴ In "pseudo-longitudinal" study designs in medical research, patients of different ages are contrasted (Altman 1990). In this study, "pseudo-longitudinal" stands for retrospective and prospective hypothetical measurement points.

5.3.2 Methodical Considerations

There are several options to analyze changes in configurations over a limited period of time¹⁰⁵. The choice depends on the assumption of a latent structure, the number of repeated measures, and the number and the level of measurement of the indicators.

Methods such as Longitudinal Configural Frequency Analysis (LCFA, Krauth and Lienert 1995; von Eye et al. 2010; von Eye et al. 2008) do not assume a latent structure. Instead, they aim at identifying manifest patterns that emerge more frequent (change type) or less frequent (change antitype) than predicted by a base model. Since the data in this study comprises three repeated measures with 31 or 32 configurations each ($c_{t-1} = 32$, $c_t = 31$, $c_{t+1} = 31$), the resulting matrix contains 30752 cells, hereof 30556 sampling zeros. The number of trajectories can be reduced via variable-wise transition coding (Krauth 1993), e.g. by assigning the same code to C-C-S and C-S-S transition patterns; however, the remaining number of change configurations is still not manageable. Furthermore, considering the sheer size of the transition matrix and the high number of empty cells, the presence of a latent structure is very likely. For these two reasons, CFA-based methods that examine outstanding manifest change configurations are discarded.

One of the options that assume latent change patterns is LCA for repeated measurements (RMLCA). This method works best for a small number of categorical indicators (preferably just one) that is measured at least three times (Collins and Lanza 2010). RMLCA identifies latent classes that represent different change patterns over time, which can be visualized as diverging curves. Applied to the present case, that could be the hypothetical classes with low-low-high and high-high-high conditional probabilities for the variable *integration* at the three time points. This potential result, however, is only of limited use because not all five process variables can be incorporated. This also applies to the family of Growth Mixture Models (Berlin, Parra, and Williams 2013; Jung and Wickrama 2008; Muthén and Muthén 2000; Ram and Grimm 2009; Wang and Bodner 2007), also called Latent Growth Curve Models (LCGM) (Byrne and Crombie 2003; Duncan and Duncan 1995; Duncan, Duncan, and Strycker 2006). In contrast to RMLCA, these techniques

¹⁰⁵ Methods for analyzing time series (i.e. massively longitudinal) data are not in the focus here.

test the hypothesized shape of a trajectory (linear, quadratic, cubic, ...) and use continuous indicators. The majority of latent growth models also focus on just one or two trajectory variables, e.g. profit level and growth (Eggert et al. 2011). More variables are possible; but since the number of parameters to be estimated increases exponentially with every variable added, the models become extremely complex and must be restricted massively.

While RMLC and LCG approaches model a time vector for individuals, Latent Transition Analysis (LTA) estimates the incidence of transitions from one time point to the next (Collins and Lanza 2010). Hence, LTA is suitable for research questions that involve the change of latent classes across time and the probabilities to stay within or move to another class. LTA belongs to the family of stage-sequential methods (Collins and Flaherty 2002), which focuses on qualitative movements between a limited number of stage measurements instead of analyzing primarily the shape of growth (as RMLCA and LCGA do). That suits better to the original research question: Here, switching from a component-oriented to a solution strategy is considered as a *qualitative* change rather than *quantitative*. This applies particularly to the scale's mid-point, thus the points three and four. Therefore, LTA based on dichotomous indicators is selected for this study.

5.3.3 Latent Transition Models as Latent Class Models

LTA can be methodically approached from two directions: 1) from latent class modeling with emphasis on latent structures (Collins and Flaherty 2002; Collins and Lanza 2010), and 2) from Markov chain modeling with emphasis on transitions between states (Kaplan 2008; Langeheine 1988; Langeheine and Van de Pol 2002). Since each of the two perspectives contributes unique advices for conducting an LTA, both approaches are presented. This section directly draws upon the chapter on LCA basics in this thesis (4.1.4).

LTA estimates the probabilities of moving from one latent class to another over time. In the context of LTA, such dynamic latent variables are called *latent status*. The corresponding parameter to the latent class prevalence γ , which represents the probability of membership in a static class, is the *latent status prevalence* δ . In contrast to the latent class prevalence, the latent status prevalence additionally

depends on time: δ_{s_t} represents the probability of being in the latent status s at time point t (Collins and Lanza 2010). Thus, a δ must be estimated for each status at each time point. At a given time point t , the status prevalences sum to 1.00, i.e. each object is assigned to one latent status.

The *conditional probability (item response probability)* ρ has exactly the same meaning as in LCA; it represents the probability for a specific item response (in our case for either the component or the solution scenario) conditional on the membership in a given latent status. Since δ_{s_t} also depends on time, the conditional probabilities ρ for a specific status vary over time. In most cases, however, the conditional probabilities are assumed to be equal over time. This corresponds to the assumption of a consistent measurement model for all time points, i.e. *measurement invariance*. This is usually implemented using parameter constraints and is common practice in LTA because it guarantees the meaning of a latent status to remain the same over time (Collins and Lanza 2010). It also supports the identification of an LTM, which is usually critical due to the large number of parameters to be estimated.

For the third set of parameters, there is no equivalent in LCA: $\tau_{s_{t+1}|s_t}$ expresses the *probability of a transition* to latent status s at time $t + 1$ given the membership in status s at time t (Collins and Lanza 2010). Transition probabilities are usually displayed in two-dimensional matrices; there are $t - 1$ individual matrices (in our case two). The diagonal from the top left to the lower right corner can be interpreted as the probability of remaining in the same class over time. Each row is a *stochastic vector*, which sums to 1.00.

$$\begin{bmatrix} \tau_{1_{t+1}|1_t} & \tau_{2_{t+1}|1_t} & \dots & \tau_{S_{t+1}|1_t} \\ \tau_{1_{t+1}|2_t} & \tau_{2_{t+1}|2_t} & \dots & \tau_{S_{t+1}|2_t} \\ \dots & \dots & \dots & \dots \\ \tau_{1_{t+1}|S_t} & \tau_{2_{t+1}|S_t} & \dots & \tau_{S_{t+1}|S_t} \end{bmatrix}$$

Table 30: Transition probability matrix (Collins and Lanza 2010, p. 198)

The basic LCA equation (formula 3) complemented by transition probabilities represents the probability of a response vector \mathbf{y} as function of the latent status

prevalences δ at $t = 1$, the transition probabilities τ at $t = 1$ in contingent on the status at $t = -1$, and the item response probabilities ρ conditional on latent status membership for any time point (i.e. no measurement invariance assumed):

$$P(\mathbf{Y} = \mathbf{y}) = \sum_{s_1=1}^S \dots \sum_{s_T=1}^S \delta_{s_1} \tau_{s_2|s_1} \dots \tau_{s_T|s_{T-1}} \prod_{t=1}^T \prod_{j=1}^J \prod_{r_{j,t}=1}^{R_j} \rho_{j,r_{j,t}|s_t}^{I(y_{j,t}=r_{j,t})}$$

Formula 5: Fundamental equation for Latent Transition Analysis (Collins and Lanza 2010, p. 198)

The assumption of measurement invariance fixes the conditional probabilities at the level of $t = 1$ for all $t \geq 2$:

$$\delta_{s_t} = \sum_{s_{t-1}=1}^S \delta_{s_{t-1}} \tau_{s_t|s_{t-1}}$$

Formula 6: Measurement invariance for LTM (Collins and Lanza 2010, p. 199)

5.3.4 Latent Transition Models as Markov Models

A LTM can also be considered as a special type of Markov model. The approaches¹⁰⁶ in Figure 30 differ in terms of measurement error and the assumption of unobserved heterogeneity. The Mixture Latent Markov Model (MLMM) is on top as the most general, even though there are further generalizations such as multigroup MLMM, which are not considered here. All subordinated approaches are simplified in certain aspects; hence we start at the bottom. The figures of the models are simplified; the model parameters to be estimated are not depicted for the sake of clarity.

¹⁰⁶ This section is based on the introductions to Latent Markov Modeling by Langeheine and van de Pol (2002) and Kaplan (2008).

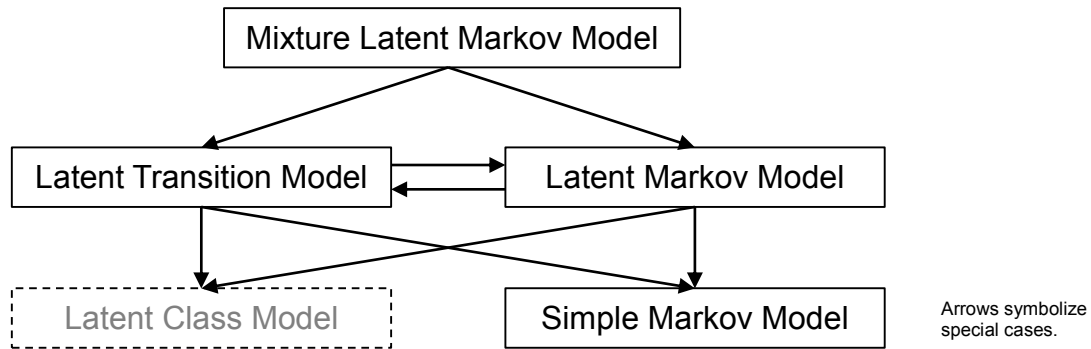


Figure 30: LTM and its relations to Markov and Latent Class Model (Kaplan 2008).

The Simple – or Manifest – Markov Model (figure 31) predicts the current state of an object based on the previous state only (first order Markov chain). Since the states S_1 - S_3 are manifest, the indicators x_{11} - x_{31} (one variable observed at three time points) are assumed to be error-free.

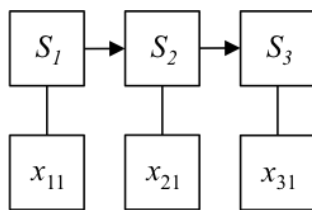


Figure 31: Manifest Markov Model

LCA – as a special case of LTA for just one point in time – contributes two concepts to Latent Markov Models (figure 32): 1) latent states replace the manifest states; the latent states are connected to the indicator variables via the conditional probabilities (item response probabilities), and 2) the indicators can be subjected to error (see section 4.1.4 for LCA as measurement model). Put differently, a Manifest Markov Model is special case of a Latent Markov Model when the conditional probabilities are 1.0, thus they are measured without error (Kaplan 2008). The Latent Markov Model is also called Hidden Markov Model outside social science (cf. Rabiner 1989).

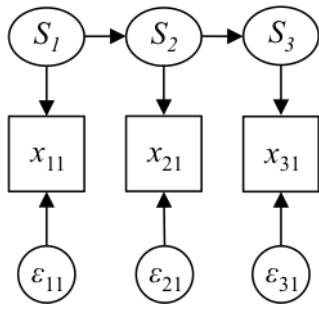


Figure 32: Latent (Hidden) Markov Model

A Latent Transition Model (figure 33) is a Latent Markov Model with more than one indicator variable to determine the latent states (Kaplan 2008); the difference is rather gradual than conceptual. From an SEM perspective, the *structural model* describes the transition probabilities between the states S_1 - S_3 , while the LCM constitutes the *measurement model*. Other measurement models are possible, e.g. advanced factor analysis techniques for categorical and/or continuous indicators such as factor mixture analysis (Nylund 2007), but they are rarely used in social sciences.

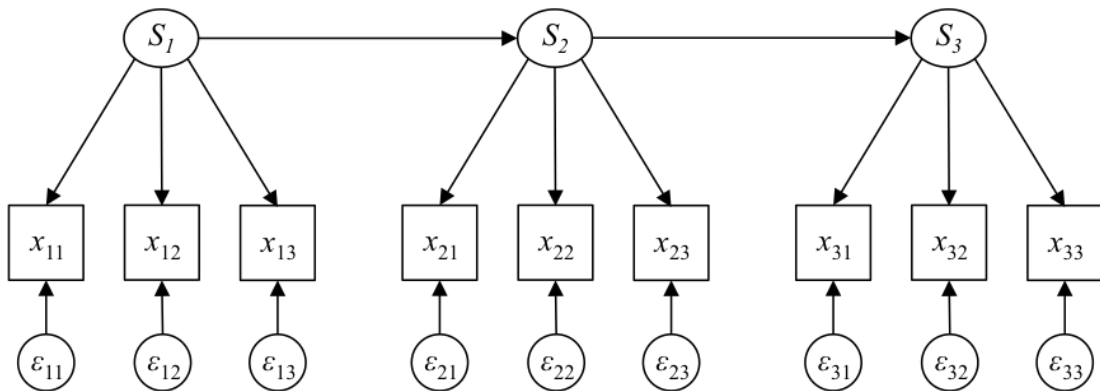


Figure 33: Latent Markov Model with multiple indicators: Latent Transition Model

While the aforementioned models assume that the sample was drawn from one population and that one set of parameters is valid for all observations, the Mixture Latent Markov Model (Kaplan 2008; Langeheine and Van de Pol 2002) allows the population to be composed of several sub-populations, each with its own distribution (finite mixture models; Frühwirth-Schnatter 2006; McLachlan and Peel 2000). The model thus admits different parameter sets for each partial population. One of the main applications is the Mover-Stayer Model (Langeheine 1994), which assumes sub-populations of movers (= change) and stayers (= no change). This is accomplished by an additional categorical variable and constrained transition

probabilities. This model will later be the final stage of the modeling process and will provide the basis for deciding whether one can speak of a trend or not.

The Movers-Stayer Model can be extended by additional variables, e.g. by covariates that predict the membership in either the mover or the stayer population or by outcome variables.

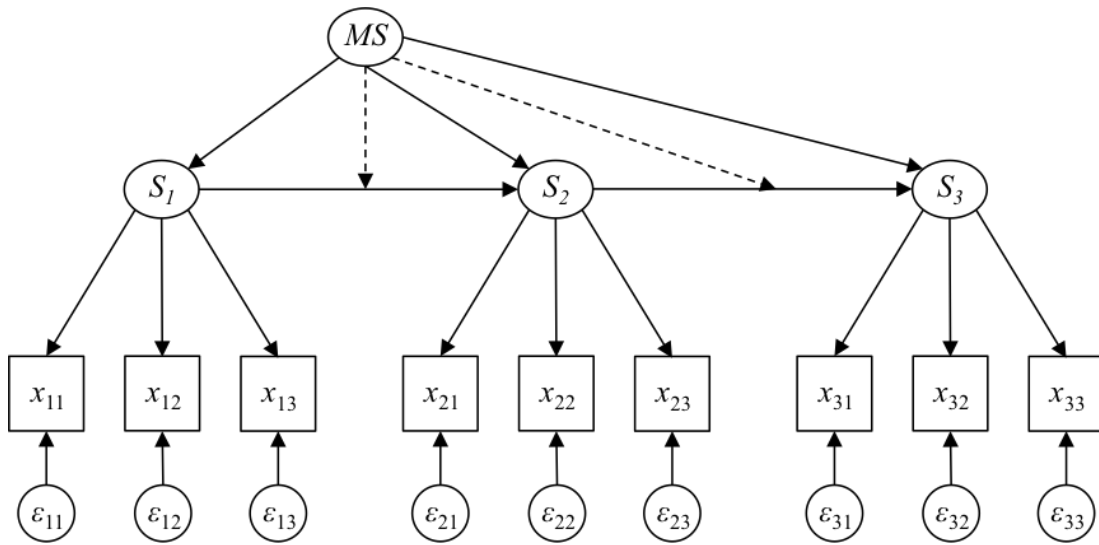


Figure 34: Mixture Latent Markov Model: Mover-Stayer Latent Transition Model (MSLTM)

The basic expressions and procedures are the same for LTM and Latent / Hidden Markov Modeling. For the sake of simplicity, the terms LCA and LTM will be used in the following.

5.3.5 Identification Issues

The number of parameters to be estimated is usually large in LTM. Also, the frequency table is typically sparse, it contains a large number of empty cells. This results in large values of the $L^2(G^2)$ distribution, which the χ^2 distribution cannot approximate accurately enough (McLachlan and Peel 2000). For this reason, the corresponding p -value is usually disregarded (Collins and Lanza 2010). Instead several models are fitted and the one with the best *relative* fit based on $L^2(G^2)$, BIC, AIC values, or (B)LRT statistics is chosen.

5.3.6 Conducting an LTA: Stepwise Procedure

Nylund (2007, p. 60 et seq.) proposes a stepwise procedure for specifying a Latent Transition Model:

Step 0: Study descriptive statistics.

Step 1: Study measurement model alternatives for each time point.

Step 2: Explore transitions based on cross-sectional results.

Step 3: Explore specification of the LTM without covariates

Step 4: Include covariates in the LTM

Step 5: Include distal outcomes and advanced modeling extensions.

Nylund's (2007) procedure follows the LTA-as-LCA approach; she recommends setting up stationary LCMs first and then extending these to a dynamic LTM. Alternatively, one can start with simple Markov chains and add more complex measurement techniques and latent variables step by step, as shown by Langeheine and van de Pol (2002). Since an LCM already has already been set up an, Nylund's approach is chosen. Her procedure has proved to be useful in a number of research settings (e.g. Becker 2009) but will be adapted to the research question of this study.

5.4 Empirical Validation

5.4.1 Descriptives and Manifest Transitions

As described earlier, five originally continuous indicators measure the respondents' evaluation of their firm's handling of processes associated with solution selling (requirements definition, customization, integration, deployment and post-deployment support) for three time points (five years ago, now, in five years). The data was then dichotomized and thus indicate either a conventional / component-oriented or a solution-oriented approach.

The variable-wise marginal frequencies (table 31) show a weak decline in component orientation for all five processes over time and as a consequence – since each time point sums up to the sample size $n = 527$ – an increase in solution orientation. The strongest change is in integration and deployment, the weakest in customization. Apart from post-deployment support, the majority of change processes have already taken place (from five years ago to today). The marginal frequencies do not reveal anything about changes in configurations: the counts could be due radical changes of few firms or subtle changes by many firms¹⁰⁷.

Marginal Frequencies for the SPCM Variables at Three Time Points										
	Conventional / Component					Solution				
	t_{-1} 5 years ago	Δ	t today	Δ	t_{+1} in 5 years	t_{-1} 5 years ago	Δ	t today	Δ	t_{+1} in 5 years
Requirements definition	161	-15	146	-7	139	366	15	381	7	388
Customization	130	-12	118	-1	117	397	12	409	1	410
Integration	154	-24	130	-6	124	373	24	397	6	403
Deployment	208	-16	192	-12	180	319	16	335	12	347
Post-deployment support	188	-6	182	-14	168	339	6	345	14	359

Table 31: Marginal SPCM frequencies for five years ago, today, and in five years

The tables 32 and 33 depict the manifest configural changes from the situation five years ago to today and from today to the situation five years from now. Frequent cells are colored to facilitate the interpretation. A close visual inspection gives the following insights:

The diagonal from the upper left to the lower right corner represents no change (“stayer” configurations) and is clearly visible. The majority of the remaining cells are either empty or have only low cell counts. In other words: there is only little dynamic. If there is a latent structure, it is very likely dominated by a strong stayer sub-population.

¹⁰⁷ This could be characterized as a mild form of ecological fallacy.

Table 32: Manifest changes in configurations (five years ago → today)

Change in Configurations: Five Years ago vs. Today		Configuration today																				Total												
	CCCC	CCCCS	CCCSC	CCCSS	CCSCC	CCSCS	CCSSC	CCSSS	CSCCC	CSCCS	CSCSS	CSSCC	CSSCS	CSSSC	CSSSS	SCCCC	SCCCS	SCCSC	SCCSS	SCSCC	SCSCS	SCSSC	SCSSS	SSCCC	SSCCS	SSCSC	SSCSS	SSSCC	SSSCS	SSSSC	SSSSS			
Configuration 5 years ago	CCCC	20	2		1				1											1												9	34	
	CCCCS	1	5								1			2																1	2	13		
	CCCSC			1												1				1						1			1	1	1	7		
	CCCSS				2																1		2						1	1	1	7		
	CCSCC	1				5	1						1																		1	1	10	
	CCSCS						4																									1	1	6
	CCSSC							3																										3
	CCSSS						1		6																							2	10	
	CSCCC	1								8																3	1					1	14	
	CSCCS										2	2											1						2		1		8	
	CSCSC					1																											2	
	CSCSS				1									1																			4	
	CSSCC									1																						3	15	
	CSSCS										1																					1	10	
	CSSSC											1																						10
	CSSSS																																	15
	SCCCC							1																										6
	SCCCS					1																												2
	SCCSC										1								2															3
	SCCSS																1	1																3
	SCSCC	1		1		1																	7											10
	SCSCS																																	4
	SCSSC																						2											2
	SCSSS										2	1									1	1												10
	SSCCC	1																																17
	SSCCS																							1	1									8
	SSCSC						1																											1
	SSCSS	2																																25
	SSSCC	2																																30
	SSSCS																																	21
	SSSSC					1																												29
	SSSSS	3			1	1																												179
Total	32	7	2	4	11	7	5	11	14	2	7	12	7	10	15	7	1	2	1	11	4	3	10	18	7	4	22	31	21	20	219	527		

Cell count: 1 2-3 ≥ 4 Non-transitions ("stayer") **bold**

Table 33: Manifest changes in configurations (today → in five years)

Change in Configurations: Today vs. in Five Years		Configuration in 5 years																										Total						
		CCCC	CCCS	CCCSC	CCSS	CCSCC	CCSCS	CCSSC	CCSSS	CSCCC	CSCCS	CSCSC	CSCSS	CSSCC	CSSCS	CSSSC	CSSSS	SCCCC	SCCCS	SCCSC	SCCSS	SCSCC	SCSCS	SCSSC	SCSSS	SSCCC	SSCCS		SSCSC	SSCSS	SSSCC	SSSCS	SSSSC	SSSSS
Configuration today	CCCC	18	1			2											2															1	32	
	CCCS	3	2							1	1	1																				1	7	
	CCCSC			1													1																2	
	CCSS				3																	1											4	
	CCSCC					7					1			1							1											1	11	
	CCSCS		1			1	4			1																							7	
	CCSSC							4																									5	
	CCSSS								7																							1	11	
	CSCCC									10						1																	14	
	CSCCS										2																						2	
	CSCSC											2																					7	
	CSCSS												10	1																		1	12	
	CSSCC													5		2																	7	
	CSSCS											1		1			4																10	
	CSSSC		1				1		1									9		2													15	
	CSSSS	1						1		1									3													1	7	
	SCCCC										1																						1	7
	SCCCS																	1																1
	SCCSC	1																					1										2	
	SCCSS																							1										1
	SCSCC					1																		6										11
	SCSCS										1														1									4
	SCSSC						1									1									1									3
	SCSSS		1						1																									10
	SSCCC																		1															18
	SSCCS																																	7
SSCSC																		1				1											4	
SSCSS						1																											22	
SSSCC						1																											31	
SSSCS																																	21	
SSSSC										1																							20	
SSSSS	2					1			1																								219	
Total	25	5	1	3	14	6	5	11	12	3	4	6	12	8	5	19	7	2	3	3	6	3	7	16	19	7	24	27	24	21	219	527		

Cell count:

1	2-3	≥ 4
---	-----	-----

 Non-transitions ("stayer") **bold**

A few mover cells gather around the lower right corner. One possible explanation is that the configurations already have high static cell counts in this region, which cause the relatively high rates of transitions. The SSSSS column in the first matrix (5 years ago → today) represents configural changes toward the Solution Provider and has 19 non-empty cells, which is the highest rate for both transition matrices combined. This implies: If there is such a thing as a trend towards selling (full) solutions, then it was stronger in the past than it will probably be in the future.

Manifest Movers and Stayers Contingent on Situation Five Years Ago

Configuration	Stayers	Movers	Total	Movers %
CCCCC	17	17	34	50.0%
CCCCS	2	11	13	84.6%
CCCSC	1	6	7	85.7%
CCCSS	2	5	7	71.4%
CCSCC	5	5	10	50.0%
CCSCS	3	3	6	50.0%
CCSSC	3	0	3	0.0%
CCSSS	6	4	10	40.0%
CSCCC	8	6	14	42.9%
CSCCS	2	6	8	75.0%
CSCSC	0	2	2	100%
CSCSS	1	3	4	75.0%
CSSCC	10	5	15	33.3%
CSSCS	5	5	10	50.0%
CSSSC	1	4	5	80.0%
CSSSS	8	5	13	38.5%
SCCCC	3	3	6	50.0%
SCCCS	0	2	2	100%
SCCSC	1	2	3	66.7%
SCCSS	1	2	3	66.7%
SCSCC	6	4	10	40.0%
SCSCS	1	3	4	75.0%
SCSSC	1	1	2	50.0%
SCSSS	3	7	10	70.0%
SSCCC	14	3	17	17.6%
SSCCS	3	5	8	62.5%
SSCSC	0	1	1	100%
SSCSS	15	10	25	40.0%
SSSCC	22	8	30	26.7%
SSSCS	13	8	21	38.1%
SSSSC	13	16	29	55.2%
SSSSS	167	28	195	14.4%
Total	337	190	527	36.1%

Table 34: Manifest Movers and Stayers

This perception is supported by the development of the cell counts for the Solution Provider (configuration SSSSS): There were 179 five years ago, while there are

now 219 and also 219 in five years. In the entire sample, there are 198 movers (= 37.6 %) and 329 stayers (table 34). Out of the 195 Solution Providers five years ago, 137 will remain stable, 58 will undergo a change processes.

These results give the impression that the “S”-dominated configurations at the bottom of the table are more stable than the “C”-dominated at the top. Two tests support this assumption: A *t*-test reveals a moderately strong difference in the number of solution-oriented approaches, i.e. in the number of “S” ($mean_{mover} = 3.08$, $mean_{stayer} = 3.60$; $p < .001$; *Cohen’s d* = 0.33). A binary logistic regression analysis (DV: movers vs. stayers, IV: SPCM variables) shows that companies that pursued solution-oriented strategies for requirements definition, customization, or integration five years ago have significantly higher chances to remain stable for the next ten years than firms that handled these processes conventionally, as the odd ratios in Table 35 show (0.58, 0.50, and 0.51 stand for lower odds for moving).

Logistic Regression Analysis, DV = Movers vs. Stayers						
	<i>B</i>	<i>s.e.</i>	<i>Wald</i>	<i>df</i>	<i>p</i>	<i>Exp. (B)</i>
Model 1						
Requirements Definition	-0.54	0.24	5.12	1	.024	0.58
Customization	-0.69	0.25	7.84	1	.005	0.50
Integration	-0.67	0.23	8.93	1	.003	0.51
Deployment	-0.03	0.24	0.02	1	.897	0.97
Post-Deployment Support	-0.07	0.23	0.10	1	.754	0.93
Constant	0.82	0.22	13.46	1	< .001	2.26
Model 2						
Requirements Definition	0.38	0.40	0.91	1	.339	1.47
Customization	-0.03	0.33	0.01	1	.920	0.97
Integration	-0.73	0.23	10.25	1	.001	0.48
Deployment	0.05	0.24	0.04	1	.852	1.05
Post-Deployment Support	-0.05	0.23	0.04	1	.845	0.96
Req.-Def. x Customization	-1.40	0.49	8.37	1	.004	0.25
Constant						
<i>n</i> = 527						
Model 1: χ^2 (<i>df</i> = 5) = 54.78; Cox & Snell R^2 = .10; Nagelkerke R^2 = .14; overall classification performance: 68.1% correct						
Model 2: χ^2 (<i>df</i> = 6) = 63.25; $\Delta \chi^2$ (<i>df</i> = 1) = 8.47**; Cox & Snell R^2 = .11; Nagelkerke R^2 = .16; overall class. performance: 69.8% correct						
Dependent variable: 0 = stayer; 1 = mover						
Independent variables: 0 = conventional (= reference category); 1 = solution-oriented, for measurement point “five years ago”						

Table 35: Logistic regression analysis, mover vs. stayers regressed on binary SPCM variables

However, model 2 shows that the direct effect of requirements definition and customization disappears if the pairwise interaction effect is taken into account.

Other interaction effects up to second order and the interaction between requirements definition, customization and integration are not significant. Thus, firms have higher chances to remain stable over the span of ten years by customizing their offering to the needs of individual customers and by integrating several components, whereby the latter process also might focus on larger customer segments.

Outstanding Transitions

Most movers (tables 32 and 33) have relatively low cell counts; only one or two companies took or will take these routes. Three cells, however, stick out: Nine Components Sellers have transformed directly into Solution Providers during the last five years (CCCC → SSSSS). Five Systems Sellers switched to rather a pro-active post-deployment support strategy in the same period; they thus have become (full) Solution Providers (SSSSC → SSSSS). Six Solution Sellers plan to move away from an individualized requirements definition procedure to a component-oriented (e.g. by targeting larger customer segments).

All these statements are descriptive. Due to the sparseness of the tables, which would be even more pronounced when the tables were combined to cover the entire range of ten years, frequencies cannot be estimated for individual cells. This however, is a prerequisite for manifest confirmative techniques such as CFA.

5.4.2 Static Measurement Models

The sparseness of the manifest transition tables can be avoided by focusing on latent structures that are less complex. As shown in chapter 4, an LCM with four classes describes the data sufficiently accurate, particularly for the classes that are in the focus here: Component Seller and Solution Provider. Although other measurement models are thinkable (Nylund 2007), the “classic” LTA approach based on LCM is chosen¹⁰⁸.

¹⁰⁸ Nylund also considers LCM as a „natural choice“ for LTA (2007, p. 42). She recommends testing other measurement models primarily to rule out other alternative longitudinal methods. If, for instance, a continuous factor model describes the data best, then LTA should be discarded and other methods (e.g. autoregressive approaches) should be chosen. Since the decision has already been made to use binary data, LCM is maintained.

Latent classes detected by static LCA are not necessarily congruent with latent states that describe dynamic latent structures. However, both Nylund (2007) and Collins and Lanza (2010) recommend conducting a static LCA for at least one time point in order to get a basic understanding about latent structures. It is not compulsory to have the same measurement model, for each time point (i.e. measurement method and number of classes) but it facilitates the specification and the interpretation of the longitudinal model (Nylund 2007).

Number of Classes

For each time point, three LCM with three to four classes are estimated (table 36). For the first time point (five years ago), the L^2 and LL statistics are best for the 5-class model, while BIC favors the 3-class and AIC the 4-class model. The $-2LLD$ test, however, indicates no improvement of the 5-class over the 4-class solution. Also the number of extreme logits for IR probabilities (and hence the risk of a local optimum) is highest for the 5-class model. Hence, the 4-class model is chosen.

The choice in favor of a 4-class model for the situation today has already been discussed in chapter 4.2.

For the situation in five years, L^2 and LL statistics are best for the 5-class model, BIC for the 3-class and AIC the 4-class model. Again, the 5-class solution is not significantly better than the 4-class model. Additionally, the L^2 value is not significant, which indicates poor model fit. Therefore, the 4-class model is also chosen for the last observation.

Stationary Latent Class Models for Three Measurement Points								
Classes	# Par.	df	$L^2(G^2)$	LL	BIC(LL)	AIC(LL)	-2LLD(BLRT) ^a	Extremes ^b
5 years ago								
3c LCM	17	14	21.65	-1398.67	2903.88	2831.34	49.05 ***	1
4c LCM	23	8	7.27	-1391.48	2927.10	2828.95	14.38 *	1
5c LCM	29	2	3.07	-1389.37	2960.50	2836.75	4.21	6
Today								
3c LCM	17	14	43.48 ***	-1336.68	2779.90	2707.35	37.42 ***	1
4c LCM^c	23	8	9.80	-1319.84	2783.82	2685.68	33.68 ***	3
5c LCM	29	2	3.47	-1316.67	2815.10	2691.35	6.33	7
In 5 years								
3c LCM	17	14	31.51 **	-1335.91	2778.36	2705.82	28.14 ***	2
4c LCM	23	8	11.48	-1325.89	2795.93	2697.79	20.03 ***	2
5c LCM	29	2	6.57 *	-1323.44	2828.62	2704.87	4.92	5

* = Significant at $p = .05$ level; ** = significant at $p = .01$ level; *** = significant at $p = .001$ level

^a Bootstrapped Likelihood Ratio Test for c vs. $c-1$ classes

^b Number of iterations where logit for an indicator approached the thresholds

^c Present values are obtained from Mplus and hence differ minimally from those computed by Latent Gold (Table 20)

Table 36: Latent Class measurement models for three observations

At first glance, the extracted latent structure is similar over time, in particular for the classes Solution Provider and Component Seller. IR probabilities for the Modifier change over time but the structure remains similar. The Mass Market Solution Seller, however, switches from rather not customizing five years ago to customization for the following two observations. The conditional probabilities for Requirements Definition move to the theoretical cut-off point of .50 for the situation in five years.

Conditional Probabilities and Latent Class Prevalences for 4-Class LCM at Three Observations

Label	Latent class			
	1	2	3	4
	Solution Provider SP	Modifier MDF	Components Seller CS	Mass Market Solution Seller MMSS
Situation 5 years ago				
Probability of membership ^a	.50	.28	.12	.10
Conditional probability of a solution-style answer (IR probability)				
Requirements Definition	.97	.66	.06	.36
Customization	.98	.79	.16	.42
Integration	.90	.65	.14	.65
Deployment	.97	.00	.14	.83
Post-Deployment Support	.88	.32	.27	.72
Situation today				
Probability of membership	.56	.19	.12	.13
Conditional probability of a solution-style answer (IR probability)				
Requirements Definition	1.00	.82	.00	.11
Customization	.96	.73	.22	.57
Integration	.91	.63	.20	.77
Deployment	.94	.14	.00	.75
Post-Deployment Support	.94	.19	.14	.70
Situation in 5 years				
Probability of membership	.55	.13	.13	.19
Conditional probability of a solution-style answer (IR probability)				
Requirements Definition	.97	.76	.20	.48
Customization	.97	.97	.19	.54
Integration	.92	.59	.34	.75
Deployment	.94	.00	.00	.77
Post-Deployment Support	.94	.21	.14	.66

^a Latent class membership probabilities here are based on most likely classifications (a posteriori), which are needed for transition matrices. They differ minimally from model-based (a priori) probabilities such as in table 25.

Table 37: Descriptions of LCM at situation five years ago, today, and in five years

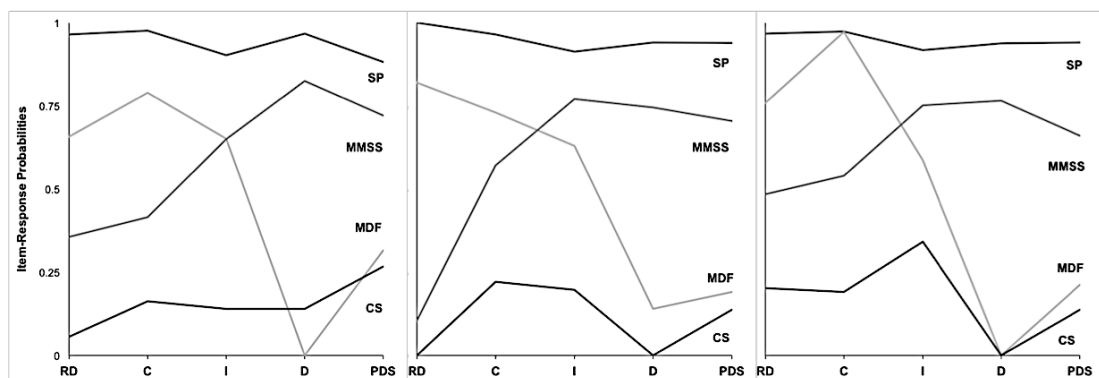


Figure 35: IR-plots for 4 latent classes; five years ago (left), today (middle) and in five years (right)

5.4.3 Transitions Based on Cross-Sectional Results

For the transition matrix in table 38, the most likely class membership is saved for each observation and subsequently cross-tabulated. Each cell is then divided by the row sum. The result is a “hybrid”: The measurement is model-based while the transitions are descriptive (Nylund 2007).

“Hybrid” Transition Matrix Based on LCA Classifications											
		today				in 5 years					
		SP	MDF	CS	MMSS			SP	MDF	CS	MMSS
5 years ago	SP	.86	.04	.02	.08	today	SP	.89	.01	.01	.09
	MDF	.21	.54	.13	.12		MDF	.14	.57	.16	.13
	CS	.25	.06	.56	.13		CS	.09	.06	.72	.13
	MMSS	.35	.15	.05	.45		MMSS	.10	.07	.04	.79

SP = Solution Provider; MDF = Modifier; MMSS = Mass Market Solution Seller; CS = Component Seller

Table 38: Hybrid transition matrix

The highest transition probabilities are on the diagonal and represent stability. The Solution Provider has the highest chance of remaining stable (.86 and .89), the most dynamic class is the Mass Market Solution Seller. Only 45% of firms that are in this class today were in the same position five years ago. The diagonal probabilities are generally higher for the coming five years, indicating that more transitions have already taken place than are expected for the near future. If firms have changed their position in the past, then they were most likely to move towards the Solution Provider class; the number of “incoming” transitions is substantially lower for the next five coming years than for the past five years. The Component Seller class had a considerable loss from the situation five years ago to today, but remains relatively stable for the coming years.

5.4.4 Basic Latent Transition Model and Extensions

Before looking at the matrix for latent transitions probabilities, a decision on measurement invariance must be made, i.e. if the same measurement model applies to each point in time. There might be theoretical explanations, why the number and nature of latent classes changes over time. Such a reason would be, for instance, if the subjects react differently to the measurement procedure due to ageing; e.g. when

measured at childhood, youth and adulthood. There is, however, no apparent reason, why the participants of this study should undergo a mental change during answering the pseudo-longitudinal survey questions within seconds. Therefore, full measurement invariance is preliminary assumed.

Measurement invariance is formally tested by constraining the item response probabilities δ_{st} to be the same for each variable for each observation and checking for better model fit. The model with full measurement invariance serves as reference (table 39). Partial invariance and full non-invariance result in lower absolute *LL* values, but these decreases are not significant given the lower numbers of parameters to be estimated. Higher BIC values support this result. Thus, full measurement invariance can be assumed: the same measurement model (with the same conditional item probabilities) should be applied for each of the three observations.

Test for Measurement Invariance					
	<i>LL</i>	-2LLD	Δdf	<i>p. for -2LLD</i>	BIC
Full measurement invariance (reference)	-3342.21				6978.97
Partial measurement invariance (<i>in 5 years can differ</i>)	-3328.93	26.55	20	.148	7077.76
Partial measurement invariance (<i>5 years ago can differ</i>)	-3336.28	11.85	20	.921	7092.47
Full non-invariance	-3325.47	33.48	40	.757	7196.18

Table 39: Formal test for LTM measurement invariance

The resulting model-based transition matrix (table 40) reveals even more stability than the hybrid version. Notable transitions are from the Component Seller to the Solution Provider class from five years ago to today (.20) and towards the Mass Market Solution Seller in the next five years (.14).

1st Order Latent Transition Matrix											
		today				in 5 years					
		SP	MDF	CS	MMSS			SP	MDF	CS	MMSS
5 years ago	SP	.98	.00	.02	.00	today	SP	.97	.00	.01	.02
	MDF	.00	.96	.04	.00		MDF	.02	.95	.03	.00
	CS	.20	.00	.79	.02		CS	.03	.00	.84	.14
	MMSS	.04	.00	.03	.93		MMSS	.00	.00	.02	.98

SP = Solution Provider; MDF = Modifier; MMSS = Mass Market Solution Seller; CS = Component Seller

Table 40: Transition matrix based on modeled transition probabilities

A number of further model extensions are tested (depicted in figure 36). Hitherto the model takes only first order effects into account, that is, in terms of Markov modeling: the status in t only depends on $t-1$. A second order effect also allows the state t to depend on $t-2$; accomplished by regressing the latent state variable S_3 (in five years) on S_1 (five years ago). Adding this effect significantly improves model fit. The firms' positioning in five years not only depends on today but also on the situation five years back; i.e. the entire span of ten years should also be accounted for. However, some researchers warn to trust on higher order effects without a clear theoretical foundation (Langeheine and Van de Pol 2000, 2002). This issue will be discussed later.

A second extension refers to the homogeneity of the transition probabilities (Collins and Lanza 2010). In case of stationary model, the transition probabilities are assumed to be equal ($T_{S_2|S_1} = T_{S_3|S_2}$). A constrained model, however, fits worse (table 41). This supports the findings based on the manifest and the hybrid transition matrices that there has been more dynamic in the past than there will be in the near future.

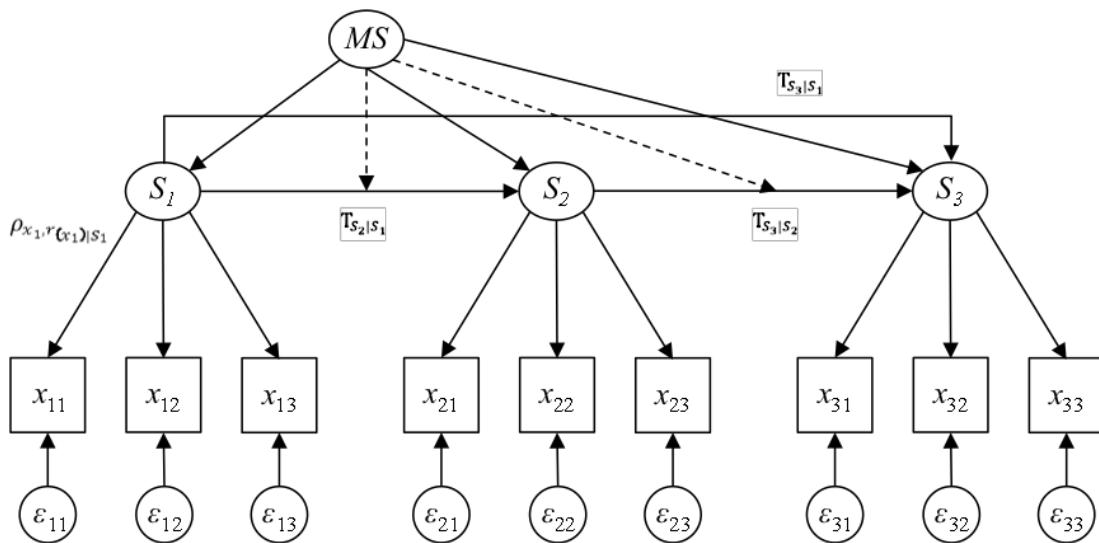


Figure 36: LTM extensions (simplified: only three instead of five indicators; ρ for just one indicator)

The third model extension is based on the assumption that the entire population is composed of a countable number of sub-populations. The Mover-Stayer Latent Transition Model, which equals a Mixture Latent Markov Model (Kaplan 2008; van de Pol and Langeheine 1989), tests the hypothesis that the population consists of a stayer sub-population, which does not change status over time, and a mover sub-

population, which changes status. This is accomplished by adding an unobserved variable with two latent classes to the model (figure 36): The IR probabilities are estimated freely in the mover class, while they are fixed to 1.00 in the transition matrix diagonal for the stayer class (and to zero for all off-diagonal cells); hence the stayer class absorbs all stayers during the model estimation process. This modification improves model fit significantly (*LL* improvement is more important than BIC improvement). The estimated class sizes are 420 for the stayer and 107 for the mover class. These findings again support the findings based on the manifest analysis: the large majority of firms does not change their handling of the five SPCM processes over a span of ten years.

Model Extensions					
	<i>LL</i>	-2LLD	Δdf	<i>p. for -2LLD</i>	BIC
1 st order model (reference)	-3342.21				6978.97
1 st order + 2 nd order model	-3326.73	30.96	9	.000	7004.42
Stationary transition model	-3349.83	-15.24	12	.228	6919.01
Mover-Stayer LTM	-3336.60	11.21	4	.024	6992.83

Table 41: LTM extensions: second order effect, homogeneous transition probabilities, latent mover / stayer variable

5.4.5 One-step vs. Three-step Approaches

The LTA matrix differs from the hybrid matrix, it is even more static. This is unforeseen, particularly given the fact that both use similar LCM as measurement models. The reason for these differences lies in the objective of Latent Transition Modeling to achieve an overall fit, including the structural model. It is a known phenomenon, that the inclusion of additional variables (in particular distal outcome variables) can have an effect on the measurement model (Asparouhov and Muthén 2013; Bolck, Croon, and Hagenars 2004; Lanza, Tan, and Bray 2013; Vermunt 2010), which leads to weaker classification results.

A closer inspection of the transition profiles and the associated IT probabilities (table A44) reveals that the Mass Market Solution Seller in LTA has higher IR probabilities for requirements definition than the related LCM classes, which again have changed substantially over time. This has two effects: 1) The LTA state for the Mass Market Solution Seller absorbs dynamic that emerged over time in LCA; and 2) since the

profile is similar to the one of the Solution Provider, the Mass Market Solution Seller attracts cases from the extraordinary stable Solution Provider class. Both effects result in an overestimation of stability.

The simultaneous estimation of external variables while estimating the latent class models is called *one-step approach*. An alternative to this is the *three-step approach* (Bolck et al. 2004; Muthén 2013; Vermunt 2010): (1) LC models are fitted; (2) cases are classified based on the most probable latent classes; (3) external variables are related to the saved nominal class variables. However, step (2) is subject to error. There are several approaches how to integrate the classification error in step 3 (e.g. Lanza et al. 2013). Current research examines the conditions under which 3-step outperform 1-step approaches; apparently, the qualification quality represented by the entropy statistics plays a major role (Asparouhov and Muthén 2013).

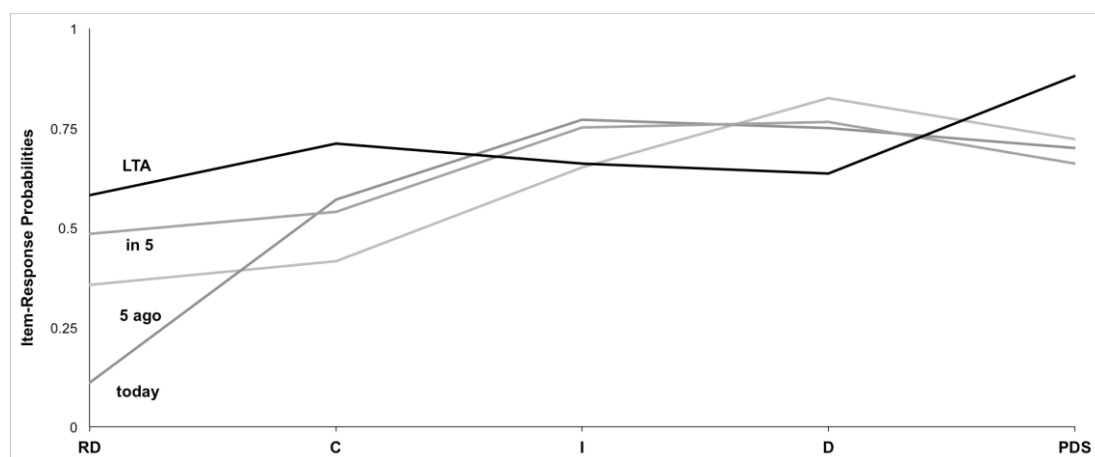


Figure 37: LCA vs. LTA profiles for Mass Market Solution Seller (LTM measurement invariance assumed)

The hybrid manifest matrix is based on the first two steps (estimation and classification); i.e. it is flawed. Given the acceptably high entropy values for the three observations (.75; .79; .70) the classification error can be neglected. Therefore, the remaining analyses rely on the separate LCA classification instead of the – presumably too static – LTA results.

5.4.6 Further Analyses

Transition Profiles

As the transition probability matrices already suggest, the static transitions (i.e. the stayers) represent the majority in the sample, approximately 62%. The most frequent mover profile is from the Modifier to the Solution Provider (MDF → SP → SP), accounting for 4.6% of all transitions (table 42, all profiles can be found in the appendix in table A46). The transition from the Component Seller to the Solution Provider is ranked third among the mover profiles and thereby the most frequent profile for Component Sellers, the proposed movements CS → MDF → SP and CS → MMSS → SP play only minor role (0.8% of all transitions). A notable number of firms switch from the Solution Provider position to the Mass Market Solution Seller (SP → MMS → MMS and SP → SP → MMS) over the span of then years, which corresponds to a movement from a project-based identification of individual customer needs towards targeting larger segments.

Transition Profiles (Based on LCA Classifications) in Descending Order				
5 years ago	Today	In 5 years	Count	Percentage
SP	SP	SP	215	40.8
MDF	MDF	MDF	55	10.4
CS	CS	CS	32	6.1
MDF	SP	SP	24	4.6
MMSS	MMSS	MMSS	23	4.4
SP	MMSS	MMSS	15	2.8
CS	SP	SP	14	2.7
MDF	MDF	CS	13	2.5
MDF	MMSS	MMSS	13	2.5
MDF	CS	CS	11	2.1
SP	SP	MMSS	10	1.9
MMSS	SP	MMSS	9	1.7
MMSS	SP	SP	8	1.5
SP	MDF	SP	7	1.3
MDF	SP	MMSS	5	0.9
MDF	MDF	SP	5	0.9
MDF	MDF	MMSS	5	0.9
MMSS	MDF	MMSS	5	0.9
CS	MMSS	MMSS	4	0.8

SP = Solution Provider; MDF = Modifier; MMSS = Mass Market Solution Seller; CS = Component Seller
The remaining profiles can be found in the appendix.

Table 42: Transition profiles (counts ≥ 4) based on LCA classifications

Second Order Effects for LCA-Based Transitions

The latent transition model could be significantly improved by adding a second order effect for the transitions from five years ago to in five years. In order to compare these two effects on the level of the LCA-based models, a 1st order matrix $\mathbf{T}_{t_1|t_0}$ was computed by multiplying the matrices $\mathbf{T}_{t_0|t_{-1}}$ and $\mathbf{T}_{t_1|t_0}$. This combined matrix $\mathbf{T}_{t_1|t_{-1}}$ is contrasted with the cross-tabulated probabilities¹⁰⁹ from five years ago straight to five years from now (table 43).

This second order effect has a stabilizing function: The diagonal frequencies are higher (= stayers), while almost all off-diagonal probabilities are lower (except CS → SP and MMSS → CS, which are marginally higher). Overall, the Mass Market Solution Seller has the largest discrepancies.

First and Second Order Effects on Transition Probabilities (based on LCA Classifications)											
		First order				Second order					
		in 5 years				in 5 years					
		SP	MDF	CS	MMSS		SP	MDF	CS	MMSS	
5 years ago	SP	.78	.04	.03	.15	5 years ago	SP	.86	.02	.02	.10
	MDF	.29	.33	.19	.20		MDF	.23	.42	.17	.18
	CS	.29	.08	.42	.21		CS	.30	.02	.53	.16
	MMSS	.38	.12	.08	.41		MMSS	.18	.00	.09	.73

SP = Solution Provider; MDF = Modifier; MMSS = Mass Market Solution Seller; CS = Component Seller

Table 43: Comparison of first and second order effects on LCA-based transition probabilities

There are two possible non-exclusive explanations: 1) The discrepancies between the probabilities are caused by the second order effect; or 2) the classification criteria have changed over time. The decision depends on the assumption of measurement invariance: LTA (measurement invariant) reveals a significant second order effect while the “hybrid 3-step approach” (based on LCA classifications) assumes measurement non-invariance. The latter implies that the measures for the situation five years ago and five years from now differ from the measurement for the situation today. This applies in particular for the Mass Market Solution Seller, for which a tension was detected between targeting as largest segments as possible and

¹⁰⁹ In the narrower sense, these are rather relative frequencies than probabilities.

customizing and integration efforts at the same time. A systemic measurement error, on the other hand, cannot entirely be excluded, given the “pseudo-longitudinal” nature of this measurement technique.

CFA Types and Transitional Dynamic

The CFA type / antitype descriptions have left the impression that antitypes are less stable than types. This proposition is tested by cross-tabulating type and antitype dummies against movers and stayers. Indeed, there are a highly significantly more stayers among the firms in a type configuration ($\chi^2 = 74.85$; $df = 1$; $p < .001$) and highly significantly more movers among firms in an antitype configuration ($\chi^2 = 64.57$; $df = 1$; $p < .001$) than firms in non-conspicuous configurations.

If the binary variable for mover vs. stayer is regressed on type and antitype dummies (table 44), being in a type configuration has a highly significantly reduced probability for moving. SSSXX configurations (i.e. the “pick-up Solution Seller SSSCS and the Systems Seller SSSSC) do not differ significantly from non-outstanding configurations regarding their transition probabilities. In contrast, configurations with the SCXXX conflict (i.e. identifying individual customer needs but then *not* customizing the offering) and the CSS tension (i.e. which corresponds to the Mass Market Solution Seller) have drastically higher probabilities to move (odd ratios of 8.06 and 12.09).

Results of Logistic Regression Analysis, Antitype / Type and Transition (LCA Classification)

	<i>B</i>	<i>s.e.</i>	<i>Wald</i>	<i>df</i>	<i>p</i>	<i>Exp. (B)</i>
Type dummy	-1.34	0.22	37.35	1	.000	0.26
SSSXX antitype dummy	0.55	0.32	2.84	1	.092	1.73
SCXXX antitype dummy	2.09	0.77	7.34	1	.007	8.06
CSSXS antitype dummy	2.49	0.76	10.91	1	.001	12.09
Constant	-0.14	0.15	0.91	1	.340	0.87

$n = 527$

$\chi^2_{(df=4)} = 106.275^{***}$; Cox & Snell $R^2 = .18$; Nagelkerke $R^2 = .25$; overall classification performance: 70.2 correct

Dependent variable: 0 = stayer; 1 = mover

Independent variables: 0 = non-outstanding (= reference category); 1 = type / antitype, at measurement point “five years ago”

Table 44: Effects of antitype / type membership on staying or moving

Note: The type / antitype definition refers to the situation today, while the dummy variables are related to the situation five years ago in order to cover the entire span of 10 years. This implies that the CFA structure applies to all three observations.

Furthermore, only inter-class changes are taken into account (see table 25 for assignments of configurations to classes). That is, the intra-class change from a Systems Seller to a Solution Provider is not counted as transition. This also implies, that transformations of SCXXX and CSSXS antitypes are more radical because they skip the latent class boundaries.

Outcomes: Movers vs. Stayers

Similar to the descriptions of the CFA types and antitypes, independent *t*-tests are computed for the additional descriptive variables for the scenarios. The numerical results can be found in the appendix (table A47).

Respondents of stayers are convinced that their offering has a higher functional value than the sum of its parts; they also report that they can claim a price premium for the integration process. Their offerings have a significantly higher services quality but not product quality.

Characteristics of Movers towards Solution Provider Class

To obtain more insights into potential driving forces of the transformation process toward Solution Providers, a dummy variable was coded for all cases that either have moved into the Solution Provider class ($X \rightarrow SP \rightarrow SP$) or will move into this class ($X \rightarrow X \rightarrow SP$). This group comprises 62 companies. Then, *t*-tests were computed for the continuous SPCM scores and the describing variables¹¹⁰, contrasting this mover group to all other non-SP firms at t_{-1} , i.e. those in the X classes.

Among the SPCM variables (table A49), only post-deployment support exhibits a significant difference; movers are more likely to pursue a proactive post-purchase strategy. Four describing variables (table A47) stick out with medium to large effect sizes (between 0.50 and 0.69): Respondents of firms that move into the Solution Provider class state that their customers want solutions and not standard components. The vendors are also convinced that they, and not their customers, are responsible for the quality of the implementation process (deployment). Finally, SP movers evaluate the relationship to their customers as better than the stayers do and they include

¹¹⁰ While the SPCM variables refer to the situation five years ago, the describing variables are only available for the situation today.

future offerings on a significantly higher level. The tests also reveal slightly weaker effects for the gestalt benefit (higher for movers) and proactive post-purchase measures (higher level for movers)

The two groups do not differ in firm size (SME vs. LE), service share and direct sales structure.

Characteristics of “Backwards Movers”

37 companies have moved “backwards” from the Solution Provider class into another (SP → X → X) or plan to move (SP → SP → X). *t*-tests were computed to contrast the moving to the staying (i.e. SP → SP → SP) Solution Providers.

All continuous SPCM variables have significantly lower means for the backwards movers (table A51), but requirements definition has by far the strongest effect (Cohen’s $d = 1.70$). This also reflected by the describing variables (table A50): the movers’ customers are indifferent concerning their preferences for components or solutions, while the stayers’ customers clearly prefer solutions. Participants of firms that move out of the Solution Provider class report a lower functional value and a lower integrative benefit of the offering and that they are less able to achieve a price premium for the integration process. The backwards movers also have a significantly smaller knowledge advantage over their customers than their staying counterparts.

Firms that have left or will leave the Solution Provider class have direct sales structures significantly less often than stable Solution Providers ($\chi^2 = 12.19$; $df = 1$; $p < .001$), but they do not differ in the share of services or firm size.

5.5 Discussion

Trend towards Solutions?

Approximately one third of the companies in the sample have changed their manifest configuration over a span of ten years. The mover-stayer LTA also implies the existence of two sub-populations, with movers accounting for 20 percent of the entire population. Put differently: *strategy retention is the rule, strategy change is the exception.*

SCXXX and CSSXS antitypes are less stable and are more likely to change than non-outstanding configurations, while the propensity to switch is significantly lower for type configurations, particularly for the Solution Provider. This again supports the interpretation of antitype tensions based on asset specificity: these antitypes are unbalanced due to unilateral investments into the relationship and therefore likely to change into a more stable configuration.

The net number of Solution Providers is expected to be the same in five years as it is today, 23 companies move toward this configuration but the same number of Solution Providers transforms backwards. If there ever was a noteworthy dynamic around the Solution Provider, then it is already in the past.

Trajectories

The dynamic revealed in study Ib must be interpreted in the context of the results of study Ia. The latent and manifest transition probabilities imply a certain unstability of the Component Seller class, but the prevalence of this class is rather low. This explains the low absolute frequency of the CS → SP → SP transitions. Despite the low frequency, it is the most common transformation trajectory for companies in the Component Seller class.

The ideal-typical offerings in the earlier introduced typology by Penntinen and Palmer (2007) can be roughly connected to the latent classes based on the SPCM (figure 38): Component Sellers offer “Basic Components”, Solution Providers “Integrated Solutions”. The Mass Market Solution Seller offers “Integrated Components” (not adapted to customer needs but embedded in relationships), the Modifier provides “Basic Solutions” (individualized but transactional). However, the

two trajectories from “Basic Components” to “Integrated Solutions” as proposed by Penttinen and Palmer, thus either over “Integrated Components” or “Basic Solutions”, play only a minor role in relation to the direct transition (count of CS → MDF → SP = 1, CS → MMSS → SP = 3, CS → SP = 15).

There are two alternative explanations: First, the transformation from a Component Seller to a Solution Provider is radical rather than gradual, i.e. the company must change completely the way it relates to its customers. Second, the transformation takes longer than the period of ten years that is covered by the participants’ evaluations in the present study; hence, Mass Market Solution Sellers or Modifiers might have been Component Sellers more than five years ago. Indeed, these two classes have had higher propensities to move in the past (table 38) but since the strongest input flow for the Solution Provider came from the Component Seller (or from close derivatives, see table 32), the first explanation seems more plausible.

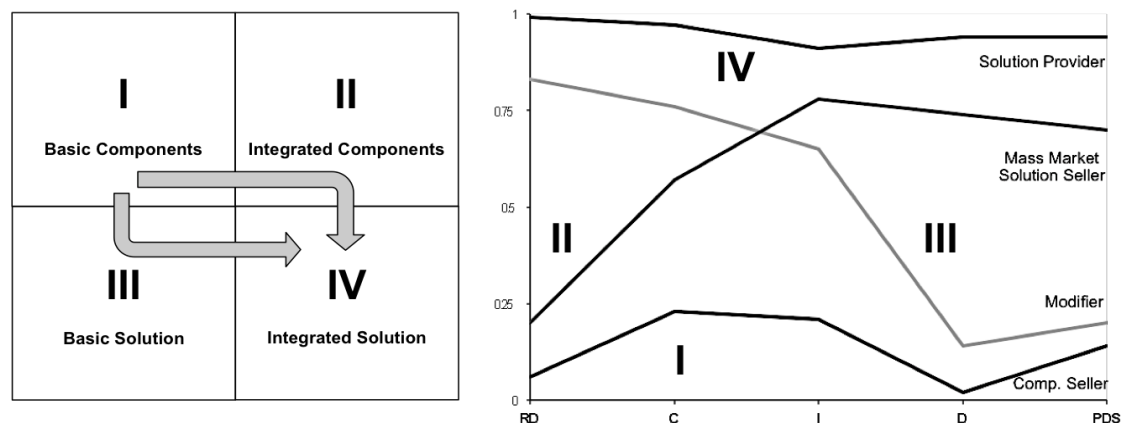


Figure 38: Penttinen and Palmer’s (2007) proposed trajectories and their LTA equivalents

The existence of a second order effect – even though its impact depends on the assumption of measurement invariance – underlines the complexity of organizational change processes: The future strategy does not only depend on the current strategy but also on the past, which goes undoubtedly further than the five years estimated in this survey. *Path dependence*, the fact that “history matters”, is a widely accepted phenomenon in organizational research (Sydow, Schreyögg, and Koch 2009; Vergne and Durand 2010). However, for a more detailed analysis of path dependence for solution selling practices, more information on the companies’ history is needed.

Factors Facilitating Transformations towards and away from Solution Selling

The differences between firms that move into the Solution Provider class and the remaining stayers can be roughly interpreted as potential driving forces of this transformation process (*roughly* because the describing variables refer to the situation today). According to that, the customers initiate the transformation: those firms become Solution Providers whose customers demand solutions instead of standardized components. Customer demand as main driver for change processes towards complex offerings has been discussed in conceptual research (Cerasale and Stone 2004; Tuli et al. 2007) but was (quantitatively) empirically confirmed only in the context of servitization (Gebauer 2007). Furthermore, only those companies move, which assume responsibility for implementing the offering and thus ensuring that the customer can use the offering effectively. However, the survey gives no information on whether the customers request this accountability or whether the companies do this for other reasons (such as differentiation)¹¹¹.

Two other factors should be interpreted as necessary conditions rather than driving forces for solutions: First, the integrative benefit (in this case only significant as the more abstract *gestalt benefit*) must already exist; it is the “crystal nucleus” for future solution offerings. The lack of this benefit is at the same time a strong driving force for backward movements, i.e. away from solution selling (see below). Second, solution movers have a better customer relationship quality. This seems plausible: Value for solution offerings is co-created and needs additional input from the customer (Biggemann et al. 2013; Cova and Salle 2008). Solution Providers also take over considerable risks from the customer; therefore, it is likely that they do so only for those customers with whom they have a robust existing relationship (Cornet et al. 2000; Zimmer et al. 2010). It also fits in the picture, that solution movers include future requirements of their customers into the offering. This is a specific investment into the relationship, which is probably only made for those customers, who are expected to behave reciprocally.

Focusing only at transformation *towards* solutions distracts attention from firms that gave up or will give up on selling solutions, which account for approximately 15 %

¹¹¹ Responsibility for the implementation correlates significantly but weak with customer demand for solutions ($r = .19$) and perceived uniqueness ($r = .14$)

of all Solution Providers in the sample. Although practitioner publications report high failure rates of transformations towards solution (for instance, that 20 percent of firms do not recapture the costs, according to Roegner and Gobbi (2001)), they leave open what happens to these firms. Also qualitative research cannot answer this question; studies on “reversed transformations” are extremely rare (Finne et al. 2013). The present study gives evidence that these “backwards movers” give up identifying individual customer requirements in favor of targeting larger segments, as can be seen in the large mean difference for requirements definition and the relatively high transition probabilities for SP → MMSS. As noted earlier, the move towards mass markets solutions reflects the firms’ fundamental conflict between individualization and standardization (Lampel and Mintzberg 1996) but is accompanied by a loss of effectiveness of the customization and integration processes. Consequently, the offerings of these companies have a lower gestalt benefit and a lower perceived functional value than those of the competition. Furthermore, the backwards-moving firms are less able to achieve a price premium for the integration process than their staying Solution Provider counterparts (also see figure 39).

Unfortunately, the pseudo-longitudinal nature of this study does not allow conclusions about cause and effect. The question, whether firms give up full solutions because they cannot achieve a price premium for integration (or because the offering does not have any integrative added-value) or whether this is a result of addressing larger customer segments, remains unanswered. In the latter case, larger segments – and a higher sales volume – could compensate the customers’ lower willingness to pay for integration. There are, however, other hints that these firms did not (or will not) leave the Solution Provider class voluntarily: First, customers demand less solution-style offerings; at the same time, the backwards movers have a smaller knowledge advantage than the stayers. These effects are connected: As already mentioned, the willingness to pay for customized offerings decreases with the customer’s competence (Ghosh et al. 2006), or as Adamson et al. (2012) provocatively put it: skilled customers lead to “the end of solution sales” (p. 61). Second, backwards movers have significantly less often distribution structures based on direct sales. This could explain why these firms take proactive after-sales measures less frequently: they lack a direct contact to the customer. Direct sales

representatives are also a valuable source of information on customer needs (Bonney and Williams 2009; Lee 1997), which might explain the lower knowledge advantage.¹¹²

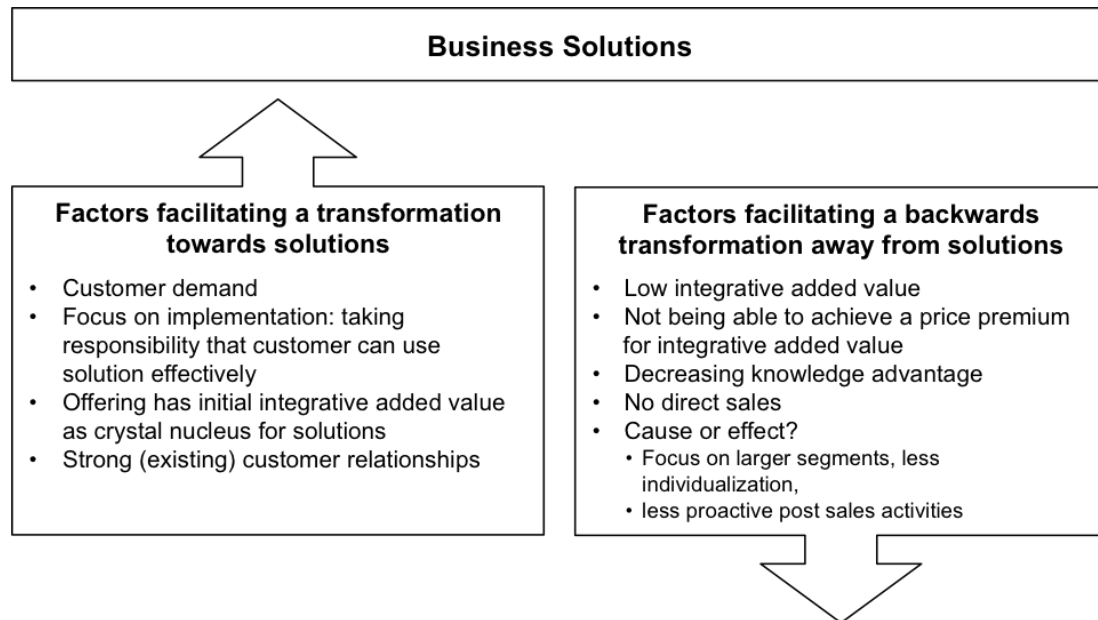


Figure 39: Factors facilitating transformations towards and away from solutions

Altogether, transitions towards solutions selling are less frequent than the transformation literature suggests, not least because solutions are already common practice. Expressed epidemiologically: the prevalence of business solutions is high, the incidence is low. The corresponding trajectories are more complex than the normative frameworks imply and also include backwards transformations. Transformations from Component Sellers to Solution Providers – in the time span covered by this study – are radical rather than subtle; they comprise several changes in the handling of SPCM processes at once.

¹¹² Firms featuring direct sales generally (i.e. in the whole sample) have a higher knowledge advantage ($mean_{others} = 4.15$; $mean_{direct} = 4.51$; $t = -2.99$; $df = 525$; $p < .01$) and pursue less often a proactive post-deployment strategy ($mean_{others} = 3.82$; $mean_{direct} = 4.19$; $t = -2.64$; $df = 525$; $p < .01$).

6 Study Ia + Ib: Implications and Limitations

6.1 Theoretical Implications

An Empirical Confirmed Typology for Complex B2B Offerings

The present typology based on the Solution Process Chain Model is the first and only typology for complex B2B offerings that meets Doty and Glick's (1994) three formal criteria for this kind of research: fully defined constructs, relationships among these constructs for defining ideal types, and falsifiable hypotheses that allow quantitative empirical testing. These prerequisites can be regarded as quality criteria for typology research, which has received massive criticism by leading management theorists for being a- or pre-theoretic (Hunt 1971; Weick 1995). However, so Doty and Glick (1994), typologies contribute to theory on two levels: The internal relationships including the ideal types represent middle-range theories; the external associations are general theoretic statements.

As a **middle-range theory**, the SPCM typology can serve as a bridge between conceptual research and contextual case-study-based findings (figure 40). It draws upon the approach by Tuli et al. (2007), which conceptualizes solutions as a set of four relational processes. The SPCM extends this approach by splitting "*customization and integration*" into two discrete processes. Each of the now five elements was then formulated as two contrasting approaches – conventional- / component-oriented vs. solution oriented – how to handle fundamental processes that define the sellers' relationship to their customers based on a specific core offering. While the original concept by Tuli et al. (2007) only portrays the solution seller, the modified framework allows a more fine-grained description of strategies for complex offerings. The hypothesized Solution Provider could be empirically confirmed as a qualitatively and quantitatively outstanding type. Also further types postulated by other authors such as the Component Seller and Resource Integrator (e.g. Doster and Roegner 2000; Roegner and Gobbi 2001) or the Mass Customizer (Lampel and Mintzberg 1996) were identified. While these latter types are significantly outstanding, they emerge relatively rarely.

The confirmation of these types should not be underestimated. So far, research on business solutions has been dominated by disaggregated case study findings and conceptual research. Being the most cited publication in this area, the framework of Tuli et al. (2007) has served as a *theoretical* link between these research streams. The SPCM now strengthens this link *empirically* and can serve as a basis for future research. The associations with external variables, which have not been used to build the typology, support the validity of the types and antitypes.

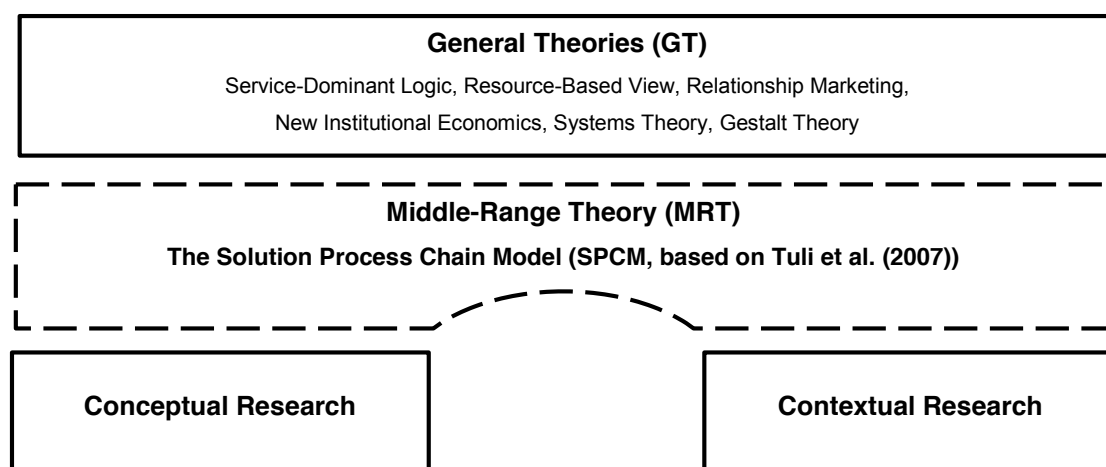


Figure 40: The SPCM as middle-range theory

Upstream and Downstream Contributions

The SPCM can also serve as a connector between general theories (GTs) and “practice theories” (see section 2.2). As the “circle of inquiry” (see figure 3 on page 22) suggests, MRTs help to consolidate GTs in the long run and to formulate new research agendas for contextual research (i.e. “fieldwork”) and conceptual research. Table 45 presents the potential upstream contributions to GTs that have been identified as relevant for complex offerings in chapter 2.3.7, as well as the complementary downstream implications.

Contribution of this Thesis to General Theories and Avenues for Future Research

Theory / Approach	“Upstream” contributions of this thesis	“Downstream” implications for future research
Service-Dominant Logic	<p>1) Product-based and service-based value-creation through solutions roughly follow the same principles and rules, supporting the core idea of SDL.</p> <p>2) <i>Co-creation</i> of customer is necessary during requirements definition, only individual solutions have full effect.</p>	<p>1) Future research should also include service-based solutions, e.g. knowledge-intensive business services (KIBS) (Bettencourt et al. 2002; Chae 2012; Muller and Zenker 2001; Strambach 2001; Xin et al. 2013).</p> <p>2) Quantification is necessary.</p>
Resource-based View	<p><i>Knowledge is necessary as a company-wide capability for successfully offering solutions.</i></p>	<p>How is this knowledge created? Who has this knowledge (sales reps as “truffle pigs”)? If and how can it be transferred to other solutions? What is the role of absorptive capacity (Xin et al. 2013)?</p>
Relationship Marketing	<p>1) Solutions are embedded in strong buyer-seller relationships.</p> <p>2) From the seller’s perspective, relationship quality mediates the effectiveness of solutions.</p> <p>3) Customers’ demand for solutions is one of the main drivers of transformation.</p>	<p>1) A dyadic view on solution-based customer relationships is necessary (so far, no dyadic quantitative study exists!). The RM view on solutions is not exploited. More quantification is needed before including other actors as in the network approach (Hadjikhani and LaPlaca 2013; Spencer and Cova 2012).</p> <p>2) Customer view on is relationship necessary, e.g. as a potential driving force for co-production.</p> <p>3) Are market-push solutions feasible, particularly for latent needs (Zimmer 2013a)? Under what circumstances are they superior to reactive solutions, i.e. demanded by the customer?</p>
New Institutional Economics	<p>1) Asset specificity has high explanatory power.</p> <p>2) The need or the avoidance of specific investments explain, why sellers remain in the chosen configuration – voluntarily or involuntarily.</p>	<p>1) Re-examination of German “textbook typologies” and searching for testable hypotheses might be fruitful.</p> <p>2) More conceptual research is needed on whether (and for whom) this is good, i.e. in the sense of keeping customers, or bad, i.e. being caught in an unprofitable niche. Links to population ecology theory should be further explored</p>
Systems Theory	<p>Integrative benefit (out of the systemic interaction of components) crucial for success of solutions</p>	<p>Nature of integrative benefit remains largely unexplained. Conceptual research needed for differentiation from other benefit / value concepts.</p>
Gestalt Theory	<p>Solutions best work as a <i>gestalt-strategy</i></p>	<p>Theoretical links to strategic management literature (e.g. Mintzberg 1978) should be strengthened.</p>

Table 45: Contributions of study I to theory

6.2 Managerial Implications

The SPCM provides several implications for companies that *want* to change their strategic positions in direction towards solutions. The italics are added consciously: There is a plethora of prescriptive theoretical frameworks suggesting that firms *should* move to solutions. Many practitioner publications imply that the majority of companies are pure component sellers that need to be transformed into solution providers (or figuratively spoken: need to move from the lower left to the upper right corner). The SPCM, however, should not be (mis-) used to derive prescriptive statements such as “Solution Providers perform best, thus any company should offer solutions”. A firm’s position within a configuration is a result of a complex interaction between the firm’s offerings, its resources, capabilities and competences, its strategic choices, its macro- and micro-environment, and, finally, its history. The SPCM depicts only a fragment of these interactions. Managers, however, can use the SPCM as a framework to assess the company’s current position and to evaluate the strategic options (figure 41).

The assessment starts with question if the customers’ business problems can be aggregated in order to target larger segments or if the problems need individual attention; the requirements definition scenarios in the survey might serve as a guideline. Only the latter case opens the route to solutions in the strict sense; the study results show that *standardized solutions* should be treated with caution (CSSSS antitype). However, when aiming at larger segments, a loop way leads to the Mass Customizer or Resource Integrator (dotted line in figure 41) since customers will probably not pay more for *individual*¹¹³ integration or customization. The answer should be considered carefully; it is a major strategic decision: The commitment to the individual approach, i.e. reducing the market size down to one, entails highly asset-specific investments and requires totally different, project-based capabilities in comparison to the segment-oriented approach (Azimont et al. 1998; Brady and Davies 2004; Cova and Salle 2007; Davies and Brady 2000; Kujala et al. 2010; Ulaga and Reinartz 2011).

¹¹³ The term „individual customization“ might sound strange but it is used as a demarcation to mass customization.

The next step concerns the offering: Managers should unemotionally ask the question¹¹⁴ whether the company's core offering already matches the customer's requirements. If this is the case, no solution-oriented approach is needed; instead, established strategy concepts (such as SCP approaches, e.g. by Porter (1980, 1985)) should be considered. However, if the offering does not meet the customer's requirements, managers should explore if customization or integration increases the offerings' functional value for the customer, provided that the offering can be customized and integrated. If the *value in use* cannot be increased, the managers should rethink if the company it really can serve this customer satisfactorily.

However, if customization and / or integration increase the functional value, the customer's willingness to pay (WTP) for these processes must be identified. This particularly applies to integration, as already mentioned, the willingness to pay a price premium can be considered as a *litmus test* for solutions. If the customer's WTP is lower than the costs for individualized integration and customization, managers should rethink their initial decision for the "markets-of-one" approach. Instead they should try to identify larger segments and serve those as Mass Customizers or Resource Integrators.

If the customer is willing to pay for individualized integration and customization, the subsequent question refers to the customer's ability to integrate the offering into the working environment. In case the customer does not need any assistance, the "pick-up" Systems Seller is a viable strategic option for the seller. This, however, also implies a rather short-term relationship to the customer based on this offering¹¹⁵. If the customer needs assistance for implementing the offering, which includes all activities to make sure that the customer receives the desired benefit from the offering (such as training or further modifications), the seller should take the chance and extend these activities to the period after deployment. The study results show that one-off projects are rather rare and limited to specific industries.

¹¹⁴ Of course, all assessments referring to customers should be supported by professional market research activities.

¹¹⁵ This does not refer to the entire relationship length, i.e. including purchases of other offerings.

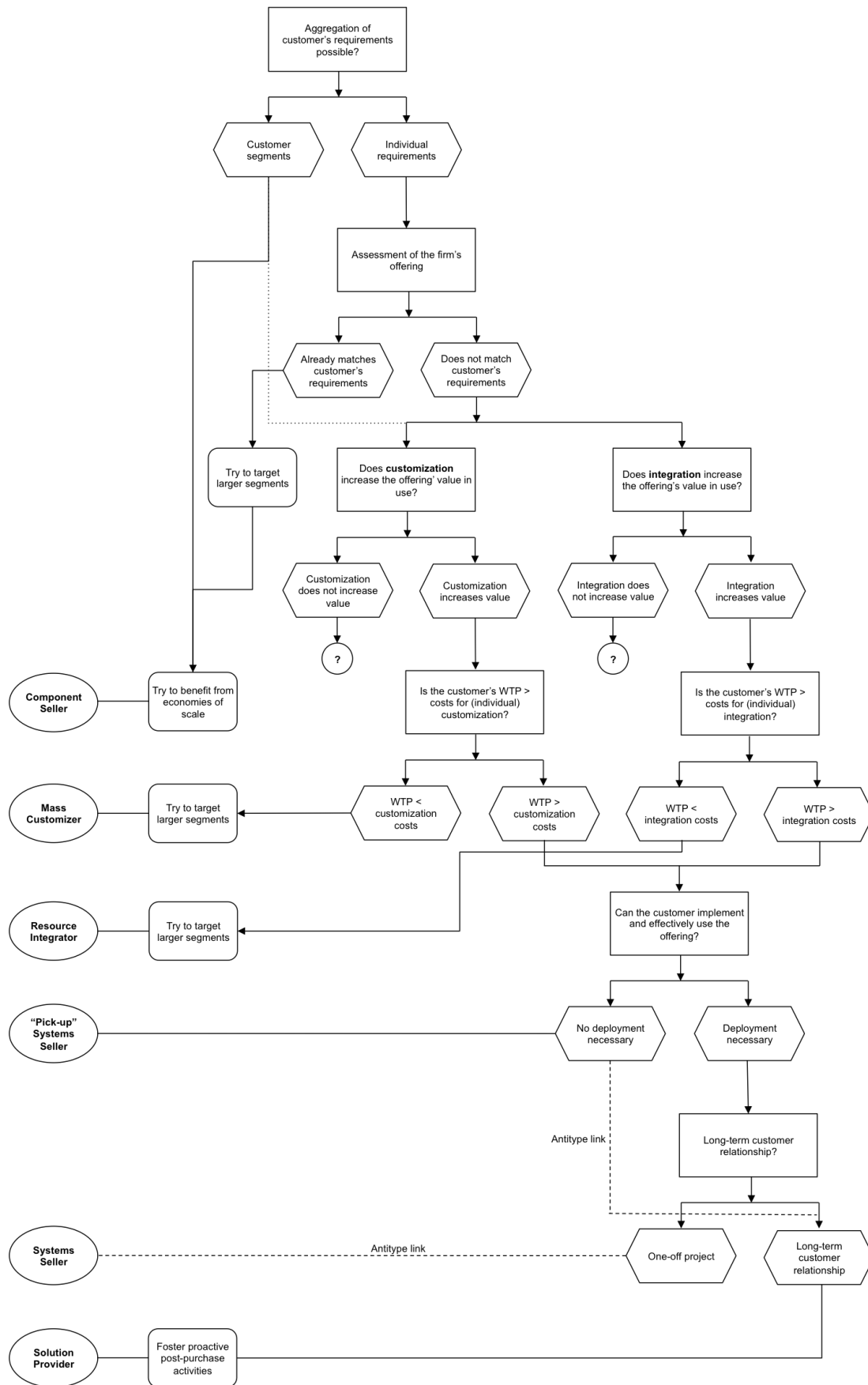


Figure 41: Managerial implications of the SPCM framework

The comparison between the “pick-up” Systems Seller and the Solution Provider also implies that sellers should not consider deployment and post-deployment activities as “necessary evil”. On the contrary, these two processes are crucial for the Solution Providers superiority with regard to central outcomes such as perceived uniqueness or the customer’s willingness to pay a price premium. Nevertheless, managers should also be aware of the costs associated with selling full solutions. This applies in particular to asset-specific investments, i.e. high expenditures into the relationship to a customer that are not transferable. Furthermore, the project-based “markets-of-one” approach also reduces the potential sales volume drastically. At the end, it is also a matter of more or less simple mathematics whether solutions are advantageous for a firm or not (also see Stremersch and Tellis 2002).

As mentioned before, the SPCM only depicts a fraction of decisions to be made. Moreover, factors that are not included in this framework need to be accounted for. For instance, the study results imply that a direct sales structure is advantageous for solutions. And finally – considering the buzz about solutions – managers should scrutinize their motives why they want to become solution providers: Just “because competitors do” is maybe a poor answer.

6.3 Limitations

6.3.1 Sample-related Limitations

Common Source and Common Method Bias

All data in for the two studies come from the same source and thus are prone to common source bias (Podsakoff and Organ 1986). Potential causes for this bias are consistency effects (participants try to give a consistent impression of themselves), implicit theories (e.g. about the effectiveness of measures), and acquiescence (general tendency for affirmation) (Podsakoff et al. 2003). Social desirability should be less of a problem, because 1) topics in the surveys do not touch any delicate matters, and 2) social desirability in online survey is generally lower than in face-to-face interviews since no interviewer is present (Duffy et al. 2005). Respondents might tend to overestimate the performance of their company, which could be caused

by a positivity or self-supporting bias (Larwood and Whittaker 1977). The result is that the majority is rated above the average (“Lake Wobegon effect”; Klar and Giladi 1997; Kruger 1999). This fact, however, should not affect the relative differences in the outcome variables.

A common method bias in the strict sense may arise if independent and dependent variables are measured in the same context, that is, at the same point in time, at the same location and using the same medium, and thus produce artificial co-variances (Podsakoff et al. 2003). The pseudo-longitudinal items are particularly prone to this bias because they are not – like “real” longitudinal data – measured at different points in time.

Online access panel providers usually consider their panelists as their core resource and do not allow any direct communication between subjects and client. Due to these privacy restrictions it was not possible to collect data that allow identifying individual firms or contacting participants. Hence, the answers given by the participants are the single source of information. As a positive side effect, however, respondents could be sure to remain completely anonymous, which usually further reduces response biases such as social desirability (Podsakoff et al. 2003).

Several procedural measures were taken to reduce a potential common method bias (MacKenzie and Podsakoff 2012; Podsakoff et al. 2003): First, several measurement techniques (scenarios, rating scales) with different item forms were used (unipolar, bipolar). Second, outcome variables were spatially separated from the scenarios and use different scale points. Third, open questions at the end of a topic provided distraction from clicking through the survey. As noted earlier, common factor tests gave no indication of excessive common method covariance.

National Focus on Germany

Data was collected in Germany only. Since the economic structure in Germany is characterized by a large proportion of SMEs, results in other countries might differ. However, the findings do not point to any systematic difference between SMEs and LEs. Other cross-national differences are imaginable, e.g. for specific industries that dominate the local economy. Also, intercultural differences might influence the

prevalence and incidence of solution selling, e.g. via different management styles, and hence limit the transferability of the results.

Companies as Source of Information

Tuli et al. (2007) demand a fundamental change in perspective; they call on to let the customer decide what a solution is. Therefore, does not it make more sense to ask customers to evaluate their providers? This perspective might be useful for theory development (and indeed it has proved to be useful in the case of Tuli et. al (2007)), but it is less appropriate for the assessment of the prevalence and the incidence of business solutions because of practical hurdles: customers cannot give information that go beyond the scope of their purchases (e.g. about the offering with the highest turnover) or information about processes behind the *line of interaction* (Zeithaml, Bitner, and Gremler 1996). The seller's point of view might be just one side of the coin, but if dyadic data is not available, vendors are the best information source about *selling* practices for complex offerings.

6.3.2 Methodological Limitations

Measurement

The scenario-based measurement used in the survey is doubtlessly prone to ambiguity and barreling of questions (Krosnick 1991; MacKenzie and Podsakoff 2012; Podsakoff et al. 2003). As a consequence, respondents might not agree with all statements included in either scenario. This risk, however, is taken consciously: The only alternative is multi-item measurement and assigning cases to configurations based on threshold values that would have to be defined in advance. For configural research, a clear classification scheme at the expense of a potential measurement error due to question barreling seems to be the lesser of two evils.

Broadness of the Scenarios

The primary objective of study I was to gain insights into common selling practices for complex offerings. The resulting generic nature of the survey, particularly of the scenarios, requires from the participants a high ability to abstract. Furthermore, no information could be gathered on the specific measures taken by the companies to implement a solution-oriented handling of the SPCM processes.

CFA-related Limitations

Configural Frequency Analysis only works with nominal data; therefore the original continuous data had to be dichotomized. Dichotomization has received partially massive criticism (Cohen 1983; MacCallum et al. 2002). The main counterarguments are loss of statistical power, reduced discriminatory precision and the occurrence of spurious significant results (Vargha et al. 1996). However, despite of smaller effect sizes, the results from analysis with categorical and continuous variables typically converge (DeCoster, Iselin, and Gallucci 2009). This applies at least to the LCA part of this study (see appendix). The negative effects of dichotomizing are also smaller if the variable is not normally distributed (DeCoster et al. 2009). Furthermore, dichotomizing can be justified if the underlying construct is of categorical nature (MacCallum et al. 2002) or if there are “theoretically meaningful cut-off points”¹¹⁶ (DeCoster et al. 2009, p. 364). Since the dichotomization in this study reflects the categorical nature of the SPC typology (traffic light analogy) and was already incorporated in the survey design and measurement process, it can be justified.

Size of Antitype Configurations

The number of observations within a significant configuration can be too small for cross-validating the results by conducting *t*-tests or ANOVAs. This is especially an issue for antitypes, which per definition occur less often than other configurations. Increasing the sample size massively (in our case: more than ten times as much) would help to reduce the risk for small sub-sample sizes ($n < 30$); however, the issue of unbalanced sub-samples still remains. Alternatively, small coherent antitypes can be grouped (as done for the “tension” antitypes).

Limitations Related to Pseudo-longitudinal Measurements

Despite of the pseudo-longitudinal nature of the central measurements in study I, the survey is cross-sectional and thus does not benefit from the advantages of “real” longitudinal research, such as more stringent causal inference and lower common method variance (Rindfleisch et al. 2008). Statements on transformation processes reflect only the participants’ retrospective and prospective *evaluations*, which are potentially distorted, e.g. through hindsight bias (Fischhoff and Beyth 1975),

¹¹⁶ Most of the criticism refers to the practice of median splitting.

availability heuristics (Tversky and Kahneman 1973) or the telescope effect (Morwitz 1997). This approach cannot, of course, substitute “real” longitudinal research. It is more akin to prognosis techniques such as (quantitative) Delphi methods (Helmer and Rescher 1959) or cross impact matrices (Gordon and Hayward 1968). Real longitudinal data allow more reliable statements about stage-sequential processes and are therefore highly desirable.

7 Study II: Business Solutions – The Buyers’ Perspective

7.1 Problem Description and Research Questions

“The winners will be those who deliver solutions *from the users’ point of view*. That is a big part of marketing’s job.”¹¹⁷

Jack Welch (1935 -)

Former CEO of General Electric

No customer solution without customers. What may seem trivial at first glance, is not at the second when looking at the scientific marketing literature to that topic. Over a period of three decades – from the beginnings at the mid-1970s (Mattsson 1973) until the mid-2000s – marketing academia defined solutions primarily from the vendor’s perspective. It was the merit of Tuli et al. (2007) who first extensively examined the customers’ view on B2B solutions. Of course, the customer has always been present in early theoretic concepts too. It was emphasized that potential solution customers need to solve complex business problems and thus have highly specific expectations of offerings, which cannot be met by off-the-shelf products and therefore require customization. Providers should also integrate several components (mostly understood as product plus service bundles) into a system in order to create additional value to the customer, who is then willing to pay more (Hannaford 1974; Page and Siemplenski 1983).

According to Tuli et al. (2007), researches should abandon the idea of solutions as customized and integrated product-service bundles even though this still reflects the prevailing view on solutions among sellers. Instead, research should take the customers’ perspective where business solutions are defined as a sequence of relational processes (requirements definition, customization and integration,

¹¹⁷ Introductory quote to the Journal of Marketing paper by Tuli et al. (2007, p. 1), who again cite Kumar (2004, p. 84) as source. The italics were shifted from „solutions“ to „from the users’ point of view“.

deployment and post-deployment support). Put differently: customers perceive the procedure as solution, while sellers focus on the outcome.

In the seventh year after its publication, the paper by Tuli et al (2007) has become the most cited in the area of B2B solutions. Spencer and Cova (2012) even see a paradigm shift caused by this article particularly when it comes to the beneficiaries of value generated through solutions (table 46): while early research exclusively focused on how to improve the seller’s competitive position, now the customer comes into play.¹¹⁸

From Business Solutions to Customer Solutions (Spencer and Cova 2012, p. 1573)		
Orientation	Firm-centric	Dyad-centric
Value for whom?	Supplier (and its value-chain actors)	Supplier and customer (and their related network actors)
Definition of solution	Solution as a customized and integrated combination of goods and services for meeting a customer’s business needs	Solution as a set of customer–supplier relational processes
Type of solution	Business solution	Customer solution

Table 46: Focus change: from *business* to *customer* solutions

Spencer and Cova, however, also perceive the dyadic centric perspective as theoretically deficient and only transitory and thus call for another paradigm shift (towards *market solutions* based on the network approach, as propagated by the IMP school). Even if this were necessary from an interpretivist standpoint, the dyadic-centric conceptualization of solutions is still not well understood from a positivistic perspective. Quite the contrary: hypothesis testing research in the context of B2B solutions a) is still scarce and b) does not cover essential topics that emerge if solutions are defined as a sequence of *relational* processes: All five (or four in the original version) processes include human actions and interactions, and perceptions by individuals both on the customer’s and the provider’s side. These *people aspects* – even though mentioned by Tuli et al. (2007, p. 7) – play only a minor role in previous research on solutions; instead *strategy aspects* dominate (i.e. solutions as business model). This is fairly surprising given the fact that research on sales and personal selling has dealt extensively with the key issue, the *raison d’être* of business

¹¹⁸ The authors consider the emergence of the term „customer solution“ instead of business solution as a result of this shift in meaning; however, most researcher still use both terms interchangeably.

solutions in the past: solving customers' problems (Saxe and Weitz 1982). The intersection between academic marketing research on solutions (and other complex offerings) and the sales literature has only recently attracted the attention of scholars (Bonney and Williams 2009; Sharma, Iyer, and Evanschitzky 2008; Storbacka et al. 2011; Ulaga and Loveland 2014), but is still largely unexplored.

The present study therefore focuses on the human interfaces involved in the relational processes of solution selling. More specifically, the study attempts to answer the question to what extent problem-oriented behavior of sales persons and service employees influences the perception of the vendor as a solution provider from the customers' point of view. With the insights gained in this study, sellers are better capable to select sales and service employees, to assemble teams, and to train personnel in order to increase the effectiveness of solution selling processes. This study also opens avenues for linking research on complex offerings and personal selling.

7.2 Theoretical Background

7.2.1 Previous Research on People Aspects of Business Solutions

A closer look at the literature on complex offerings (see the reviews in sections 2.4.2, 2.4.11, and 5.2.1) suggests a strong focus on "hard factors" such as strategy (Davies et al. 2007; Hax and Wilde II 2003; Sawhney 2006; Windahl et al. 2004), organizational capabilities (Brady et al. 2005; Davies and Brady 2000), pricing (Roegner and Gobbi 2001; Sharma and Iyer 2011), or firm value and other financial outcomes (Antioco et al. 2008; Fang et al. 2008). Research on "soft factors", i.e. on the role of individuals, is largely underrepresented so far. In conceptual research, humans predominantly appear in form of aggregates, for instance as the seller's staff that needs to undergo changes (Galbraith 2005a, 2005b, 2002) and constitutes a huge expense factor during transformation towards solutions (e.g. Johansson et al. 2003). There are only a few publications that focus on the personality (in a wider sense, such as traits, skills, competences, orientations, preferences) of individuals involved in selling and purchasing complex B2B offerings. This is insofar remarkable, as early practitioner publications (Bosworth 1995; Gschwandtner 1987) positioned business

solutions as a *selling* approach in the tradition of consultative selling (Hanan et al. 1970). After marketing academia had picked up these concepts and merged it with the literature on systems marketing, the focus shifted from individual skills to organizational competences. The topic returned in the mid 2000s. In his 2006 Harvard Business Review paper, Frank Cespedes presents a case study featuring a fictional recruiting situation, in which a large technology company is about to fill a vacant sales manager position and needs to make a decision: either an experienced, home-grown, down-to-earth, relationship-oriented person (“old hand”) or a new “solution manager” from outside the company (“new blood”). This person is characterized as an assertive, problem-oriented strategist but also as brash and pushy. As a reply to this fictional situation, several managers and academics give recommendations. They agree, that the company needs both persons (and hence both set of skills). Even if this fictional case nurtures clichés rather than thoroughly depicts traits, it was among the first publications that shed light on individual characteristics of persons involved in selling solutions.

Sharma (2007), Sharma et al. (2008) and Sheth and Sharma (2008) describe new challenges that salespersons have to face when their companies move from selling high-tech products to providing technology-based solutions: First, solutions usually have a high percentage of services. These are typically based on long-term contracts or even imply new business models (such as pay-per-use), which collides with the rather short-term, transaction-based horizon of traditional selling approaches with the focus on “deal-closing”. Second, solutions are more complex than stand-alone products and usually have to fit into an existing infrastructure at the customer’s site. Thus, the salesperson must develop from a “product expert” to a “customer expert” (Sheth and Sharma 2008, p. 265) with advanced consulting and problem-solving skills. Third, solutions usually include an intensive after-sales support, often with service level agreements or guaranteed uptime. Salespeople become increasingly responsible also for this phase of the customer lifecycle, de facto turning into account managers. Sheth and Sharma (2008) summarize the new challenges as follows:

„The shift toward consultative selling requires personnel who can be problem solvers and managers of their accounts. Instead of charisma and push, salespeople will now need to understand the customer and sharpen their ability to provide excellence customer service“ (p. 266)

Bonney and Williams (2009) further specify requirements for solution salespersons. They draw parallels between solution selling and entrepreneurship, since both realms require specific cognitive abilities to identify and exploit market opportunities. They propose a formative construct *salesperson opportunity recognition*, which includes the dimensions *awareness* (noticing “changes or misallocations of resources in a customer account”, p. 1037), *problem-solution discovery* (defining problems, exploring solutions), and *evaluation* (selecting the most promising solution). The authors also propose several influencing and intervening variables on the side of the customer’s and the seller’s organizations, such as the salesperson’s autonomy, rewarding schemes or the demandingness of the customer. A higher opportunity recognition should result in higher efficiency and effectiveness of the solution. This framework, however, is not easy to operationalize (and has not undergone empirical testing so far). For instance, it is not clear, if *salesperson opportunity recognition* is a lower order construct with a mediating effect or a higher order construct. Moreover, given the dominance of relationship marketing thinking (Morgan and Hunt 1994) it is questionable, if the primary concern of solution sales reps should be hunting for new business opportunities instead of nurturing (“farming”) the extant customer base.

Töllner et al. (2011) show in an analysis of 17 in-depth interviews that solution customers in the capital goods industry weight the solution processes (Tuli et al. 2007) differently depending on their role in the buying center (as users, buyers, or deciders, cf. Webster Jr. and Wind 1972). While buyers emphasize requirements definition, users underline the importance of customization and integration processes.

Uлага and Loveland (2014) investigate inter-individual differences between goods-centric and hybrid offering¹¹⁹ salespersons. On the basis of focus groups and in-depth interviews with senior managers, they identify 13 personality dimensions relevant for effectively selling hybrid offerings: Salespersons must exhibit a strong *learning-orientation*, since the actual sales process resembles more and more a “learning experience” about customer needs, for which prior knowledge is only partially

¹¹⁹ As outlined in section 2.4.5, the concept *hybrid offerings* shares many similarities with business solutions.

applicable (Davies and Brady 2000). Sales reps should also have a strong pro-active *service orientation*, which is not limited to solving problems after they occur (cf. Challagalla et al. 2009). This implies a focus on the installed base instead of new deals (farming vs. hunting). The *motivation* to sell hybrid offerings should be *intrinsic*, which is insofar challenging as most compensation schemes only reward deal-closing. Since the selling process for hybrid offerings takes longer than for products and includes longer periods of uncertainty about the outcomes, salespeople should be *emotionally stable*. While extraversion has a positive effect on sales performance for products (Vinchur et al. 1998), hybrid offering salespersons should be rather *introverted*. Also on two other dimensions of the Big Five personality inventory (Digman 1990; McCrae and Costa 1987) – openness and conscientiousness – hybrid offerings salespersons should score higher. Additionally the authors identify *teamwork orientation*, *visionary thinking*, *nurturance*, *perfectionism*, *assertiveness* and *general intelligence* as relevant dimensions. Ulaga and Loveland’s framework, however, has not been tested empirically-quantitatively so far.

In a quantitative study in the IT industry (n = 106), Jacob et al. (2014) identify project management skills of the providers’ consultants that have a positive impact on consulting satisfaction, which in turn mediates trust in and loyalty to the provider. The authors, however, link their research model to solutions only on an abstract, general theoretical level (via SDL). Thus, the constructs do not directly refer to characteristics of business solutions, such as integration, customization, etc.

7.2.2 Solutions and Problem Solving in the Sales Literature

Although research on sales and personal selling is part of “mainstream academic marketing” (as published for example in the Journal of Marketing), it also forms a separate scientific community with its own research outlet (primarily the Journal of Personal Selling and Sales Management). However, this narrow area of research – which equally covers activities on B2C markets – has largely ignored business solutions so far. Although some researchers called on to investigate solution from a sales perspective (for instance in the context of customer centricity, see Leigh and Marshall 2001) and put it on the research agenda (Jones et al. 2005), this domain is

still largely unexplored¹²⁰. There are, however, some conceptual overlaps between solutions and established selling approaches that touch core issues of business solutions.

Saxe and Weitz (1982) define **customer orientation** as implementation of the *marketing concept* at the level of the individual salesperson: “In the marketing concept, all parts of an organization are oriented toward solving customer problems and meeting the needs of the marketplace. [...] A mark of professionalism in sales is that sellers adopt a problem-solving approach to their work. A professional salesperson does not wonder, ‘What can I sell this individual?’ but instead asks, ‘How can I best solve this person's problems?’ (Kurtz, Dodge, and Klompmaker 1976, p. 13-14; cited by Saxe and Weitz 1982). The authors contrast this problem-solution-based customer orientation¹²¹ with hard selling practices that aim at short-term success through stimulation of demand (selling orientation vs. customer orientation, SOCO). The SOCO approach has triggered extensive research¹²², mostly with customer orientation as predictor for sales performance (Cross et al. 2007; Jaramillo and Grisaffe 2009), but has also been applied in unconventional research settings (for instance, Bagozzi et al. (2012) examine the genetic and neurological foundations of SOCO).

Adaptive selling (Spiro and Weitz 1990) is based on the assumption that personal selling “is the only communication vehicle that allows a marketing message to be adapted to the specific needs and beliefs of each customer” (p. 61). Although their concept focuses on the salesperson’s flexibility to switch between different selling strategies, the authors emphasize the necessity to treat every customer individually and to respond to needs and wishes. In the case of business solutions, such an attitude should be helpful for sales persons during requirements definition and for

¹²⁰ Storbacka et al. (2011) explicitly refer to this research gap. However, by identifying top management practices related to solution selling, they aim at a more abstract level of selling behaviors.

¹²¹ Saxe and Weitz (1982) see the origins of the problem-solution approach in industrial marketing and refer to early practitioner publications on systems selling.

¹²² Bagozzi et al. (2012) state that „seldom has a concept sparked so much interest, resonating with both researchers and practitioners“ (p. 639).

service employees for post-purchase activities. Spiro and Weitz embed adaptive selling in a nomological network that shares some similarities with the findings by Loveland and Ulaga (2014), for example with regard to empathy, self-monitoring or intrinsic motivation.

In the recent past, SOCO and adaptive selling are often examined in conjunction. Meta-analyses (Goad and Jaramillo 2014; Jaramillo et al. 2007) reveal a generally positive impact of customer orientation on sales performance, but a selling orientation can be advantageous in specific situations, so that flexible salespersons are most effective. Other authors (e.g. Franke and Park 2006) refer to conceptual overlaps, insofar as both approaches emphasize the salespersons empathy as prerequisite to detect customer needs. Besides of sales performance, positive effects on customer satisfaction were found for both concepts (Homburg, Müller, and Klarmann 2011a; Román and Iacobucci 2010).

Customer orientation and adaptive selling are not limited to sales practices: SOCO has been adapted to other personnel such as front-line employees (Brown et al. 2002; Hennig-Thurau and Thurau 2003; Kelley 1992); the idea behind adaptive selling plays a major role in the context of service customization (Bettencourt and Gwinner 1996; Gwinner et al. 2005).

Conclusion

A possible *employee solution orientation* combines attributes from both approaches: His adaptability allows him to respond to individual customer needs and wishes. Being customer-oriented, he focuses on effectively solving the customer's problem, putting his own interests aside. Such a person literally *embodies* the idea behind solutions and should act as an ambassador for a solution-oriented seller.

7.3 Hypotheses

7.3.1 Focal Hypotheses

Direct Effects of the SPCM Elements

Reflecting the mainstream of academic research on business solutions and other complex offerings (see chapter 2.4.9), vendors that offer solutions better meet the requirements of their customers. More specifically, solutions pursue a “reversed product-to-market design” that starts with the desired outcomes (Brady et al. 2005, p. 3). Identifying customer needs and understanding the underlying business problem is therefore pivotal for the entire solution process chain. Hence, a positive direct effect of the requirements definition process on **satisfaction** (SAT) and **perceived usefulness** (USF) is expected (**H_{R1}** and **H_{R2}**). The same logic applies to the customization process (Franke et al. 2009; Ghosh et al. 2006; Lampel and Mintzberg 1996; Salvador, Chandrasekaran, and Sohail 2014) in which the actual adjustments to the customer needs are performed (**H_{C1}** and **H_{C2}**). Central to the idea of solutions is the integration of several components into an offering that delivers more value than the sum of its parts (cf. Sawhney 2006, Tuli et al. 2007); hence a direct effect of integration on satisfaction and the offerings’ usefulness is expected (**H_{I1}** and **H_{I2}**). Deployment refers to the implementation of the solution (Tuli et al. 2007). This process comprises all activities to put the solution into service and to ensure an effective operation (such as trainings for the staff). Thus, deployment is hypothesized to influence customer satisfaction and perceived usefulness of the offering directly (**H_{D1}** and **H_{D2}**). Post-deployment support in the context of business solutions primarily refers to activities that guarantee the up-time of the solution (Tuli et al. 2007), which are expected to increase customer satisfaction (Challagalla et al. 2009) but also the perceived usefulness (**H_{P1}** and **H_{P2}**) due to the higher availability.

In addition to the rather traditional customer-level outcomes *satisfaction* and *usefulness*, two other desired effects of solutions should be examined:

Business solutions are considered as an effective tool to differentiate from the competition (cf. Brown 2000; Wise and Baumgartner 1999). Hence, executing the

SPC elements in a solution-oriented manner should increase the **uniqueness** (UNIQ) as perceived by the customer (**H_{R3}**, **H_{C3}**, **H_{I3}**, **H_{D3}**, **H_{P3}**).

Solutions promise a superior value, for which the seller should be able to charge a premium price – at least theoretically; practitioners regularly emphasize the difficulties in asserting a **price markup** (PMU) for solutions (Bennet et al. 2001; Johansson et al. 2003; Roegner and Gobbi 2001). Nevertheless, paying a price premium can be considered as a “litmus test” for the integrative added value of solutions (Sawhney 2006). This also differentiates solutions from (price) bundles, which must be offered at a discount price (Stremersch and Tellis 2002; also see section 2.4.3.). However, the positive impact of the solution processes on the customer’s willingness to pay a price premium is not limited to integration. As previous research suggests (Palmatier et al. 2007b), other relational activities also positively influence this relationship. Therefore, a positive effect of all five SPCM elements on the willingness to pay a price markup is expected (**H_{R4}**, **H_{C4}**, **H_{I4}**, **H_{D4}**, **H_{P4}**).

Central Hypotheses: Solution Processes, Employees’ SOL-O, and Outcomes

Independent (exogenous) variables					Dependent (endogen.) variables	
R	C	I	D	P		
H _{R1} + H _{R1M}	H _{C1}	H _{I1}	H _{D1} + H _{D1M}	H _{P1} + H _{P1M}		→ 1 SAT
H _{R2} + H _{R2M}	H _{C2}	H _{I2}	H _{D2} + H _{D2M}	H _{P2} + H _{P2M}		→ 2 USF
H _{R3} + H _{R3M}	H _{C3}	H _{I3}	H _{D3} + H _{D3M}	H _{P3} + H _{P3M}		→ 3 UNIQ
H _{R4} + H _{R4M}	H _{C4}	H _{I4}	H _{D4} + H _{D4M}	H _{P4} + H _{P4M}		→ 4 PMU
Partially mediated through SOL-O), stronger effects for decision makers	Only direct, since beyond the <i>line of interaction</i>		Partially mediated through SOL-O, stronger effect for users			

Table 47: Central hypotheses

Mediating Effect of the Customer Contact Employee

The processes customization and integration differ from requirements definition, deployment, and post-deployment support insofar as frontline employees (i.e. sales and service employees) are only involved in the latter. Customization and integration usually take place behind the “line of interaction” (Zeithaml et al. 1996), carried out by product units without customer contact (Galbraith 2005b, 2002).

Previous research suggests a mediating effect of customer orientation between perceived firm and person characteristics and several customer-level outcomes, such as satisfaction and loyalty (Williams and Attaway 1996; Brady and Cronin Jr 2001a; Hennig-Thurau and Thurau 2003; and Hennig-Thurau 2004). Hence, for those three SPCM elements that involve customer interactions, a solution-oriented behavior (that is, customer-centric, adaptive and focused on solving the customer's problems) of the frontline employees (SOL-O) is expected to partially mediate the relationship between the customers' perception of the solution processes and the aforementioned outcomes satisfaction, perceived usefulness, uniqueness and willingness to pay a price markup:

- **H_{R1-4M}**: The employee's solution orientation partially mediates the effect of the provider's requirements definition activities on satisfaction, perceived usefulness, uniqueness and willingness to pay a price markup.
- **H_{D1-4M}**: The employee's solution orientation partially mediates the effect of the provider's deployment activities on satisfaction, perceived usefulness, uniqueness and willingness to pay a price markup.
- **H_{P1-4M}**: The employee's solution orientation partially mediates the effect of the provider's post-deployment activities on satisfaction, perceived usefulness, uniqueness and willingness to pay a price markup.

The *partial* mediation (Hayes 2013) implies, that 1) direct effects of the SPCM on the focal outcomes satisfaction, usefulness, uniqueness and price mark-up still exist, 2) employee solution orientation has a positive effect on these outcome variables and 3) requirements definition, deployment and post-deployment support have a significant impact on employee solution orientation.

Moderating Effect of the Customer's Role in the Buying Center

Depending on the customer's function during the procurement process, the impact of the frontline employees on the perception of the solution might differ. As suggested by Töllner et al. (2011), *decision makers* emphasize the requirements definition stage. This seems plausible since deciders are per definition primarily involved in the pre-purchase processes (Johnston and Bonoma 1981; Webster Jr. and Wind 1972). In contrast, *users* are expected to appreciate solution-oriented behavior when the

solution is being implemented (deployment stage) and in the period thereafter (post-deployment support).

Therefore, a moderating effect of the customer's role in the buying center on the mediating effects of the perceived employee's solution-orientation is expected (moderated mediation; Hayes 2013). The mediating effect for requirements definition should be stronger for decision makers, while those for deployment and post-deployment support should be stronger for users.

7.3.2 Further Hypotheses

Satisfaction has proved to be a consistent predictor for positive word of mouth (Anderson 1998; Anderson and Mittal 2000), this also applies to business markets (v. Wangenheim and Bayón 2007). Satisfaction with the provider is also expected to positively influence a price premium for B2B offerings (Palmatier et al. 2007b; Zimmer et al. 2010); this link could be proven in a B2C context (Homburg, Koschate, and Hoyer 2005a). Finally, it has been shown that customer satisfaction leads to higher repurchase *intentions*¹²³ in B2B settings (Lam et al. 2004; Molinari, Abratt, and Dion 2008; Rauyrueen and Miller 2007). Consequently:

- **Hs1:** Satisfaction elicits positive word of mouth
- **Hs2:** Satisfaction positively influences the willingness to pay a price premium for solutions
- **Hs3:** Satisfaction leads to a higher repurchase intention (decider sample only)

Perceived value is in B2B marketing usually defined as a result of the *customer relationship with the provider* (Lindgreen and Wynstra 2005; Ulaga and Eggert 2006). This value concept has shown to increase the repurchase intention and to lead to positive word of mouth (Eggert and Ulaga 2002). In general, value to the customer should lead the intention to pay a price premium (Rao and Bergen 1992; Rao and Monroe 1996), this is also the fundamental premise of value-based pricing (Hinterhuber 2004; Simon and Fassnacht 2008). Hence, the corresponding hypotheses are:

¹²³ Albeit not necessarily repurchase *behavior* (Mittal and Kamakura 2001, in B2C context)

- **H_{V1}**: Perceived value leads to positive word of mouth.
- **H_{V1}**: Perceived value increases the willingness to pay a price markup
- **H_{V3}**: Perceived value positively influences the repurchase intention.

Perceived usefulness – the utility created by the offering – plays an important role in the study context (see section 7.5.1). Product- and service-related benefits have been demonstrated to be reliable predictors of relationship value on business markets (Sanchez-Fernandez and Iniesta-Bonillo 2007; Spiteri and Dion 2004; Ulaga 2003; Ulaga and Eggert 2005). As users get in touch with the solution offering on a regular basis, the link between perceived usefulness and value associated with the provider should be stronger than for decision makers (Kleinaltenkamp 2013; Wunderlich 2010):

- **H_{USF}**: Perceived usefulness increases perceived relationship value. This relationship should be more positive for users than for decision makers.

Commoditization, the loss of perceived differentiation, is regarded as one of the chief causes for shrinking margins on business, both for products (Homburg et al. 2011b; Reimann et al. 2010) and – more recently – also for services (Bruhn 2011; Minculescu et al. 2011; Turner 2009; Visnjic Kastalli and Van Looy 2013). Consequently, if customers perceive a seller as a unique solution provider, they should be willing to pay a price premium for the solution offerings:

- **H_{UNIQ}**: Perceived uniqueness leads to a higher willingness to pay a price markup.

Figure 42 displays the entire hypothesis framework.

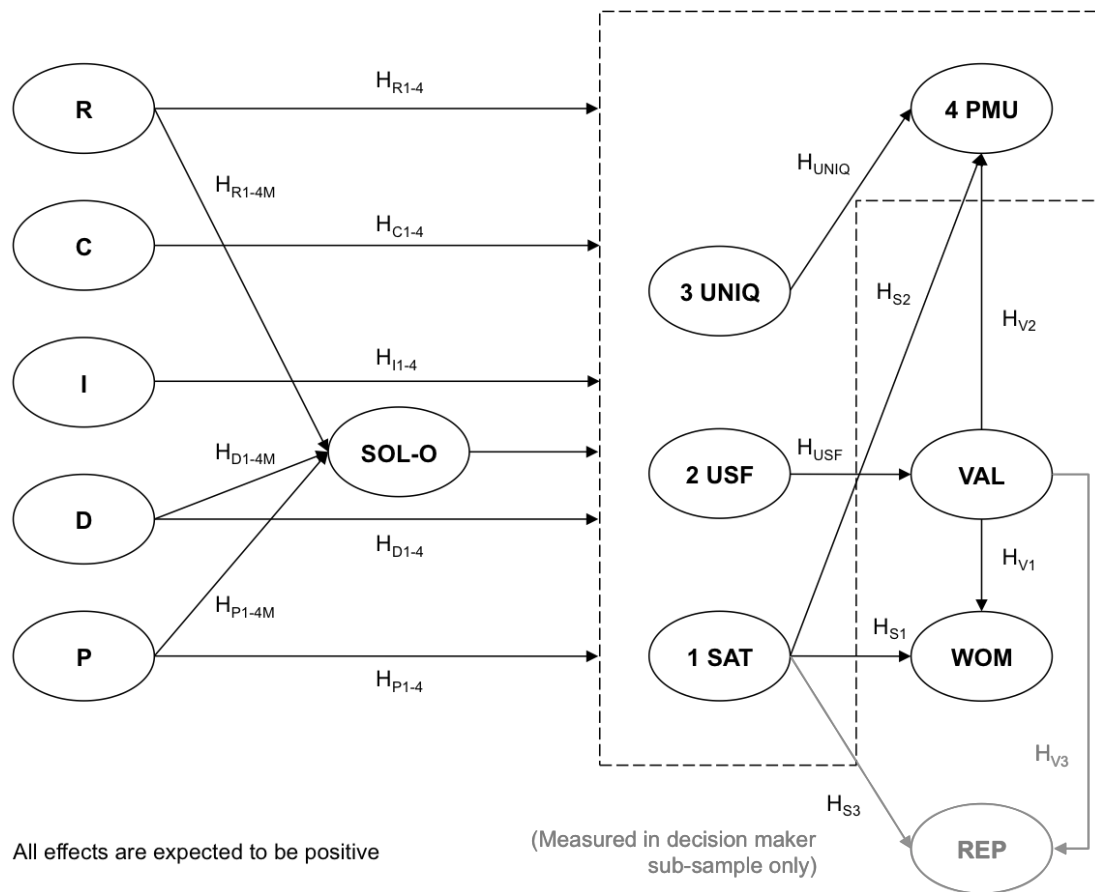


Figure 42: Hypothesis framework for study II (direct and mediating effects)

7.4 Survey Design

7.4.1 Basic Concept

The study directly draws upon the Solution Process Chain Model (SPCM) as outlined in section 2.5.6., but with a significant modification: the perspective switches from the seller to the buyer. Thus, the customer evaluates either the provider's solution-oriented activities or solution-related characteristics of the offering. Each statement should refer to the last purchase with a value of more than 50,000 EUR, in which the participant was involved.

Only the central scales are presented in the following, the remaining measurements can be found in the appendix (table A52).

7.4.2 Central Scales and Measures

Perceived Solution Orientation of the Provider

The item wording (see Table 48) is close to the original paper by Tuli et al. (2007), with additional input from Sawhney (2007) for the integrative benefit and Challagalla et al. (2009) referring to the proactivity of post-purchase activities. In contrast to the solution-orientation of the employee (SOL-O), the SPCM-based measurements refer 1) to the provider in general and not to behaviors of an individual person (“*the provider* integrated several components...”), 2) to behaviors that are specific to the solution processes, and 3) to particular activities in the past, except for requirements definition (formulated in present tense). All items use a 6-point rating scale, reaching from “I totally disagree” (=1) to “I totally agree” (=6).

The items are supposed to measure the latent construct “provider’s solution orientation” *reflectively* (Bagozzi 1984; Jarvis, MacKenzie, and Podsakoff 2003). That is, the construct “causes” the measures, which are expected to correlate. Omitting an item does not change the meaning of the construct.

Perceived Solution Orientation Scale Based on the Solution Process Chain Model

Dimension / Items	Origin / Comments
Requirements Definition	R
The provider dealt with the procurement background, respectively the question of why we need something.	R1
The provider considered our requirements. *	R2
The provider considered our wishes and ideas. *	R3
The provider asked about specific problems that had to be solved with the procurement.	R4
The provider included the future development of our needs.	R5
Customization	C
The provider has adapted the offering in any way to our needs.	C1
We had the impression that the vendor wanted to sell us standard products instead of a customized solution. (rev)	C2
Integration	I
The provider integrated several components into a complete system.	I1
The offering provides – as a whole – a higher functional benefit than the sum of its parts.	I2

Deployment		D
The provider took measures by which we are able to use offering effectively (e.g. through training).	D1	
The offering has caused more problems than it could solve. (rev)	D2	Own formulation, based on Tuli et al. (2007).
After installation, no problems occurred during operation.	D3	
The provider could prove that in reality everything works as promised in the concept.	D4	
Post-Deployment Support		P
After the purchase, our provider proactively takes care of the offering's permanent availability (e.g. through remote diagnostics).	P1	Own formulation, based on Tuli et al. (2007), Chalagalla et al. (2009) and Athaide et al. (1996). In contrast to other established scales for relationship activities (e.g. Athaide, Meyers, and Wilemon (1996)), the focus is on proactivity.
After the purchase, our provider informs us proactively about ways to use the offering more effectively.	P2	
Our provider asks proactively how he could further improve the offering.	P3	
Our provider asks proactively how pleased we are with the purchase.	P4	

Table 48: Perceived provider's solution orientation based on the SPCM

Employee Solution Orientation

The measuring instrument for the vendor's employees' solution orientation draws upon established scales¹²⁴: selling orientation-customer orientation (SOCO) by Saxe and Weitz (1982), respectively the short forms by Periatt, LeMay, and Chakrabarty (2004) and Thomas, Soutar, and Ryan (2004), adaptive selling (Spiro and Weitz 1990). Even though the original SOCO scale includes items that refer to problem solving, the formulations by Sirdeshmukh, Singh, and Sabol (2002) were used because they better fit into the context. In accordance with Homburg et al. (2011a), only those items that were central to the research question were taken from the specific scales.

While the SPCM measurements refer to the seller on a rather generic level and prescind from the individual person, the SOL-O measurement focus on the specific employee involved in the transaction.

Two items refer to "disobedient" behaviors (SOL-O 8 + 9, see table 49). In the original scales, these items load on the same factors as the remaining items for

¹²⁴ Originally, these scales are self-ratings for sales (or services) employees, but they can also be rated by customers as demonstrated by Daniel and Darby (1997).

customer-orientation. As it turned out in the further course of the analysis, these two items form a separate factor (see section 7.6.1.).

Employee Solution Orientation Scale (SOL-O)		
Items	SOL-O	Origin
Sales person / service employee ... doesn't hesitate to take care of our problems.	SOL-O1	Adapted from Sirdeshmukh et al. (2002)
... makes special efforts to solve customer problems.	SOL-O2	Adapted from Sirdeshmukh et al. (2002)
... consults rather than just selling.	SOL-O3	Based on Hanan et al. (1970) and Liu and Leach (2001)
... gives us ideas and suggestions for the best use / optimal design of the offering.	SOL-O4	Based on Challagalla et al. (2009)
... helps us to achieve our goals.	SOL-O5	Adapted from Saxe and Weitz (1982)
... finds also for our individual needs a good solution.	SOL-O6	Homburg et al. (2005c)
...s' advises are based on the customers' specific needs.	SOL-O7	Based on Spiro and Weitz (1990)
... is willing to disagree with a customer in order to help him make a better decision.	SOL-O8	Adapted from Saxe and Weitz (1982)
... is willing to bend company policies to help to address customer needs.	SOL-O9	Adapted from Sirdeshmukh et al. (2002)

Table 49: Employee solution orientation scale (SOL-O)

7.5 Data Collection and Processing

7.5.1 Study Context: In-vitro Diagnostics Industry

The empirical part of the study took place in the *in-vitro diagnostics* (IVD) industry. In-vitro diagnostics includes all analytical processes that are carried out outside the human body (VDGH 2013). “In-vitro” (lat.) means “in glass” (= test tube); the counterpart is *in-vivo diagnostics*, mostly associated with diagnostic imaging (X-ray, MRI, etc.). IVD is typically used for analyzing body fluids (in most cases blood) or tissues, which are brought in contact with specific reagents in large, fully automated devices (analyzers). One distinguishes between four different types of analysis: clinical chemistry (e.g. electrolyte levels), hematology (focus on blood cells), immunology (antigen-antibody reactions) and molecular diagnostics (genetic analyses). Special devices and matched reagents are necessary for each type of analysis; there is no “one type fits all” analyzer. IVD is typically carried out in laboratories, which are usually integrated in hospitals or medical practices, or privately owned (VDGH 2013).

The study was conducted in the German IVD market, which had a total volume of 2177.8 m EUR in 2013 (VDGH 2014). The majority of this sum (1907 m EUR) was spent on consumables (reagents), only 270.8 m EUR of the expenditures were on devices and services. The estimated volume of the worldwide market in 2014 is 50,380 m USD (37 bn EUR) (Frost 2010).

A **field study** including several interviews with users and decision makers, and service and sales employees was conducted prior to the quantitative study. The primary aim was to gain first-hand knowledge about common practices and issues, which should help to bring the questionnaire closer to the participants' daily routine. The interviewees reported a great need for solutions for two particular "pain points": 1) Even though the standard analytical processes are largely automated, the handling and especially the logistics of the reagents was described as cumbersome and laborious. 2) The handling of patient data was considered as suboptimal. The manufacturers attempt to solve these issues by special software, which is, however, not yet well integrated, thus leaving room for a potential "integrative benefit". Depending on the focus of the laboratory and the number and fluctuation of samples, the analyzers (respectively the *system* consisting of the analyzer device and the corresponding reagents) can be customized. The analyzers require regular maintenance, partly for legal reasons (calibration). The maintenance technicians are so frequently present that they are perceived as part of the lab team. For this reason and due to strict service plans and service level agreements, the interviewees consider the overall service quality as high, with only minor differences between the manufacturers.

As it turned out, IVD equipment is replaced every five to six years with rather rare straight rebuy decisions, even though switching costs are high. The labs usually prefer different manufacturers for each type of analysis (see above), for "historical" reasons: the manufacturers have their roots often only in one field and expanded their portfolio massively through acquisitions.

In general, IVD manufacturers are increasingly under pressure since laboratories centralize their procurement processes: rather involuntarily due to privatizations of hospitals or voluntarily by founding larger buying centers (e.g. for all local community hospitals). These findings are also supported by a governmental report

(Baas et al. 2012) and a commercial market report (Frost 2010). In addition, both publications see a strong trend toward solutions and consulting services in this market.

At the time of the study (mid 2012), the typical buying center consists of the medical director of the laboratory (in case of clinical labs) or the lab manager (in case of privately owned labs) and some senior users.¹²⁵ Clinical lab directors usually do not personally perform the purchase process – hospitals have procurement departments – while private lab managers do. Since high-volume procurements (such as a new analyzer) are relatively rare, the quantitative study focuses on *decision makers* and *users* as buying center members (Webster Jr. and Wind 1972), ignoring the *buyer*, i.e. the person in larger hospitals that carries out the transaction.

7.5.2 Data Collection

Before conducting the main study, the survey was tested by five marketing academics with B2B expertise, three B2B market research experts and two physicians; the latter checked the correct use of the medical terms. Their feedback was referring mainly to minor phrasing issues and to the length of the questionnaire. Less important parts were thereupon removed from the survey.

Data was collected in a two stage, hybrid process: First recruiting by phone and then letting participants filling the questionnaire online. A healthcare market research company contacted lab employees based on an address database with approximately 4000 entries from a specialized provider. Although the database included job descriptions, the potential participants had to answer screening questions for the correct assignment to the user or decider sample: *users* needed to use an analyzer at least once a week, *decision makers* had to be involved in procurement processes with a transaction volume¹²⁶ of more than 50,000 EUR. The participants then received a personalized link to the online survey.

¹²⁵ In Germany, the users typically have a different educational background (MTLA = medical-technical laboratory assistant), whereas the management level is usually staffed by physicians.

¹²⁶ Analyzers are often leased. The contract value was decisive in these cases.

There were two reasons for choosing an online questionnaire: First, the participants expressed the wish to complete the survey outside working hours; second, a test run by phone showed a duration of more than 45 minutes, which could have reduced the participation rate. 359 persons agreed to participate in the study, 292 actually opened the survey link. The recruitment procedure was paused after the first 20 completions to check the consistency of the answers and to analyze the respondents' comments in the feedback section. Since there was no evidence for issues, the recruiting continued and the completed questionnaires were maintained.

7.5.3 Data Screening and Preparation

Missing Values

Answering to the questionnaire's rating scales was compulsory, survey pages could not be skipped. Replying the open questions (e.g. definition and expectation of a solution, details for the last purchase) was requested but voluntarily. Of the 292 persons who had begun to fill in the questionnaire, 152 participants left the survey at different stages. As a consequence of these mechanisms, missing values emerge at the end of the questionnaire. These incomplete cases were removed from the sample (Schafer and Graham 2002). The remaining missing values emerge only for "number of elements of last purchase" (= 24), "number of employees of the laboratory" (= 2) and "daily number of samples" (= 8). These missing values are replaced by the median of the corresponding variable.

Outliers and Speeders

Since nearly all variables are measured using rating scales (predominantly 1-6 points), extreme values are unlikely to emerge. The range for price is large by nature, but since no statistical test includes this variable, univariate outlier detection was not conducted for price. Multivariate outliers for the rating scales were examined using Mahalanobis distances¹²⁷ (Tabachnick and Fidell 2007). The analysis indicates a critical p value $< .05$ for one case. A close inspection, however, does not reveal any

¹²⁷ In SPSS, all rating scale variables were standardized and regressed on a dummy variable (ID) and the Mahalanobis distances were saved. Then a χ^2 -test (df = 104) was computed.

conspicuous response pattern. Since the duration for completing the survey is also not extraordinary, the case is retained.

The mean duration is 2020 sec. (\approx 34 min.), the median 1901 sec. (\approx 32 min.). Eight respondents completed the survey in less than the half median, i.e. in 950 sec. or less. These cases were also carefully examined, but they do not exhibit any response pattern or critical Mahalanobis distances and are also kept in the sample.

The final sample comprises 140 cases, 62 decision makers and 78 users.

7.5.4 Method Effects

All responses come from one source and were collected using the same survey at one point in time, hence common method variance (Campbell and Fiske 1959; Podsakoff et al. 2003) could be an issue. *Harman's Single Factor Test* exhibits a forced one-factor solution that explains 24.57% of the total variance (all rating scales, except "others" answer options), which is considered non-critical.

Similar to the first study, information on the time between invitation and participation is not available. For this reason, early and late respondents cannot be compared to detect a potential non-response bias (Armstrong and Overton 1977; Kanuk and Berenson 1975).

7.5.5 Sample Description

The last purchase was $md = 14.5$ months ago, the average purchase volume was $md = 155,000$ EUR (\approx 210,000 USD). The purchase consists of $md = 2$ individual elements (e.g. analyzer + service contract), the percentage of services in the total volume is $md = 10\%$. The three market leaders account for roughly two thirds of all purchases (Roche Diagnostics 26%, Siemens Healthcare 23%, Abbott Diagnostics 19%).

The laboratories in the sample have $md = 14$ employees. The labs are in 66 % of all cases part of a hospital, 25 % are privately owned, 9% have other ownership statuses (e.g. belong to larger companies). The labs process $md = 500$ ($mean = 2000$) samples per day.

The respondents are predominantly in the age groups 40-49 years (39%) or 50-59 years (40%). 64% of the participants are female. The respondents have on average 24 years of job experience and a high formal education: 16% received a PhD, 10% additionally a *habilitation*. Further information, also on differences between the samples, can be found in the appendix (Table A55 to Table A59)

7.6 Results

7.6.1 Evaluation of the Measurement Model

First, the model was tested for multivariate normality in IBM AMOS 21. Mardia's test (Mardia 1970) exhibits a multivariate kurtosis of 56.08, the corresponding critical value of 13.05 violates the assumption of multivariate normality. For this reason and because the *number of parameter / sample size ratio* ("10 times rule", cf. Bentler and Chou 1987; Bagozzi and Yi 1988) is critical, partial least square structural modeling (PLS SEM; Lohmöller 1989; Wold 1982) using SmartPLS 2.0 (Ringle, Wende, and Will 2005) was chosen instead of covariance-based SEM¹²⁸.

Since the model only contains reflectively measured constructs, common 1st and 2nd generation criteria (Fornell and Larcker 1987) are considered for the evaluation of the measurement model (see appendix table A60).

First, exploratory factor analysis (EFA) in conjunction with scale reliability tests to obtain Cronbach α (CA) were conducted. Every analysis provided acceptable one-factor solutions with more than 50 % explained variance (TVE), except the *employee solution orientation*, for which two factors were extracted. The items (the employee...) "... is willing to disagree with a customer in order to help him make a better decision" and "... is willing to bend company policies to help to address customer needs" form an additional factor. Since these items represent disobedient behaviors, the factor was named *employee recalcitrance*.

¹²⁸ For PLS, Hair et al. (2013) recommend at least 10 times the number of indicators of the latent variable with the most indicators (in our case SOL-O with seven); Chin (2010) recommends a sample size of at least 100.

Descriptives, 1st. and 2nd Generation Evaluation Criteria for the Measurement Model

	Descriptives Total sample (n = 140)		1 st gen. (EFA) Total sample (n = 140)		2 nd gen. Total sample (n = 140)		2 nd gen. User sample (n = 78)		2 nd gen. Decider sample (n = 62)	
	mean	sd	TVE	CA	AVE	CR	AVE	CR	AVE	CR
Requirements definition	4.493	1.184	.737	.899	.736	.932	.787	.948	.662	.905
Customization	4.499	1.180	.685	.540	.675	.804	.651	.785	.712	.831
Integration	4.098	1.375	.712	.589	.705	.826	.683	.810	.736	.848
Deployment	4.434	1.095	.591	.764	.588	.851	.644	.878	.510	.805
Post-deployment support	4.040	1.306	.735	.880	.735	.917	.715	.909	.765	.928
Employee recalcitrance	3.674	1.255	.741	.645	.737	.849	.729	.843	.755	.860
Employee solution orient.	4.727	1.079	.701	.925	.700	.942	.731	.950	.653	.928
Overall satisfaction	4.392	1.119	.887	.934	.887	.959	.898	.963	.871	.953
Usefulness	4.902	1.126	.881	.928	.881	.957	.902	.965	.840	.940
Value	4.012	1.135	.789	.863	.788	.917	.814	.929	.736	.892
Word of mouth	5.180	1.396	.877	.847	.880	.960	.905	.966	.812	.928
Repurchase intention^a	4.103	1.008	.752	.835					.743	.897

^a Repurchase intention was measured in the decision maker sample only.

TVE = total variance explained, CA = Cronbach α , AVE = average variance extracted, CR = composite reliability

Table 50: Evaluation of the measurement model

As displayed in table 50, all constructs meet the suggested thresholds (TVE > .50; CA > .70; AVE > .50, CR > .70; see table A60 for details) apart from the two-item scales *customization*, *integration*, and *employee recalcitrance*, for which CA is smaller than .70. Since CA assumes that each indicator is equally reliable, CA almost always underestimates the reliability for two-item scales (Eisinga, Grotenhuis, and Pelzer 2013). In contrast, PLS considers each indicator according to its reliability during model estimation and can therefore account for unequal weights (Hair et al. 2013). Hence, composite reliability is a more appropriate criterion for construct reliability in PLS.

Two items in the total sample are minimally below the recommended cut-off-value of .70 for factor loadings: “employees do not hesitate to solve problems” loads .693 on *employee solution orientation*; “background information” .670 on *requirements definition*. Since the corresponding constructs’ CRs are well above the critical level,

these items are retained for reasons of content validity (Hair et al. 2011). All indicator loadings in the total sample are significant on a $p < .001$ level. Hence, indicator reliability can be assumed.

To meet the *Fornell-Larcker criterion* for discriminant validity (Fornell and Larcker 1981), the AVE of a latent construct should be higher than each squared pairwise correlation of the remaining constructs. This is the case for all constructs (Table 51)

Factor Correlations (Total Sample, n = 140), Square Root of AVE on Diagonal													
	R	C	I	D	P	REC	SOL-O	SAT	PMU	UNIQ	USF	VAL	WOM
R	.858												
C	.569	.822											
I	.360	.434	.839										
D	.606	.570	.306	.767									
P	.504	.359	.315	.549	.857								
REC	.149	.086	.148	.159	.348	.859							
SOL-O	.500	.480	.292	.604	.640	.509	.837						
SAT	.589	.523	.272	.730	.580	.148	.662	.942					
PMU	.134	.076	.121	-.007	.126	.081	.064	.073	SI				
UNIQ	.226	.116	.228	.190	.146	.163	.215	.154	.096	SI			
USF	.415	.442	.232	.557	.487	.102	.509	.645	.039	.197	.939		
VAL	.449	.405	.291	.499	.487	.216	.560	.581	.119	.031	.589	.888	
WOM	.549	.543	.225	.696	.540	.119	.628	.863	.057	.121	.614	.578	.936

SI = single item measurement (AVE not available)

For better interpretability (and mathematically equivalent) the following tables exhibit the unsquared factor correlation and the square root of the AVE score on the diagonal.

Table 51: Factor inter-correlation matrix for total sample

As a second criterion for discriminant validity, the loadings of the indicators that belong to a construct should be higher than all cross-loadings, i.e. loadings on other factors (Hair, Ringle, and Sarstedt 2011). Table A63 (in the appendix) displays that this condition is also met.

Since the sample is composed of two sub-samples (users and decision makers), it is advisable to test if the measurement model applies to both sub-samples (measurement invariance). In covariance-based SEM, this is usually done by multi-group comparisons based on goodness-of-fit (GOF) indices (Cheung and Rensvold 2002; Steenkamp and Baumgartner 1998; Vandenberg and Lance 2000). Because global fit indices are not available in PLS, a formal test of measurement invariance is not possible (Hair et al. 2013). However, the factor structure is identical for both sub-samples: Similar factor correlations (tables A61 and A62) and low item cross-

loadings (tales A64 and A65) indicate discriminant validity in each sub-sample. AVE and CR scores are above the recommended values (table 50), and all indicator loadings are significant on a $p < .01$ level. All in all, this could be interpreted as an indication of *configural* or *factorial* invariance.

7.6.2 Criteria for the Evaluation of the Structural Model

Prior to the examination of the results, all endogenous latent variables that serve as predictors in the model (R, C, I, D, P, SOL-O, REC, usefulness, overall satisfaction, uniqueness and price markup) were tested for **collinearity** issues (Hair et al. 2013). The variance inflation factor (VIF) scores range from 1.15 to 3.16 and thus remain under the critical level of 5.00.

To determine the **significance** of the path coefficients, bootstrapping was applied using the conservative no-sign-change option (Chin 1998; Hair et al. 2013; Henseler, Ringle, and Sinkovics 2009). For each model (total, user, decision maker) 5000 samples with the respective number of cases were drawn (140; 78; 62). The corresponding t -value is the quotient of the path coefficient and the standard error of the bootstrapped variable (which equals the standard deviation in the case of bootstrapping, see Hair et al. 2013); t -values larger than 1.96 indicate significance on the $p = .05$ level.

To assess the relevance of the latent variable relationships, the **effect size** f^2 (Chin 2010) was computed for each significant path coefficient as:

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}}$$

For this purpose, the models were fitted several times; once with, once without the respective independent (exogenous) latent variable. Since PLS relies on iterative OLS regressions for the inner model (Hair et al. 2011), Cohen's recommendation for effect sizes for regression analyses (Cohen 1977) can serve as guidelines (0.02 small, 0.15 medium, >0.35 large effect).

In addition to the coefficient of determination R^2 , Stone-Geisser's Q^2 serves as an indicator for the predictive relevance of the model. This value is obtained using

blindfolding (Chin 1998; Hair et al. 2013). This procedure is a sample reuse technique that omits data points in an endogenous variable and tries to approximate those artificially missing values using the model estimates. Q^2 scores should be greater than zero, higher values indicate better predictive relevance of the variable.

7.6.3 Mediator and Moderator Effects in PLS SEM

A variable (or construct) functions as *mediator* (Baron and Kenny 1986) if it adds an alternative path ab to the direct impact c of the predictor on the outcome variable (Figure 43, left). To formally meet the criteria for a mediating effect, both a and b have to be significant and when controlled for ab , the previously significant path c becomes insignificant.

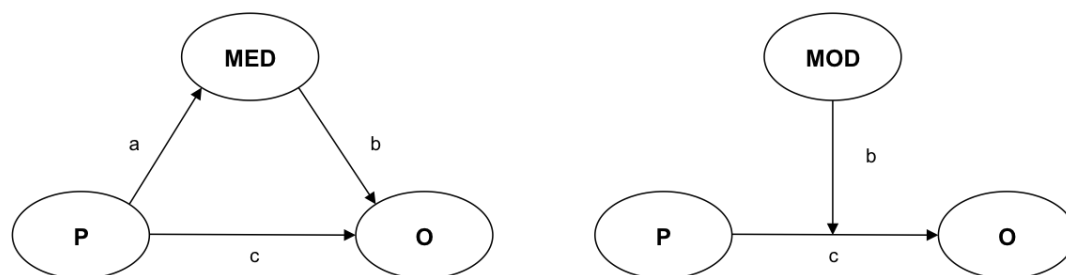


Figure 43: Mediator and moderator effects

Baron and Kenny (1986) propose the *Sobel* test to check for mediation, but this procedure has a several drawbacks, such as strict distribution assumptions. Hayes (2009, 2013) proposes an alternative approach using bootstrapping. Hair et al. (2013) demonstrate how Hayes' procedure can be transferred to PLS SEMs (also see Figure A6). First the model is fitted without the mediating variable; the expected direct effects must be significant. Then the model is refitted including the mediator. Not only the paths leading towards and away from the mediating construct must be significant (a and b), also the total indirect effect – a and b combined ($a \cdot b$) – needs to be significant. Therefore, this product is computed manually based on the coefficients from a bootstrapped sample ($n = 5000$). The bootstrapped standard deviation of this indirect effect equals the standard error; hence, the empirical t-value to test for significance equals the quotient of the indirect effect and the standard deviation.

In addition to this traditional concept of mediation based on Baron and Kenny (1986), which presuppose a significant direct effect, other types of indirect effects will also be inspected (Hayes 2009).

A *moderating* variable affects the strength or direction of the relationship between predictor and outcome (Baron and Kenny (1986), see Figure 43 right). There are several options available for testing moderating effects in PLS SEM (Henseler and Chin 2010; Henseler and Fassott 2010). Since the moderating variable in this study is categorical (users vs. decision makers), multigroup comparison is chosen. Hensler's nonparametric approach using bootstrapping best reflects PLS rather relaxed distribution assumptions and is therefore selected (Sarstedt, Henseler, and Ringle 2011).

7.6.4 Results: Total Sample

Focal Hypotheses

Direct effects: In the total sample, *deployment* has a significant direct effect on *satisfaction* ($\beta = .377$; $p < .001$) and *usefulness* ($\beta = .262$; $p < .01$), supporting hypotheses H_{D1} and H_{D2}. *Post-deployment support* has a direct effect only on *usefulness* ($\beta = .206$; $p < .05$), which consolidates H_{P2}. *The employee's solution orientation* positively influences *customer satisfaction* ($\beta = .355$; $p < .001$), whereas the *employee's recalcitrant behavior* has a negative impact on *satisfaction* ($\beta = -.157$; $p < .05$) even though it fosters the perception as being *solution-oriented* ($\beta = .343$; $p < .001$). *Requirements definition*, *customization*, and *integration* have no significant impact on any other construct; hence, the corresponding hypotheses cannot be supported.

Mediating effects: Prerequisite for a "traditional" mediating effect is the existence of a significant direct effect between predictor and outcome *without* the mediator (Hayes 2009, 2013). As mentioned above, the model was therefore recomputed without the mediating constructs *employee solution orientation* (SOL-O) and *employee recalcitrance* (REC). In this temporary model, *deployment* and *post-deployment support* have a significant direct effect on *satisfaction* and *usefulness*, which "qualifies" these four effects for a true mediation. Additionally, both the effects from the predictors (D, P) to the mediators (SOL-O, REC), the effects from

the mediators to the outcomes (SAT, USF) and the indirect effects (i.e. the multiplied path coefficients) must be significant. Figure 44 shows that REC and SOL-O have significant effects on *satisfaction* only. The indirect effect of *deployment* via SOL-O on *satisfaction* (D → SOL-O → SAT) is significant ($\beta = .117$; $p < .01$). The *variance accounted for* (VAF) is 19.7%, which equals a partial mediation (Hair et al. 2013). The same applies to the path P → SOL-O → SAT ($\beta = .102$; $p < .01$; VAF = 31.3%). The indirect effect causes the direct effect to disappear. The *t*-value for the suppressor effect of *post-deployment* support via *recalcitrance* on *satisfaction* (P → REC → SAT) marginally misses the threshold for significance ($1.94 < 1.96$). Hence, the *employee's solution orientation* has a partial mediating effect for *deployment* and *post-deployment support* on *satisfaction*, which supports the hypotheses H_{DIM} and H_{PIM}. The effect sizes of the path coefficients (see appendix table A66) indicate medium effects; the R^2 values of the endogenous constructs imply medium predictive accuracy. All Stone-Geisser's Q^2 are substantial larger than zero (table A69); therefore predictive relevance of the exogenous constructs can be assumed.

Further Hypotheses

The *usefulness* of the offering has a positive effect on the perceived *value* of the relationship to the provider ($\beta = .588$; $p < .001$) and thus supporting H_{USF}. Also, *satisfaction* elicits positive *word of mouth* ($\beta = .767$; $p < .001$), confirming H_{S1}. All other hypothesis must be rejected, particularly those concerning *uniqueness* and *price mark-up*. These constructs are not significantly related to any other construct in the total sample. Stone-Geisser's Q^2 of *uniqueness* is below zero, thus, the endogenous constructs fail to predict *uniqueness*.

Total Effects

Following Hayes' (2009) recommendation to relax the usual requirements for mediating effects by considering also indirect effects without significant direct effects leads to further findings (see tables A67 and A68). *Deployment* and *post-deployment support* also have significant *total effects* (= sum of indirect and direct effects) on *value* ($\beta = .201$; $p < .001$ and $\beta = .148$; $p < .01$) and on *WOM* ($\beta = .421$; $p < .001$ and $\beta = .200$; $p < .01$). The *employee's solution-orientation* also positively affects the propensity to give positive *WOM* ($\beta = .300$; $p < .001$). The total

effect of the *employee's recalcitrant behavior* via *solution-oriented behavior* on *satisfaction* is not significant, direct and indirect effects cancel each other out.

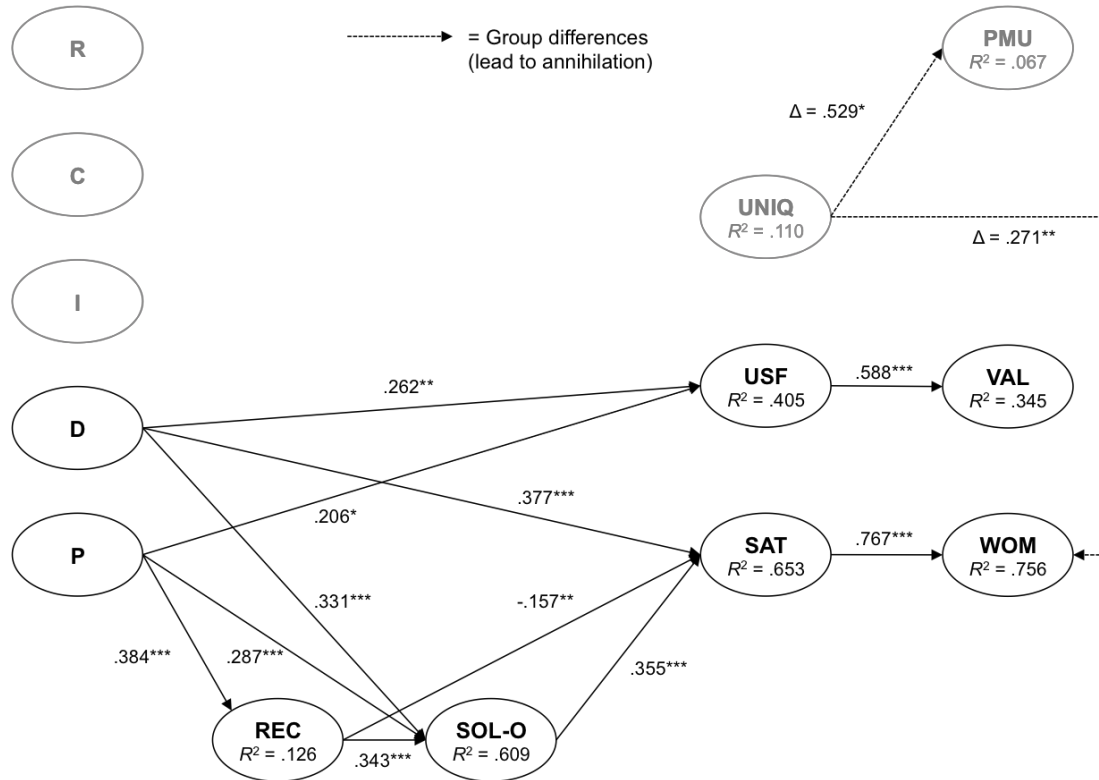


Figure 44: Final model (total sample), only significant paths depicted

7.6.5 Moderating Effects: Group Differences

Direct Effects: The effect of *requirements definition* on perceived *usefulness* is significantly different ($\Delta = .529$; $p < .05$), as well as the impact of *deployment* on *uniqueness* ($\Delta = .433$; $p < .05$) and the employee's *solution orientation* on *price markup* ($\Delta = .724$; $p < .05$). All these three effects, however, are neither significant in the total sample nor in one of the sub-samples. Perceived *uniqueness*, however, leads to a significantly higher *willingness to pay* in the user sample ($\beta = .321$; $p < .01$) but to a lower *willingness* in the decider sample ($\beta = -.208$; $p > .05$). Although the latter effect is not significant, the difference is significant ($\Delta = .529$; $p < .05$). On *WOM*, however, the effect of perceived *uniqueness* is significantly negative with users ($\beta = -.104$; $p < .05$) but positive with decision makers ($\beta = .167$; $p < .01$). While the effect sizes are weak ($f^2 = 0.067$ and 0.066), the difference is highly significant ($\Delta = .271$;

$p < .05$). Due to the diverging directions of these effects in the sub-samples, the effects cancel each other out in the total sample (figure 44).

Total effects: A solution-oriented *deployment* has a significant total effect on perceived *uniqueness* in the user sample ($\beta = .362$; $p < .05$). The difference between the users' and the deciders' perception is significant ($\Delta = .529$; $p < .05$), which supports H_{D3M} .

Post-deployment support has a significant total impact on *satisfaction* only in the decision maker sample ($\beta = .360$; $p < .01$); the difference is also significant ($\Delta = .298$; $p < .05$). This suggests a moderated mediating effect of the *employee's solution-orientation*; the mediation is formally tested below.

7.6.6 Results: User Sample

Mediating effects: Omitting the *employee's solution orientation* and *recalcitrance* does not elicit any additional direct effects. Consequently, only the relationship between *deployment* and customer *satisfaction* can be mediated by the employee's *solution orientation*. This indirect effect is indeed significant ($\beta = .130$; $p < .05$; VAF = 22.9%), hence H_{DIM} is also supported in this sub-sample. The R^2 values of the endogenous constructs are comparable to the values in the sub-sample; all Stone-Geisser's Q^2 scores are substantially larger than zero (Table A69).

Other effects: As mentioned above, perceived *uniqueness* increases the *willingness to pay a price premium*, which partially¹²⁹ supports H_{UNIQ} . Although the direct effect of *customization* on *perceived uniqueness* is significant ($\beta = .311$; $p < .05$), the difference is not significant. Following the aforementioned convention for the partial support of hypotheses, H_{I3} receives no support.

Figure 45 shows the path diagram; a detailed analysis can be found in the appendix.

¹²⁹ In this study, a hypothesis will only be considered partially supported, if it is significant in the total sample or in one of the sub-samples with significant differences.

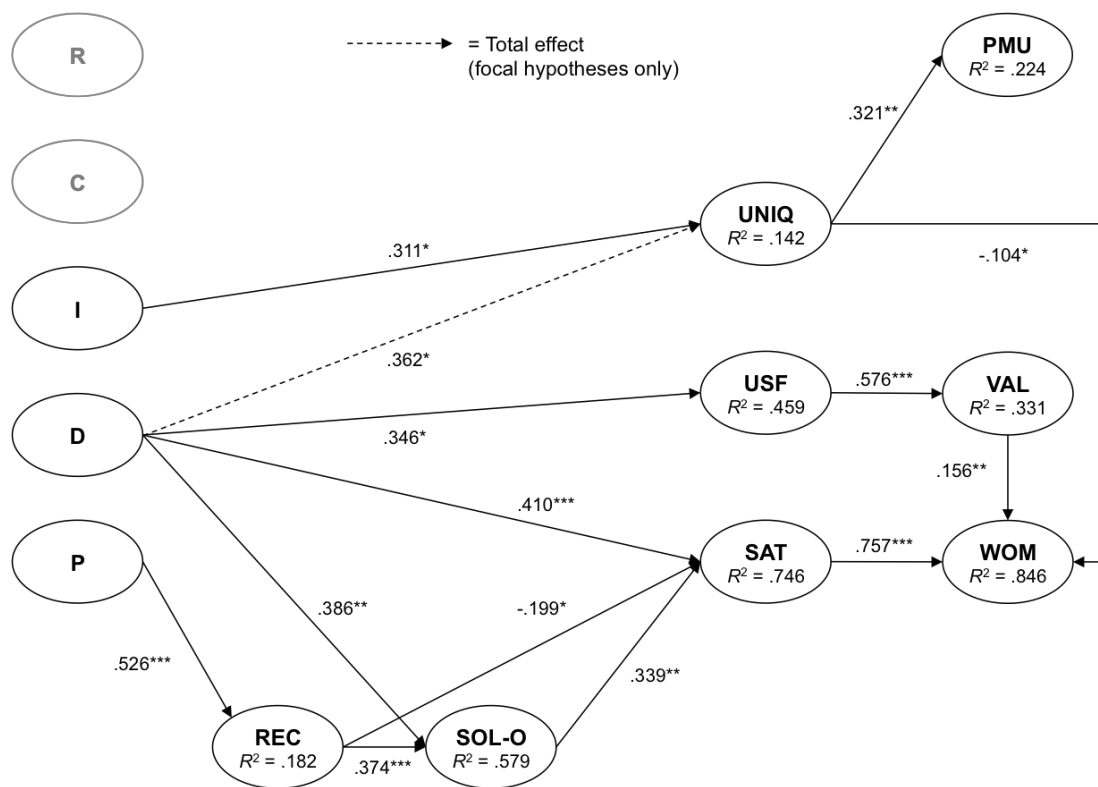


Figure 45: Final model (user sample), only significant direct paths depicted

7.6.7 Results: Decision Maker Sample

Mediating Effects: Without the constructs SOL-O and REC, three significant direct effects emerge: From *deployment* to *satisfaction*, and from *post-deployment support* on *satisfaction* and *usefulness*. After the inclusion of SOL-O and REC, these direct three effects disappear, but also the effect of *solution-orientation* on *usefulness*. Only the indirect effect between *post-deployment support* via *solution-orientation* on *satisfaction* is significant ($\beta = .193$; $p < .05$; VAF = 34.1%), the one between *deployment* and *satisfaction* misses the critical t -value for significance on the 5% level ($t = 1.89 < 1.96$). Consequently, H_{P1M} is supported in the decider sub-sample.

Requirements definition does not have any total effects on the outcome variables; the hypothesis of a mediating effect of the *employee's solution orientation* cannot be supported.

In contrast to the user sample, the *employee's recalcitrant behavior* is not influenced by any SPCM construct and has no significant negative impact on *satisfaction*. Since *satisfaction* is only affected significantly by the employee's *solution-oriented behavior*, the explained variance of this construct is lower than in the user sample ($R^2 = .561$).

Other effects: *Satisfaction* positively influences the *repurchase intention*. Since this construct was measured in the decision maker sample only, H_{S3} can be fully supported.

Figure 46 displays the model in the decider sample. A detailed analysis can be found in the appendix.

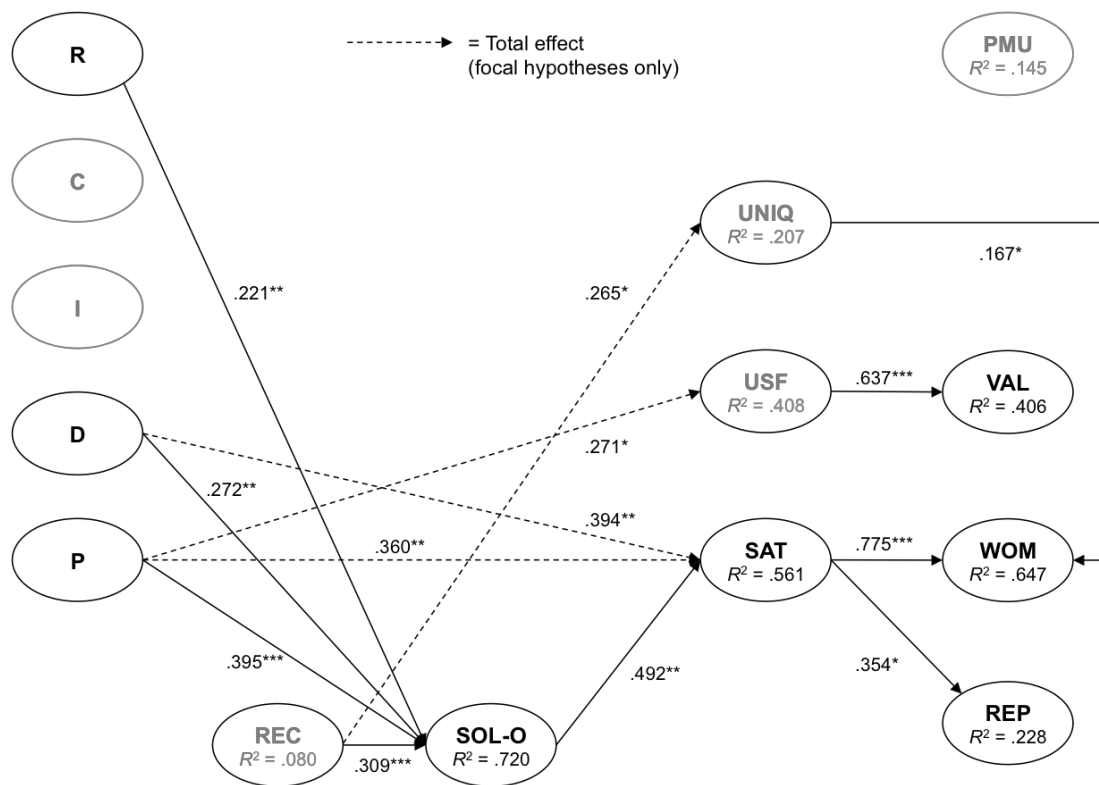


Figure 46: Final model (decision maker sample), only significant paths depicted

7.7 Discussion of the Results

7.7.1 Summary of the Findings

The key hypotheses proposed a direct positive effect of the SPCM elements on the focal outcomes *satisfaction*, *usefulness*, *uniqueness* and *willingness to pay a price premium*; i.e. the more these processes are executed in a solution-oriented manner, the higher these outcomes. Additionally, the *employee's solution-oriented behavior* should be mediated these relationships for those processes that involve human interactions, namely *requirements definition*, *deployment* and *post-deployment support*.

Summary: Hypotheses		
Hypothesis	Status	Comment
H _{R1-4} + H _{R1-4M}	Rejected	No significant effect on focal outcomes, only on SOL-O in decider sample
H _{C1-4}	Rejected	No significant effect on focal outcomes, only total effect on WOM in user sample
H _{I1-4}	Rejected	Only direct effect on UNIQ in user sample, difference not significant
H _{D1}	Supported	Direct effect of D on SAT
H _{D1M}	Supported	SOL-O partially mediates effect between D and SAT for users only. But total effect is significant in decider sample too.
H _{D2}	Supported	Direct effect of D on USF
H _{D2M}	Rejected	No indirect effect of D on USF (lacking effect of SOL-O on USF)
H _{D3M}	Partially supported	Total effect of D on UNIQ in user sample, difference significant
H _{D3-4} , H _{4M}	Rejected	No direct effects of D on UNIQ and PMU, no indirect effect on PMU
H _{P1}	Rejected	Direct effect of P on SAT suppressed by SOL-O in decider sample
H _{P1M}	Supported	SOL-O mediates impact of P on SAT in decider sample only. Difference is significant.
H _{P2}	Supported	Direct effect of P on USF, in total sample only
H _{P2M}	Rejected	No indirect effect of P on USF (lacking effect of SOL-O on USF)
H _{P3-4} , H _{P3-4M}	Rejected	No direct or indirect effects of P on UNIQ and PMU
H _{S1}	Supported	SAT elicits WOM.
H _{S2}	Rejected	SAT does not increase PMU.
H _{S3}	Supported	SAT increases REP.
H _{USF}	Supported	USF increases VAL.
H _{1V}	Rejected	VAL elicits WOM only in user sample, difference not significant.
H _{2V}	Rejected	VAL does not increase PMU.
H _{3V}	Rejected	VAL does not increase REP.
H _{UNIQ}	Partially supported	UNIQ increases PMU in user sample, difference significant

Table 52: Summary of findings: hypotheses

The hypothesis framework receives only partial support (see table 52). *Requirements definition, customization, and integration* do not have any significant direct effect on the outcomes; the indirect effect for *requirements definition* via the *employee's solution orientation* is also not significant.

A solution-oriented *deployment*, however, positively influences both the *customer satisfaction* and the *usefulness* of the offering. The mediating role of the *employee's solution orientation* on the relationship between *deployment* and *satisfaction* can also be confirmed. It is additionally moderated by the customer's role in the buying center, because the mediation effect cannot be found in the decision maker sample since the initial direct effect (i.e. without SOL-O) was lacking.

If the formal requirements for mediators are relaxed (see Hayes 2009), if also significant total effects are considered, the hypothesis concerning the mediating effect of deployment on *uniqueness* receives partial support. Since the group differences are significant, this mediation is additionally moderated by the customer's function in the buying center: the employee's behavior is relevant only for the users' perception of the link between solution-oriented *deployment* and *uniqueness*.

A different picture emerges for post-deployment support. The initial direct effect becomes insignificant, when the *employee's solution orientation* is taken into consideration. These behaviors account for 31.3% of the explained variance of *satisfaction*. Since this mediating effect is not significant in the user sample while it is *significant* and even stronger in the decision maker sub-sample (VAF = 34.1%), it is also a moderated mediation. A significant total effect in the decider sample, for which also the group difference is significant, underlines this conclusion. The relationship between *post-deployment support* and *usefulness* is not affected by the employee's behavior.

Satisfaction fosters *positive word of mouth* and increases the *repurchase intention*. The perceived *uniqueness* of the offering increases the *willingness to pay a price premium* for a solution. This effect, however, can only be found in the user sample; the group difference is significant.

7.7.2 Employee's Solution-Orientation

Put in a nutshell: The *employee's solution* orientation partially mediates the positive impact of the provider's perception as being solution-oriented on *customer satisfaction* for users during *deployment* and for decision makers during *post-deployment support*.

The *employee's solution orientation* only affects *satisfaction*. It is not related to the perceived *usefulness* of the offering. This causal link could have been plausible since solution-oriented behavior was primarily defined as problem solving. It might be, of course, that the offering (i.e. the analyzer device) does not have any malfunction or design failure that can or need to be eliminated by service or sales employees. Therefore, future studies should take the offerings' error rate as a potential moderator into account.

Recalcitrance has a small but significant negative impact on *satisfaction*, but also a positive effect on the perception of the *employee's solution-orientation*. That is, the subjects perceive recalcitrant behavior (disagreeing with the customer to help making him a better decision, breaking the company's policies to help the customer) as part of the employee's solution-orientation but are possibly annoyed by this manner. This implies that the employee's solution orientation is a rather multifaceted construct that also might include some internal contradictions. These can already be found in the literature review above: Cespedes (2006) depicts the typical solution sales rep as *assertive, energetic, brash* and quite *extravert*. In contrast, Ulaga and Loveland (2014) characterize the optimal sales person for hybrid offerings as *introvert* and *conscientious* and *emotionally stable* (but also as *assertive*, which might not fit into the picture of such a person). Studies on the personality traits of customer-oriented and adaptive salespersons rather support the latter view (Brown et al. 2002; Gwinner et al. 2005; Widmier 2002). Therefore, more quantitative research is needed that includes established measures for personality traits such as the NEO-FFI/PI-R (McCrae and Costa 1987) and for which norm values are available. This research should also be extended to other frontline employees involved in business solutions, such as service technicians or call-center agents.

Perceived uniqueness is only influenced by *recalcitrant behavior* in the decider sample. Given the negative effect of *recalcitrance* on *satisfaction* (in the total sample) it is doubtful if this is really the kind of differentiation that the seller wants to achieve. The *willingness to pay a price premium* for solutions is also not influenced by the employee's characteristics.

7.7.3 Solution Processes from the Customers' Point of View

The major contribution by Tuli et al. (2007) was to contrast the sellers' perspective (solutions = customized and integrated products and services) and the customers' perspective (solutions = relational processes). The authors, however, left open which process is the most relevant from the customers' point of view. Nonetheless, quotes out of their interviews with solution customers give the impression that deployment plays an outstanding role ("*The proof of the pudding lies in implementation. It is a solution once it's delivered. Before that, it is all concepts and hot air.*" p. 7). The results of the present study support this assumption. Solution-oriented *deployment*, i.e. taking actions that the customer can effectively use the offering, has a positive impact both on *customer satisfaction* and *the perceived usefulness* of the offering. This particularly applies to users. With this customer group, solution-oriented *deployment* also increases the perceived *uniqueness*, although with rather unexpected consequences (see below). The picture changes for post-deployment support, which is particularly important to decision makers in terms of satisfaction. Solution-oriented post-purchase activities primarily aim at failure prevention and at guaranteeing the availability of the offering. Correspondingly, decision makers appreciate the provider's measures to increase the offering's *efficiency*, while users associate with solutions primarily *effectiveness*, i.e. a trouble-free usage.

In contrast to the expectations, all other solution processes do not have an impact on the focal outcomes (apart from *integration* on *uniqueness*, for which the group difference is not significant). This does not necessarily contradict Tuli's et al. conceptualization of solutions as a set of processes – it only means that firms cannot *excel* through a solution-oriented execution of these processes. A possible explanation is the existence of high industry standards that raise the customers' expectations. Indeed, the field study prior to the main study suggests that

customizing the devices according to the laboratory's requirements and integrating the core device into a system environment (including reagents and the necessary logistic infrastructure) is already common practice.

7.7.4 Solution Outcomes

The focal outcomes in this study include established constructs such as *satisfaction* and *usefulness*, but also desired (from the seller's point of view!) consequences such as the *willingness to pay a price premium* and *perceived uniqueness* in order to differentiate from the competition. These two outcomes are closer connected to the concept of business solutions (see section 2.4.9).

However, the explanatory power of the exogenous constructs (i.e. the SPCM elements and SOL-O / REC) is lower for these solution-specific outcomes than for *satisfaction* and *usefulness*¹³⁰. In fact, the *willingness to pay a price markup* can essentially *not* be explained by these variables. Only *uniqueness* significantly increases the *willingness to pay a price premium* – but only in the user sub-sample; the deciders' willingness is significantly lower. But users usually do not have the power to decide on prices to pay for the offering, which renders this effect less useful in practice.

Uniqueness also does not receive any significant influence from the SPCM variables (the effect from integration is only significant in the user sample but not significantly different in the decider sample), and the effect of the employee's recalcitrant behavior is rather unwanted. Surprisingly, *uniqueness* has a significantly negative impact on the intention to give WOM in the user sample, while it is positive in the decision maker sample; the difference is also significant. The latent variable means differ significantly neither for *uniqueness* nor WOM (UNIQ: $mean_{user} = 3.85$; $mean_{decider} = 3.61$, $t = .82$; $df = 138$; $p = .42$; WOM: $mean_{user} = 5.13$; $mean_{decider} = 5.23$, $t = -.40$; $df = 134.02$; $p = .69$) and cannot explain the sign of the effect. Why perceived *uniqueness* of the offering hinders users to give *positive word of mouth* remains ultimately unexplained and invites speculation: Since *uniqueness* was

¹³⁰ The *intention to pay a price premium* has also in other studies low R^2 values (e.g. Palmatier et al. 2008).

measured as the perceived differentiation either through products and services or through the *interaction* of products and services, the integrative benefit through this interaction could be more difficult to grasp for users, which might result in a lower intention to give WOM.

The low impact on uniqueness could also be a consequence of high service standards. Therefore, future studies should also measure the general service level in this industry. This can be operationalized as individual perceptions or as perception of the governance function of service level agreements (Goo et al. 2009). Additionally, a cross-industry comparison is advisable.

7.7.5 Contrast with the Providers' Perspective

In the following, the results of this study (study II) are contrasted with the variable-oriented regression analyses of study Ia (see table 18). The results must, of course, be interpreted with caution: This is not a dyadic study design, the providers that are evaluated by the customers in study II are not identical with those firms in study I. Furthermore, study II is a single-industry analysis, while study I is a cross-industry examination.

The vendors are convinced to achieve a *price premium* through *integration* and even more through solution-oriented *deployment* activities. In the customer sample, however, the willingness to pay a *price premium* remains largely unexplained. *Deployment* also plays an important role in achieving *uniqueness* from the seller's point of view, followed by a solution-oriented *requirements definition* process. The effect of *deployment* on *uniqueness* can also be found in study II, although only as total effect in the user sample; that is, only solution-oriented deployment activities are not sufficient to differentiate from the competition, solution-oriented employees are also necessary. If the outcome variable "functional value" in study I is interpreted as *usefulness* in study II (remember: *value* in study II refers to the relationship to the provider), no overlap between the results from the two studies can be found: sellers are convinced to increase the value through solution-oriented requirements definition whereas for customers *deployment* and *post-deployment support* is pivotal. From the sellers' perspective, a solution-oriented – i.e. proactive *post-deployment support* – has a positive effect on *relationship quality*, followed by a solution-oriented

requirements definition. The value that customers receive from the relationship to the provider is increased by solution oriented *deployment* activities and a *post-deployment* support (see table A67 for total effects).

To summarize (with the limitations mentioned before), sellers tend to overestimate the effect of solution-oriented *requirements definition*, but they are basically right in assessing the positive effect of *deployment* activities.

7.8 Implications

7.8.1 Theoretical Implications

The present study is the first quantitative examination of B2B solutions from the customers' perspective that directly draws upon the frequently cited framework by Tuli et al. (2007). This study exemplifies how the framework's theoretical components can be operationalized and reliably measured. While Tuli et al. (2007) consider all solution processes as equally important, the results imply that customers give different weights to these processes, at least if their impact on customer satisfaction and the perceived usefulness of the offering is taken into account. In this case, deployment activities and post-deployment support are crucial.

This study is also one of the first that focus on the function and personality of frontline employees in solution selling. For this purpose, established theoretical concepts from the literature on personal selling – namely customer orientation, adaptive selling and problem solving – were adapted in order to specify the role that sales and service employees play. The results imply that employees *embody* the seller's positioning as solution providers from the customers' perspective particularly during those processes that have been previously identified as central to solution selling. This research thereby supports previous qualitative research on the personality of sales persons for hybrid offerings (Ulaga and Loveland 2014). At the same time, the present study calls on to question if all these desired traits really describe a potentially existing human with a coherent personality. This study is only a first step into this field, more rigorous research is needed that also includes measurement instruments with higher psychometric quality. Hardly any

measurement for “orientations” or other domain-specific behavior in the marketing literature meets the harsh criteria that apply to personality tests in clinical or differential psychology. Among those criteria are also published norm values that allow interpreting *absolute* test scores. Findings in academic marketing research on personality are usually limited to *relative* statements (“increase in employee’s solution-orientation leads to higher satisfaction”).¹³¹

This study also continues the qualitative work by Töllner et al. (2011) who pointed to the different functions in the buying center that solution customers have. The results of the present study suggest that users emphasize efficacy aspects of solutions. From the user’s perspective, the main task of solution providers is to ensure a smooth operation, which requires a proper implementation of the solution. On the other hand, decision makers prioritize the efficiency of solutions, which providers can increase by guaranteeing the solution’s constant availability through proactive post-purchase activities (Challagalla et al. 2009; Frambach et al. 1997) and thereby reducing total costs of ownership. These findings, however, only point to future research avenues. The distinction between users and buyers (or decision makers) of business solutions is vital since it concerns the “core idea” of solutions: solving a problem. It is very likely that users and buyers define the problem, which the solution is supposed to solve, differently. These diverging problem definitions might result in a goal conflict for the solution provider: it is not unlikely that a thorough solution of a *user problem* increases the costs of the solution offering. At the same time, the *buyer’s main concerns* are probably related to the monetary side of solutions, e.g. reducing transaction costs (Sawhney 2006; Kühlborn 2004). Thus, the distinction between users and buyers has important implications for the requirement definition process – and consequently for the entire design of the solution and necessary marketing and sales activities.

The present study, however, also touches questions that could not be answered satisfactorily: Relevant predictors for the willingness to pay a price mark-up for the solution could not be identified. The most plausible causal relationship – the

¹³¹ This discussion is not new in marketing academia (Brown, Churchill Jr., and Peter 1993; Churchill 1979; Parasuraman, Berry, and Zeithaml 1993). On the contrary, some authors (e.g. Rossiter 2011a) believe that marketing focuses too much on psychometrics.

integration process leads to an integrative benefit (Sawhney 2006) – is obviously not as a straight as initially assumed. Maybe this is a peculiarity of the industry in the sample – given the pioneering nature of this study, it is up to future research to answer this question. Predictors for perceived uniqueness could be identified but not the expected consequences.

7.8.2 Managerial Implications

Managerial implications both for sellers and buyers of solutions can be derived.

Vendors should be aware that the mere process of identifying customer requirements does not have an effect on the customers' perception of the offering. This does not imply that this process is irrelevant in the further course of designing the solution – the identified requirements determine function and scope of the solution – but this process might be perceived as just a hygiene factor¹³² (Brandt 1988; Herzberg 1966), whose fulfillment is expected but whose over-fulfillment does not increase satisfaction any further. The vendor's decision for identifying individual customer needs and serving only market sizes, i.e. pursuing a solution-style approach for requirements definition, might be fundamental for the seller, but it is invisible and hence less relevant to the customer.

It is not a new finding that invisible intra-firm processes are difficult to evaluate from the customer's point of view (Shostack 1987; Zeithaml et al. 1996). Instead buyers rely on the outcomes of these processes (Brady and Cronin Jr. 2001b; Dabholkar and Overby 2005; Grönroos 2001, 1984). That means for solutions: customization and integration *processes* are hard to assess – it is the result of these processes that matters. For solution this “proof of the pudding” is the deployment stage (also see the aforementioned customer quote in the paper by Tuli et al. (2007)). Solution marketers should therefore put all their effort in implementing the solution, because this is the time when the original promise to solve a customer's problem is fulfilled.

¹³² This issue has also been discussed in context of the “Kano” model and quality function deployment (Kano et al. 1984; Matzler and Hinterhuber 1998).

Processes might be invisible, but frontline employees are visible¹³³. Hence, solution-oriented sales and service employees are a great opportunity for vendors to strengthen the image as a solution provider. Furthermore, for activities during the deployment and post-deployment support, the behavior of these employees contributes significantly to customer satisfaction; about one third of the measured satisfaction can be explained by the employees' solution-orientation. This also has consequences for human resources management. However, previous research suggests, that traits, which can be associated with an individual's solution-orientation (such as problem-solving thinking), are deeply rooted into the personality. Hence, it is questionable if less solution-oriented employees can be trained. This might explain reports according to which 75-80% of the sales force needs to be laid off when moving towards solutions (Johansson et al. 2003; Reinartz and Ulaga 2008). Job re-assignments might be one alternative option, forming heterogeneous sales teams a second. As the present study implies, also behaviors that do not fit into the picture of the rather introverted sales person are associated with an individual's solution orientation (e.g. contradicting customers). In the style of the *good cop – bad cop* interrogation technique, solution providers should also deploy sales and service employees that take over the part of the *devil's advocate*.

In general, providers should be aware of the fact that users and decision makers (or buyers) perceive and weight the solution process elements differently. Users stress efficacy, while decision makers emphasize efficiency aspects, particularly those that are related to the entire lifecycle of the solution. For these reasons, proactive post-deployment support is vital for deciders.

Furthermore, sellers should carefully determine whose problem they want to solve. Especially technology-driven firms tend to emphasize their offering's problem-solving capability for user problems, ignoring the fact that users are often not the persons who buy the solution or decide upon the purchase.

Solution **customers** as well should take the different problem definitions into account when forming buying centers. Especially in the case of distinct buying

¹³³ Call center agents, e.g. for customer service, are of course not visible to the customer but they take part in interactions.

center roles, that is, if buyers and deciders do not regularly use the solution and users are not sufficiently involved in the decision making process, the spec sheet for the solution probably focuses on the decision makers' requirements. Not necessarily, but very likely, these solution needs interact: If the solution does not solve the user's problem, productivity is endangered and consequently the solution's long-term efficiency as well.

7.9 Limitations

All data was collected within a single industry; this limits transferability. Additionally, the medical technology industry is partially regulated by law. Devices, such as analyzers must be maintained and calibrated on a regular basis. This requires high service standards for all market participants and leaves little room for differentiation. The buying center roles are not as clear-cut as in other industries: decision makers also operate the devices while users are also involved in buying situations (albeit with considerably less power).

This study focuses on the customers' perception of solution-orientated activities of sellers. It does not include a "need for solutions". However, experiences from research on service quality suggest that subjects tend to raise their expectations when asked. This reduces the reliability of expectation-confirmation/disconfirmation measurements (Brady, Cronin, and Brand 2002; Cronin Jr. and Taylor 2004).

All measurements stem from one source, which generally increases the vulnerability to common method bias. The sample size is rather low but comparable with other quantitative B2B marketing studies using PLS SEM (e.g. Storbacka et al. 2011; Jacob et al. 2014). For the group comparisons, however, the lower limit in terms of the ratio between number of parameter and sample size is reached. Even though PLS handles small samples well, the statistical power drops with decreasing sample size. This particularly applies to constructs to which a large number of arrows point: In the sub-samples, significant results are less likely to emerge for the focal outcomes (receiving seven paths) if their R^2 drops below .25 (see Hair et al. 2013, p. 21).

PLS is the method of choice for theory building but it is less appropriate for "hard" theory testing (Chin 2010; Hair et al. 2011). For a possible replication of this

research, a larger sample size and an additional validation using covariance-based SEM is recommended.

8 Outlook and Concluding Remarks

Most problems arise in their solution.

Leonardo da Vinci

Italian Polymath (1452-1519)

8.1 Implications for Future Research

8.1.1 Research on Business Solutions

Non-normative Research, Failure Studies and Reversed Transformations

So far, research on complex offerings has focused on transformations towards solution providers. In particular descriptive qualitative research aims at identifying ways to overcome barriers, which are considered as principally conquerable. The results of this thesis, however, indicate that not all firms *need* to tackle this transformation process (because they established themselves in a comfortable niche, as in case of the Mass Customizer) or *can* move to solutions (for example, because they cannot enforce a price premium or allocate the costs for integrating and customizing to the product, as in case of some Component Sellers). This has three implications for further research.

First, more non-normative research is necessary. Normative trajectories overstate the need for transformation and raise unrealistic expectations. Given the high reported failure rates and sparse quantitative empirical data on successful transformations towards solutions, “one-strategy-fits-all” approaches (some of those can be found in table 6) should be treated with caution. In contrast, frameworks such as the one of Ulaga and Reinartz (2011) focus on concepts and tools for assessing the firm’s actual and desired position and give only mild suggestions on which way to go. Descriptive frameworks might not be as *catchy* as prescriptive ones, but are finally more suitable to depict the complexity of today’s business markets.

Second, more (published) research on failed transformations is needed. Failure rates of up to 80% (Krishnamurthy et al. 2003; Roegner and Gobbi 2001) point to an

“iceberg” of unsuccessful transformations that is largely ignored by research. As outlined in the introductory section, this could have two reasons: a) A publication bias prevents that “unsuccessful” case study research appears in the literature; b) a cooperation bias makes it difficult to find industry partners for research. To remove the first obstacle, editors of scientific marketing journals should be encouraged to admit more counter-mainstream research that questions prevailing business practices. Special issues could feature failure stories and non-confirmed (but reasonable!) hypotheses about common beliefs on business solutions and change processes. The second obstacle is more persistent. Cooperation agreements between researchers and industry partners are often based on a deal: data and access in exchange for expertise (e.g. on transformation processes). But this barter deal does not work for failure stories. Managers cannot be forced to collaborate but maybe government-funded research could compensate cooperating firms.

Third, more research on reversed transformation is needed. The Solution Provider is the ultimate goal in normative typologies (typically the upper right corner in matrices). However, the results of study Ib suggest that the number of firms moving away from full solutions is as high as the number of companies that become (full) Solution Providers. From a normative perspective, these firms move *backwards*. From a descriptive point of view, these firms just change their strategy. The results imply that some companies move voluntarily, others involuntarily. Both transformations are equally interesting for research. Firms that become Mass Market Solution Seller successfully managed the friction between aggregated requirements of larger customer segments on the one hand and delivering an integrative benefit as a result of customization and integration on the other hand. Research (also CSR) is necessary to find out how this was accomplished and if this strategy is successful also in the long run.

Solutions for Small and Medium Sized Enterprises

The selection of cases in qualitative and conceptual research (IBM, GE, Nokia, Michelin, Kone, etc.) gives the impression that solutions are primarily suitable for large multinational corporations. But there is no good theoretical reason why solution selling should not be a strategic option for SMEs too. SME solutions, for instance a development project outsourced to a small engineering firm, might not necessarily be

the first thing that comes into a researcher's mind when thinking of typical solution offerings. However, as long as they essentially *are* solutions, that is, if they comply with formal conditions such as a solution orientation for all processes of the SPC and if customers perceive these offerings as solutions, then B2B marketing academia should perhaps rethink its notion of "typical" solutions.

The results from study Ia and Ib indicate that the concept "solutions" is definitely applicable to SMEs and is already practiced by these. It was rather irrelevant with regard to essential characteristics and outcomes whether the company was an SME or the SBU of a larger enterprise. However, in this study was not investigated whether there are differences concerning the specific measures the firms have taken to implement a solution strategy. Establishing a training department to support the deployment process is expected to be easier for a LE than for a SME thanks to a potentially higher organizational slack. On the other hand, SMEs have a greater leeway in customizing, as they benefit less from economies of scale. Implementing a solution-oriented organizational structure is a radical intervention for LEs (Galbraith 2005a, 2002); SMEs can respond more flexibly.

Future research – also qualitative – should explore differences between solutions for LEs (= extant research) and SME solutions and analyze specific challenges. This is to some extent also associated with examining international differences since the industrial structure differs considerably from country to country; SMEs are more present in the sample of study I (Germany) than in most other countries.

Service Solutions

Previous research on complex offerings is implicitly product-focused (Nordin and Kowalkowski 2010): Services are primarily perceived as supplement to an existing product-based business (see Vandermerwe and Rada 1988) or the service business should replace the product business in the long run (see Oliva and Kallenberg 2003). This led to a quasi-paradigm in which research puts its primary attention on (international large) manufacturers. The present thesis shows, however, that service-based solutions (i.e. solutions with a high service share) do not differ structurally from product-based solutions.

This has three implications for future research: 1) When speaking of business solutions, pure services solutions, e.g. based on professional B2B services or KIBS, should also be considered. The limited view on services primarily as a strategy option for manufactures corresponds neither to the economic structure of developed countries nor to the mainstream in academic marketing research (SDL). 2) The actual implementation of a solution-orientation was not in the focus of this study and opens several avenues for future research on pure service solution – also for qualitative research: How does bundling (and bundle pricing) work for industrial and professional services? How can several B2B services be integrated in order to provide an added value and how do these mechanisms differ from product-based or hybrid offerings? The implementation of concepts and results plays a major role in many professional services (Zimmer et al. 2009) but has not been studied so far (e.g. impact on customer satisfaction, effectiveness of pricing strategies such as gain sharing).

Furthermore, while there are long-term studies on service strategies for manufacturers (Eggert et al. 2011; Fang et al. 2008), there is no equivalent research for B2B service providers. First, conceptual research should adapt basic concepts (such as developing analogies for SSC and SSP). Then, the impact of service innovation, bundling, integration and deployment (= implementation) activities on firm profitability or firm value, or customer-related metrics should be investigated. The SPCM including the identified types can serve as a research framework.

Services as Solution Components

The impact of services on the profitability of firms has already been investigated (Fang et al. 2008). Higher uniqueness through inclusion of services – a second, often alleged, but never quantitatively-empirically confirmed outcome – could not be found in the present studies either. In fact, providers offering standardized services get in the same difficulties as their product counterparts (= productization of services). This commoditization of services undermines the positive effects that firms expect to achieve through the integration of services. The differentiating effect of services is also likely to disappear in industries with high services standards (e.g. fixed through service level agreements, SLAs, as in study II). Hence, future research should a) examine the differentiating effect of B2B services conceptually; b) analyze

this effect across industries (thus across different service standard levels); c) inspect intervening variables such as the impact of SLAs and type of service (e.g. established categories such as SSC vs. SSP).

Solution Customers

Study II reveals significant differences between different groups of customers, depending on their role in the buying center. As noted earlier, these differences probably go beyond the perception of the solution processes and also affect the definition of the underlying problem that the solution is supposed to solve. This has far-reaching consequences for designing, advertising, and selling solutions. Here is urgently more research needed.

The comparison of the solution outcomes revealed different perceptions also between sellers and customers (although these must be interpreted with caution due to the non-dyadic design). These differences point to diverging interpretations of the *integrative benefit* of solutions, that is, the added value generated through the integration of several components. In general, even though this is a core concept in the research on complex B2B offerings – for instance on systems (Mattsson 1973), on solutions (Sawhney 2007), and also in the bundling literature (Stremersch and Tellis 2002) – the nature of the integrative benefit is not yet well understood. Hence, more research is necessary, including conceptual research that demarcates this type of added value from other value concepts in the B2B literature (Lindgreen and Wynstra 2005; Ulaga 2003, 2001; Ulaga and Chacour 2001; Ulaga and Eggert 2005). It also needs to be investigated how specific this integrative benefit is: Study Ia implies that it loses most of its effect if it is not combined with individual requirements definition. This might have consequences for the efficiency and efficacy of industry-wide, rather standardized solutions (“Branchenlösungen”). These are often requested by customers due to a lower risk of a lock-in.

8.1.2 Data and Methodology

Data

One central limitation is the cross-sectional nature of both studies, even though central measurements in study I are pseudo-longitudinal. Real longitudinal data,

however, enables researchers to make more accurate statements about transformation processes. To the author's best knowledge, existing B2B panel studies (such as the NIFA panel (Eggert et al. 2011; Rogalski and Hauptmanns 1993)) cover neither the dimensions of the SPCM nor the range of industries sufficiently. Setting-up and conducting a long-running panel study for complex offerings is laborious and costly but promising. Government or other research institutions might support such a project.

Study I reflects the sellers' perspective, study II is from the customers' point of view. Combining both perspectives in form of dyadic data, is highly desirable but challenging if more than one company or industry is involved. Another desideratum for future research is secondary data from external sources, such as official statistics or published reports. As mentioned earlier, privacy policies did not allow the online access panel providers to disclose their companies' names for data triangulation purposes.

Pseudo-Longitudinal Research

To the best knowledge of the author, the combination of "pseudo-longitudinal" data (study participants give simultaneous ratings that pertain to different points in time) and pattern-oriented longitudinal methods of analyses as done in study Ib has never been applied before in research. Future research could compare this method with established forecast techniques such as Delphi or cross impact matrix analysis. If "real" longitudinal data is available, the predictive validity should be assessed. More research is also necessary to determine the ideal number of virtual measurement points and to adjust the temporal distances. One of the main advantages of this approach is the straightforward integration into surveys. Thus, B2B researches are encouraged to include pseudo-longitudinal ratings at least for their central (single item) measurements. This type of analyses could also serve as a prediction tool for marketing professionals such as business consultants.

8.1.3 Research Policy

The integration of products and services is an attractive opportunity for diversification particularly for those economies with a strong manufacturing sector, thus reducing the associated risks and dependencies. Consequently, several countries

with such economic structures, such as Germany and some Scandinavian countries, launched research programs in order to find ways that broaden the scope of action of their domestic manufacturers. This also includes the transformation to solution providers.

As useful and valuable as this type of research funding is (this dissertation also was supported with funds from such a program), it carries an inherent danger: As the overall research agenda is more or less fixed (goal: transforming into solution providers), the funded research is involuntarily pushed into an instrumental direction (developing tools for transformation). In any case, most of this research is normative; it is not the primary task of the research assignment to question the fundamental assumptions and premises behind these support programs. This dissertation hopefully demonstrates that it is worth doing it.

Hence, governmental research funding should be more open-ended and leave room to break free from hypes and fashions, to which also researchers (and government employees behind these programs) are susceptible. This is particularly crucial for European B2B marketing research, since the majority of young and future scientists are brought up with these funds. Governmental research funding should also encourage fundamental research, e.g. by providing financial means for longitudinal studies (à la a possible “European B2B Solution Panel”), by granting access to official statistics, or, as mentioned before, by compensating firms that failed in their transformation process and thus are less motivated to participate in research that retrospectively examines the circumstances of this failure.

8.2 Solutions: Myths and Facts

The study results suggest rethinking some common beliefs about business solutions:

The Great Myths about Solutions (and Facts According to this Thesis)	
Myth	Fact
“There is a general trend from component sellers to solution providers.”	No, the incidence is rather low. Less than 3% of components seller move (directly) to solutions.
“I should move to solutions because there aren’t that many solution providers.”	No, prevalence of solution selling is rather high. Including “derivates”, about 60% of the firms offer solutions.
“Solutions are a base product + add-on service.”	The basic principles also apply to service solutions, which are already widespread.
“Solutions are something for large, international manufacturers.”	No, also SMEs successfully provide solutions.
“Solutions are something for incumbent companies.”	Offering solutions might be exactly the right strategy for new entrants since they cannot make use of economies of scale. But they often can customize and integrate more easily.
“Solutions are primarily a matter of business strategy.”	Also soft factors play a role, a substantial part of the perception as a solution provider can be explained by the behavior of frontline employees.
“Solution sales persons are from Venus.”	At least some behaviors fit rather extravert, assertive people (“Martians”).
“By including services into my solution offerings, I can better differentiate from the competition.”	High service shares do not lead to higher perceived uniqueness. High service standards in the industry might prevent this.
“Solutions are the end point of transformation trajectories.”	Solution provider also face costs through individualization and sacrifice market shares (markets of one). If they can aggregate the demand, they move on to “mass market solutions”.

Table 53: Myths and facts about business solutions

8.3 Final Remark: Business Solutions – Management Fad, Hype or Contemporary Marketing Practice?

In the light of the results of this thesis – what are business solutions? A transient trend? Certainly not. A management fashion? At least partly. Already common practice? Probably. Given the fact that approximately 40% of the surveyed companies – if closely related derivatives are also considered even 60% – can be classified as solution sellers, calling solutions just a fad does not do justice to this phenomenon. The dynamism, however, is lower than one could assume considering the buzz in the business press: The proportion of transformation processes from the Component Seller to the Solution Provider is negligibly small; the net inflow into the Solution Provider configuration is even close to zero. How does it all fit together?

Ironically, a concept that was developed by business consultants might give an answer. Gartner's Hype Cycle (Fenn and Raskino 2008) describes the typical development that technology innovations run through (see figure 47): a new technology emerges and gains attention by the media. Early success stories inflate the expectations but the new technology is not yet mature enough to live up to these hopes. The media report on hurdles and problems, the public attention decreases. But unnoticed by the public, the technology makes progress; more reliable products and services based on this technology hit the market until the technology is widely adapted.

Essentially the same happened to business solutions: The first publications appeared in the 1970s (Hannaford 1974, 1976; Mattsson 1973) but gained only little attention until the 1990 when the concept was heavily promoted by business consultants and turnaround managers (Bosworth 1995; Gerstner 2002; Gschwandtner 1987). Practitioner publications skyrocketed in the aftermath; business solutions were perceived as a panacea against all kind of market threats during a turbulent period at the turn of the millennium (see practitioner review in table 6). Then the mood changed; reports on high failure rates and high transformation costs increased (Krishnamurthy et al. 2003) – business solutions were in the through of disillusionment. More balanced views on solutions were published several years later (Sawhney 2006; Tuli et al. 2007) that also re-boosted the attention to this topic. But

“behind the scenes”, firms adopted solution-selling practices quietly, without much ado.

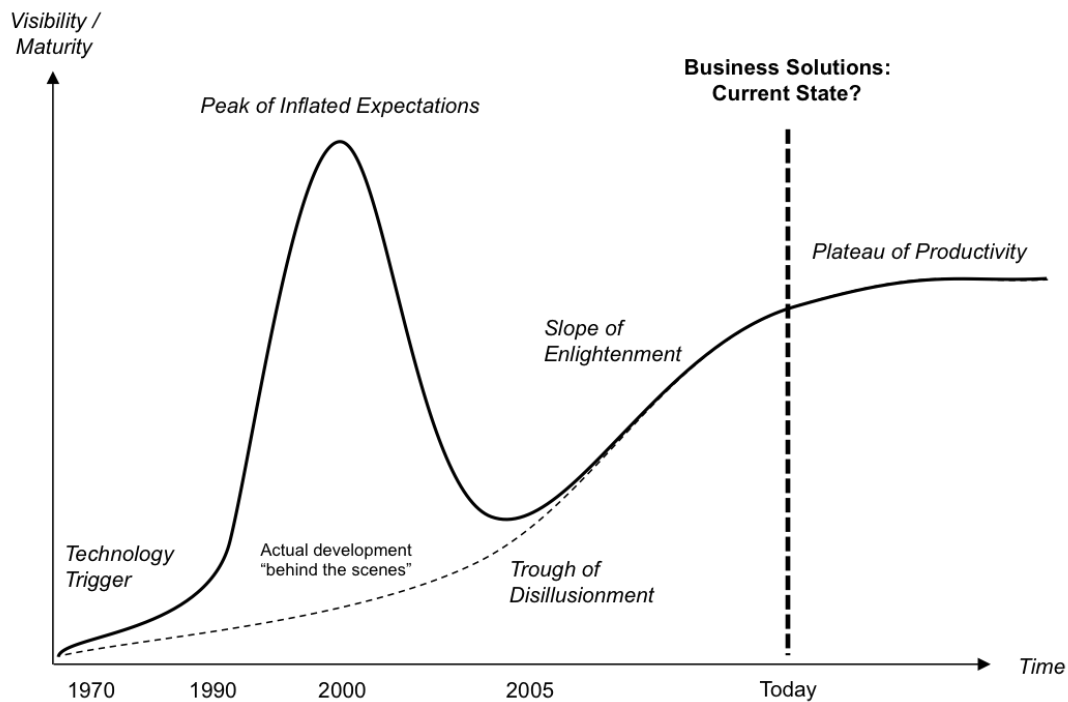


Figure 47: Gartner Hype Cycle

Today, business solutions might have become a *contemporary marketing practice* in B2B markets. A group of researchers around Nicole Coviello and Roederick Brodie coined this term in the late 1990s (Brodie, Coviello, and Winklhofer 2008; Coviello and Brodie 2001; Coviello et al. 2002; Lindgreen, Palmer, and Vanhamme 2004). They wanted to point to the gap between marketing theory, which was trapped back then in a harsh debate about the “right” paradigm (notably about relationship marketing), and marketing practice, in which managers felt obviously comfortable with multiple practices.

If this also applies to business solutions, then the ultimate implication for research of this thesis is short and straightforward: Ignore the *buzz*, look at the data and listen to people who already do what researchers think they *should* do.

9 Acknowledgement

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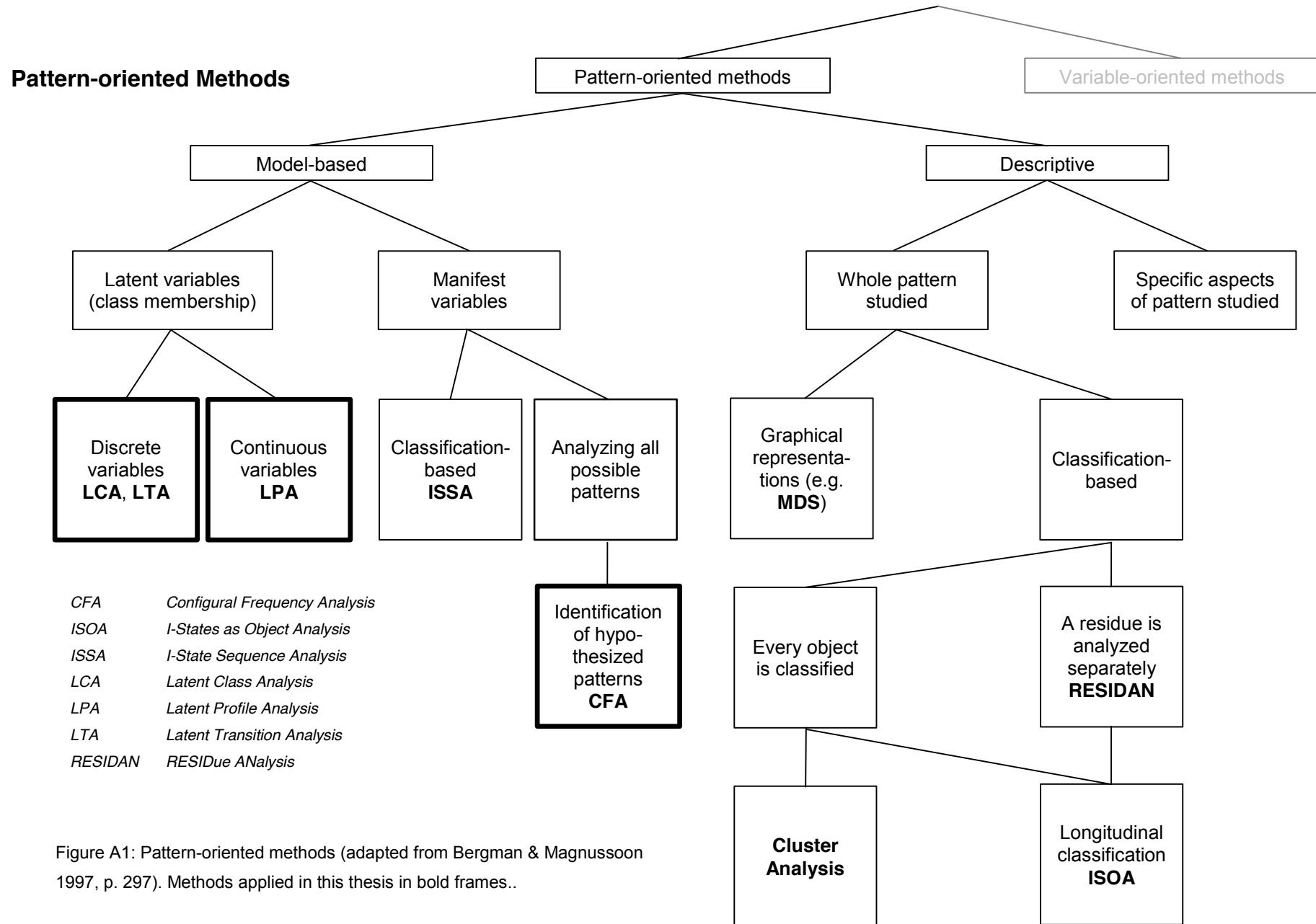
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Appendix Part I: Theoretical Foundation and Study I

Selected Definitions of Complex Offerings		
Publication	Label	Definition
Mattsson (1973)	Systems	"In systems selling, the seller provides, through a combination of products and services, a fulfillment of a more extended customer need than is the case in product selling." (p. 108)
Paliwoda and Bonaccorsi (1993)	Systems Solutions	"A systems seller does not offer mere products or services, but integrated solutions to complex customer problems. The ultimate value a firm creates is when buyers are willing to pay for what the firm provides, which includes the physical product as well as any ancillary services or benefits" (p. 156)
Doster and Roegner (2000)	Solutions	"A solutions provider is one who packages and integrates components to deliver a complex, turnkey solution that meets a specific business need." (p. 51)
Stremersch et al. (2001)	Full Service Contracts	"A comprehensive bundle of products and/or services, that fully satisfies the needs and wants of a customer related to a specific event or problem." (p. 2)
Miller et al. (2002)	Solutions	[Solutions are] "integrated combinations of products and/or services that are unusually tailored to create outcomes desired by specific clients or types of clients. Whereas products are mostly about functionality, solutions are about outcomes that make life easier or better for the client." (p.3.)
Hax and Wilde II (2003)	Total Customer Solutions	"Solutions [consist] of a portfolio of customized products and services that represent a unique value proposition to individualized customers" (p. 5-6)
Brady et al. (2005)	Integrated Solutions (IS)	"Delivering IS to meet user needs means combining products and systems with services in order to specify, design, deliver, finance, maintain, support and operate a system throughout its life cycle." (p. 360)
Sawhney (2006)	Solutions	A Solution is "an integrated combination of products and services customized for a set of customers that allows customers to achieve better outcomes than the sum of the individual components of the solution." (p. 369)
Tuli et al. (2007)	Customer Solutions	"Suppliers tend to view a solution as a customized, integrated bundle of goods and services [...]. In contrast, customers tend to view a solution more broadly as a set of customer-supplier relational processes comprising (1) customer requirements definition, (2) customization and integration of goods and/or services and (3) their deployment, and (4) postdeployment customer support." (p. 2)
Brax and Jonsson (2009)	Solution Offerings	"A bundle of physical products, services and information, seamlessly combined to provide more value than the parts alone, that addresses customer's needs in relation to a specific function or task in their business system; it is long-term oriented, integrates the provider as part of the customer's business system, and aims at optimizing the total cost for the customer." (p. 541)

Table A1: Selected definitions of business solutions



Comparison of cs/fs/QCA and CFA

	Crisp Set / Fuzzy Set Comparative Qualitative Analysis (Ragin 1989; 2000; 2008)	Configuration Frequency Analysis (von Eye 1990; 2002)
Based on...	... set membership (crisp: dichotomous, fuzzy: gradual)	... frequency of theoretically possible configurations
Identifies...	... configurations of conditions that cause an outcome	... abnormally high or low frequencies of configurations (types / antitypes)
Algebra	Set algebra, Boolean algebra	Linear algebra
Description vs. causation	Causation	Description or causation (depends on status assigned to variables)
Assessment of the solution by	"Coverage" and consistency (non-probabilistic)	"Classic" parameters (e.g. p , χ^2)
Weak points	Logical remainders (empirically non-existent configurations, = empty cells)	Less prone to empty cells
Strengths	Equifinality, complex interactions, also works with medium-sized samples	Equifinality, complex interactions
Practical challenges	Sensitivity to parameter changes, scale calibration (full + non-membership, cross-over point), handling of remainders, interpretation of results, limited number of conditions	Choice of frequency distribution, α -error adjustment, limited number of conditions (tables grow quadratically)

Table A2: Comparison of cs/fs/QCA and CFA

Survey Items

General Scenarios

Items	Item origin and comments	Measurement	Code
<p>“C”- scenario (1)</p> <p>Our offering is standardized. ... is in principle comparable with its competitors. ... has <i>no</i> strategic importance for the customer. ... has the character of a "commodity". Deals based on this offering have a transactional character. ... tend to have a short turnaround time. ... require no intervention in the customer's processes.</p>	<ul style="list-style-type: none"> • Own formulation • Content input from Tuli et al. (2007), Cova and Salle (2007) 	<ul style="list-style-type: none"> • 6-point bipolar • Agreement: fully scenario 1 vs. fully scenario 2 • Three point in time: <ul style="list-style-type: none"> – today – 5 years ago – in 5 years 	GEN
<p>“S”-scenario (2)</p> <p>Our offering can be individualized. ... is difficult to compare with competitors. ... is of strategic importance for the customer. Deals based on this offering have a project character. ... tend to have a longer transaction time. ... require intervention in the customer's processes.</p>			
<p>Our customers' needs are mainly met by <i>standard components</i>.</p> <p style="text-align: center;">vs.</p> <p>Our customer' needs require <i>customized solutions</i>.</p>	<ul style="list-style-type: none"> • Own formulation 	<ul style="list-style-type: none"> • 6-point bipolar 	com_sol
<p>Figuratively speaking: The typical customer expects us to supply the <i>fitting puzzle piece</i>.</p> <p style="text-align: center;">vs.</p> <p>The typical customer expects to solve the <i>whole puzzle</i>.</p>	<ul style="list-style-type: none"> • Own formulation 	<ul style="list-style-type: none"> • 6-point bipolar 	puz

Table A3: General scenario and additional items

Requirements Definition

Item	Item origin and comments	Measurement	Code
<p>“C”- scenario</p> <p>For our offering ...</p> <p>... we don't need to identify <i>individual</i> customer requirements.</p> <p>... no background information about <i>individual</i> customer problems is required.</p> <p>With our offering ...</p> <p>... market research tries to identify the requirements of preferably large <i>customer segments</i>.</p> <p>... customers are aware of their needs and the offering's requirements.</p> <p>... on the customer side, mainly the purchasing department is involved.</p> <p>... no additional in-house resources and skills are necessary to realize the customer request.</p>	<ul style="list-style-type: none"> • Own formulation • Content input from from Tuli et al. (2007), Sawhney (2006), and Ulaga and Sharma (2001) 	<ul style="list-style-type: none"> • 6-point bipolar • Agreement: fully scenario 1 vs. fully scenario 2 • Three point in time: <ul style="list-style-type: none"> - today - 5 years ago - in 5 years 	R
<p>“S”-scenario</p> <p>For our offering ...</p> <p>... we identify <i>individual</i> customer requirements.</p> <p>... background information about <i>individual</i> customer problems is required.</p> <p>With our offering ...</p> <p>... market research tries to identify the requirements of <i>individual</i> customers.</p> <p>... the exact needs of the customers and their requirements of the offering have to be identified.</p> <p>... on the customer side, there are several specialist departments and - if necessary - the senior management involved.</p> <p>... the development of additional internal company resources and capabilities might be necessary to realize the customer request.</p>			
<p>We include the future development of the customer's needs into the offering.</p>	Based on Day (1994)	<ul style="list-style-type: none"> • 6-point unipolar 	fut_ need
<p>Sometimes we know even better than the customer himself what he really needs.</p>	<ul style="list-style-type: none"> • Own formulation 	<ul style="list-style-type: none"> • 6-point unipolar 	kno_ bet

Table A4: Requirements definition scenarios and additional items

Customization

Item	Item origin and comments	Measurement	Code
<p>“C”- scenario</p> <p>The following applies to our offering:</p> <p>... The customer uses our offering, "as it is", no customization is required.</p> <p>... Motto: "If an adjustment is necessary, the customer adapts to our offering."</p>	<ul style="list-style-type: none"> • Own formulation, • loosely based on Ghosh et al. (2006) and Lampel and Mintzberg (1996) 	<ul style="list-style-type: none"> • 6-point bipolar • Agreement: fully scenario 1 vs. fully scenario 2 • Three point in time: <ul style="list-style-type: none"> - today - 5 years ago - in 5 years 	C
<p>“S”-scenario</p> <p>The following applies to our offering:</p> <p>... An adaptation of the offering to customer needs is required (ranging from simple modifications of existing elements to a complete new development).</p> <p>... Motto: "If an adjustment is needed, we adapt our offering to the customer."</p>			
We try to standardize our offering as much as possible.	<ul style="list-style-type: none"> • Own wording (no recoding! Item remains inverted in relation to scenario) 	<ul style="list-style-type: none"> • 6-point unipolar 	stand_off
We make money only with standardized offerings.	<ul style="list-style-type: none"> • Own wording 	<ul style="list-style-type: none"> • 6-point unipolar 	stand_off_pr of
Even our standard products and services meet the expectations of our customers.	<ul style="list-style-type: none"> • Own wording (no recoding! Item remains inverted in relation to scenario) 	<ul style="list-style-type: none"> • 6-point unipolar 	stand_off_ex p

Table A5: Customization scenarios and additional items

Integration

Item	Item origin and comments	Measurement	Code
<p>“C”- scenario</p> <p>The following applies to our offering:</p> <p>... Our offering has a "stand-alone" character.</p> <p>... The "integration expertise" is with the customer: He makes sure that all the parts fit together.</p>	<ul style="list-style-type: none"> • Own formulation • Idea if integration expertise / capabilities based on Schilling (2000), Dunn Jr. and Thomas (1986), Hobday et al. (2005) 	<ul style="list-style-type: none"> • 6-point bipolar • Agreement: fully scenario 1 vs. fully scenario 2 • Three point in time: <ul style="list-style-type: none"> - today - 5 years ago - in 5 years 	I
<p>“S”-scenario</p> <p>The following applies to our offering:</p> <p>... Our offering has a "system" character; it consists of several components that work as a whole.</p> <p>... The "integration expertise" is with us: we make sure that all the parts fit together.</p> <p>... If it is necessary or if the customer wishes, we also integrate components from other vendors into our offering.</p>			
<p>Our customers' satisfaction mainly depends on the quality of specific products and services.</p> <p>vs.</p> <p>Our customers' satisfaction mainly depends on the interplay of our products and services.</p>	<ul style="list-style-type: none"> • Own formulation 	<ul style="list-style-type: none"> • 6-point bipolar 	ind_ sys_ qual
<p>What sets us apart from other providers is the quality of individual products and services.</p> <p>vs.</p> <p>What sets us apart from other providers is the way how our products and services work together as a whole.</p>	<ul style="list-style-type: none"> • Own formulation 	<ul style="list-style-type: none"> • 6-point bipolar 	ind_ sys_ alone
<p>We achieve a price premium with the customer for the integration of single products and services into a solution.</p>	<ul style="list-style-type: none"> • Own formulation 	<ul style="list-style-type: none"> • 6-point unipolar 	wtp_ int
<p>What we sell to the customer has - as a whole - a higher functional benefit than the sum of its parts.</p>	<ul style="list-style-type: none"> • Own formulation • Represents "gestalt" approach 	<ul style="list-style-type: none"> • 6-point unipolar 	func_ ben

Table A6: Integration scenarios and additional items

Deployment

Item	Item origin and comments	Measurement	Code
<p>“C”- scenario</p> <p>The following applies to our offering:</p> <p>... With the delivery of the offering to the customer our task is basically done (except for maintenance, repair, etc.).</p> <p>... The customer must implement the offering in his corporate environment / processes.</p> <p>... The customer must ensure that he will receive maximum benefit from the offering (e.g., by organizing training for his staff).</p>	<ul style="list-style-type: none"> • Own formulation • Content input from from Tuli et al. (2007), and Heide & John (1992) 	<ul style="list-style-type: none"> • 6-point bipolar • Agreement: fully scenario 1 vs. fully scenario 2 • Three point in time: <ul style="list-style-type: none"> – today – 5 years ago – in 5 years 	D
<p>“S”-scenario</p> <p>The following applies to our offering:</p> <p>... With the delivery of the offering to the customer, our task is not yet done.</p> <p>... We take care of the implementation of the offering in the corporate environment / customer processes.</p> <p>... We ensure that the customer receives maximum benefit from the offering (e.g., by offering trainings for customer's staff).</p>			
<p>The quality of the implementation depends primarily on the <i>customer</i>. In principle, he should easily be able to use the offering effectively and efficiently.</p> <p style="text-align: center;">vs.</p> <p>The quality of the implementation depends primarily on <i>us</i>. Only with our help, the customer will be able to use the offering effectively and efficiently</p>	<ul style="list-style-type: none"> • Own formulation 	<ul style="list-style-type: none"> • 6-point bipolar 	imp_ dep

Table A7: Deployment scenarios and additional item

Post-Deployment Support

Item	Item origin and comments	Measurement	Code
<p>“C”- scenario</p> <p>The following applies to our offering:</p> <p>... Where available, our after-sales support consists essentially of repair and maintenance.</p> <p>... After the delivery to the customer, we don't have "access" to the offering any longer (e.g., for collection of usage data via an Internet connection).</p> <p>... After the delivery, the offering (from this same supply) is no longer the central focus of the customer relationship. The deal is done.</p>	<ul style="list-style-type: none"> • Own formulation • Content input from from Tuli et al. (2007) and Challagalla et al. (2009) 	<ul style="list-style-type: none"> • 6-point bipolar • Agreement: fully scenario 1 vs. fully scenario 2 • Three point in time: <ul style="list-style-type: none"> - today - 5 years ago - in 5 years 	P
<p>“S”-scenario</p> <p>The following applies to our offering:</p> <p>... Our after sales support includes comprehensive service offerings, going beyond repair and maintenance.</p> <p>... After the delivery to the customer, we have "access" to the offering and can - for example - collect data on usage or operating status.</p> <p>... The offering is long after the delivery an important part of the customer relationship. Completion of the transaction is sometimes difficult to define, e.g. due to long-term service agreements.</p>			
<p>We respond promptly to problems (eg, failure, malfunction, "service failure",...) of our offerings as <i>they occur</i>.</p> <p style="text-align: center;">vs.</p> <p>We try to <i>proactively</i> prevent problems of our offerings (e.g., using remote monitoring).</p>	<ul style="list-style-type: none"> • Own formulation based on Challagalla et al. (2009) 	<ul style="list-style-type: none"> • 6-point bipolar 	PDL_ react_ prev
<p>We inform customers <i>proactively</i> about new products and services in the context of the offering.</p>	<ul style="list-style-type: none"> • Own formulation based on Challagalla et al. (2009) 	<ul style="list-style-type: none"> • 6-point unipolar 	PDL_ info
<p>We <i>proactively</i> seek feedback on the offering of our customers.</p>	<ul style="list-style-type: none"> • Own formulation based on Challagalla et al. (2009) 	<ul style="list-style-type: none"> • 6-point unipolar 	PDF_ feedb

Table A8: Post-deployment support and additional items

Outcome Variables

Item	Item origin and comments	Measurement	Code
<p>Honestly, on a scale from 1 to 6, how would you rate your offering relative to its competitors in terms of the following criteria?</p> <ul style="list-style-type: none"> • Product quality • Service quality • Uniqueness • Price • Price/performance ratio • Functional value • Customer relationship, in which it is embedded 	<ul style="list-style-type: none"> • Adapted from Homburg et al. (2005c) 	<ul style="list-style-type: none"> • 6-point bipolar 	<p>prod_ qual serv_ qual uniq price pp_rat func_ val rel_qual</p>

Table A9: Outcome variables

Industries in the Sample

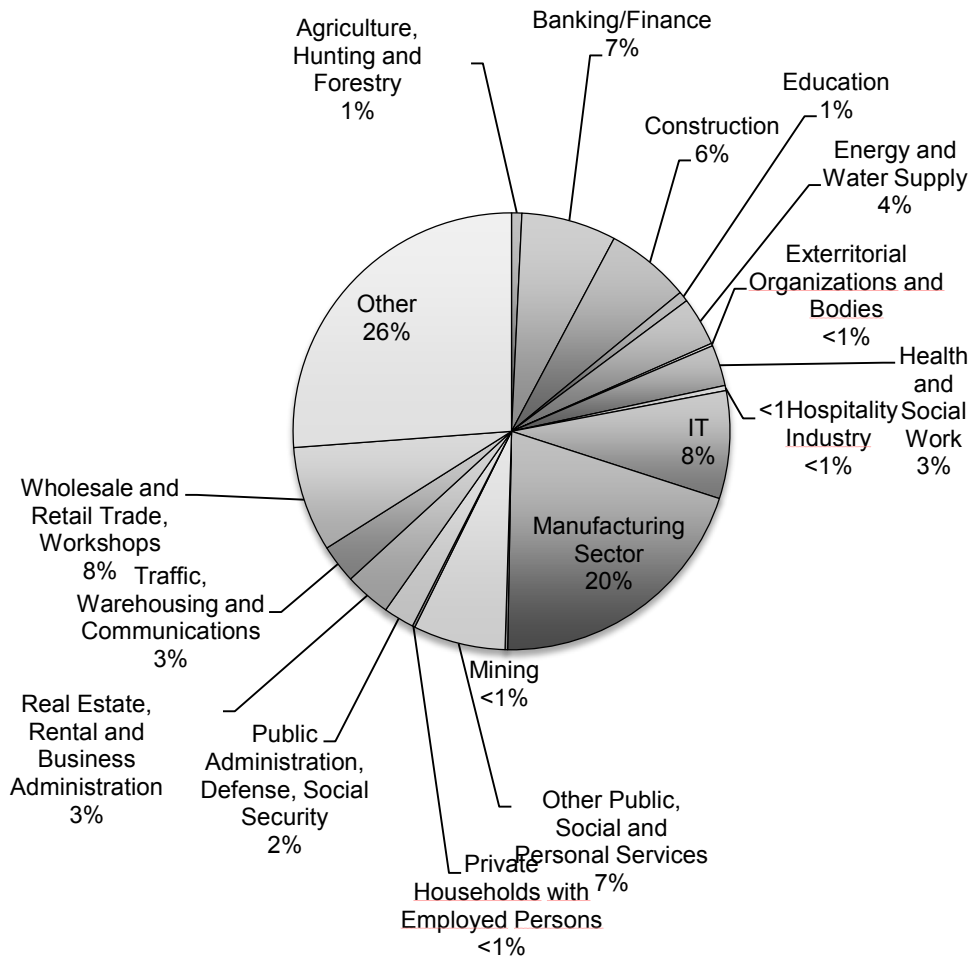


Figure A2: Industries covered by the sample of study I

Firm Type		
	Frequency	Percent
SBU	353	67
Large Enterprise	174	33
Total	527	100

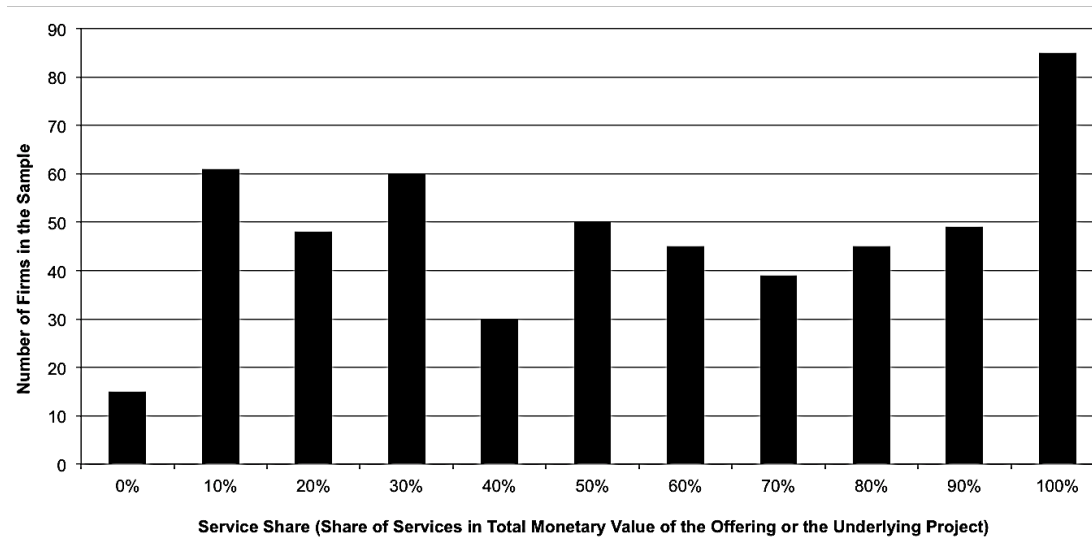
Table A10: SBU vs. large enterprises

Respondents' Department Affiliation

	Frequency	Percent
Production (- planning and control)	64	12.1
Research and development	35	6.6
Marketing	17	3.2
Sales	83	15.7
Purchasing	11	2.1
Controlling and accounting	37	7.0
Financing and investment	10	1.9
Human resources and organization	15	2.8
IT	64	12.1
Customer service	21	4.0
Management	132	25.0
Other	38	7.2
Total	527	100

Table A11: Department affiliation of the respondents

Service Share



Number	15	61	48	60	30	50	45	39	45	49	85
Percent	3	12	9	11	6	10	9	7	9	9	16

Table A12: Histogram of service share

Describing Variables		
	<i>mean</i>	<i>sd</i>
Our customers' needs are mainly met by standard components. - Our customer' needs require customized solutions.	4.36	1.617
The typical customer expects us to supply the fitting puzzle piece. - The typical customer expects us to solve the whole puzzle.	4.26	1.627
We include the future development of the customer's needs into the offering.	4.51	1.402
Sometimes we know even better than the customer himself what he really needs.	4.38	1.355
We try to standardize our offering as much as possible.	3.73	1.433
We make money only with standardized offerings.	3.06	1.488
Even our standard products and services meet the expectations of our customers.	3.83	1.32
Our customers' satisfaction mainly depends on the quality of specific products and services. - Our customers' satisfaction mainly depends on the interplay of our products and services.	4.02	1.73
What sets us apart from other providers is the quality of individual products and services. - What sets us apart from other providers is the way how our products and services work together as a whole.	3.93	1.697
We achieve a price premium with the customer for the integration of single products and services into a solution.	3.91	1.391
What we sell to the customer has - as a whole - a higher functional benefit than the sum of its parts.	4.31	1.367
The quality of the implementation depends primarily on the customer. In principle, he should easily be able to use the offering effectively and efficiently. – The quality of the implementation depends primarily on us. Only with our help, the customer will be able to use the offering effectively and efficiently	3.98	1.619
We respond promptly to problems (eg, failure, malfunction, "service failure", ...) of our offerings as they occur. - We try to proactively prevent problems of our offerings (e.g., using remote monitoring).	3.41	1.727
We inform customers <i>proactively</i> about new products and services in the context of the offering.	4.04	1.437
We <i>proactively</i> seek feedback on the offering of our customers.	4.08	1.467

Table A13: Describing variables

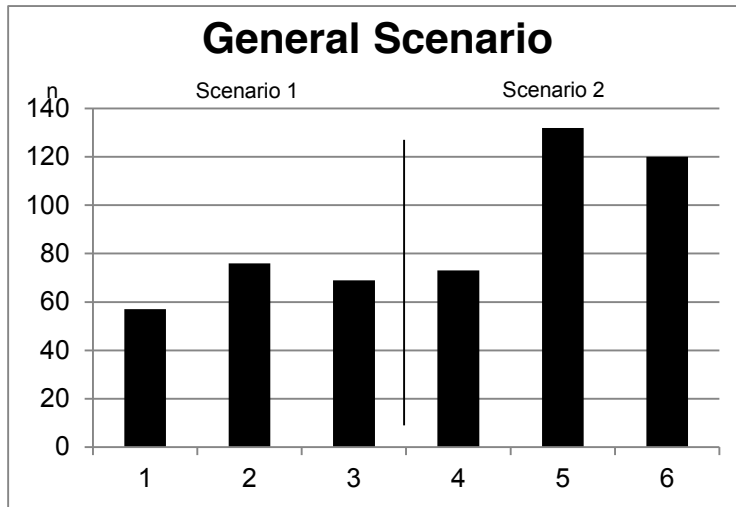
Outcome Variables		
	<i>mean</i>	<i>sd</i>
How would you assess your offering in comparison to the competition regarding the following dimensions:		
Product quality	4.61	1.033
Service quality	4.73	1.027
Uniqueness	4.26	1.163
Price	3.99	1.128
Price/performance ratio	4.61	0.951
Functional value	4.7	0.964
Customer relationship, in which it is embedded	4.74	0.996

Table A14: Outcome variables

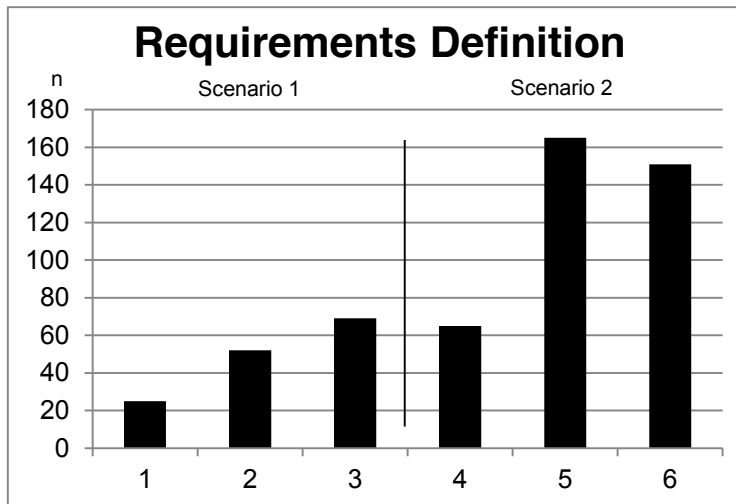
Table A15: Correlation matrix of scenarios (today's situation) and describing variables

Correlation Matrix		GEN	R	C	I	D	P	com sol	put puz	fut need	kno bet	std off	std off	Ind sys	ind sys	wto int	func ben	imp dep	PDL rct	PDL info	PDF fb	prd qual	srv qual	OC: uniq	OC: prc	OC: pp rat	OC: fnc val	
GEN		1																										
R		.628	1																									
C		.452	.586	1																								
I		.238	.328	.311	1																							
D		.413	.406	.368	.392	1																						
P		.317	.401	.347	.347	.658	1																					
com_sol		.544	.549	.535	.184	.298	.270	1																				
put_puz		.369	.391	.299	.266	.376	.273	.529	1																			
fut_need		.302	.361	.363	.253	.306	.363	.315	.286	1																		
kno_bet		.260	.255	.279	.234	.236	.264	.278	.236	.528	1																	
stand_off		-.137	-.102	-.132	.082	.010	.051	-.158	-.031	.059	.045	1																
stand_off_prof		-.210	-.158	-.273	.007	-.014	-.040	-.248	-.061	-.151	-.139	.607	1															
stand_off_exp		-.144	-.129	-.164	.059	-.003	-.011	-.186	-.071	.021	.001	.615	.551	1														
Ind_sys_qual		.248	.199	.184	.335	.308	.322	.238	.288	.232	.171	.101	.055	.065	1													
ind_sys_alone		.220	.210	.146	.274	.304	.262	.206	.314	.176	.107	.071	.028	.054	.664	1												
wto_int		.297	.258	.234	.250	.303	.264	.257	.218	.257	.291	.031	-.026	.038	.384	.295	1											
func_ben		.260	.277	.250	.352	.353	.316	.264	.306	.345	.365	.130	.025	.072	.398	.324	.596	1										
imp_dep		.175	.168	.136	.299	.508	.501	.193	.226	.207	.179	.105	.080	.059	.344	.285	.207	.190	1									
PDL_rct_prev		.109	.139	.105	.117	.274	.294	.110	.108	.131	.072	.103	.159	.076	.256	.294	.159	.157	.276	1								
PDL_info		.095	.118	.114	.206	.284	.342	.114	.178	.333	.213	.149	.066	.125	.202	.222	.300	.345	.316	.277	1							
PDF_feedb		.119	.185	.117	.232	.311	.355	.111	.199	.349	.220	.207	.068	.116	.197	.245	.249	.339	.257	.304	.646	1						
prod_qual		.194	.203	.215	.162	.175	.204	.221	.159	.272	.211	.032	-.114	.051	.146	.062	.199	.207	.134	.055	.185	.211	1					
serv_qual		.106	.193	.156	.175	.153	.189	.149	.110	.309	.187	.067	-.020	.119	.175	.141	.236	.269	.106	.093	.223	.261	.568	1				
OC: uniq		.233	.203	.159	.116	.222	.173	.282	.234	.258	.188	.051	-.029	.031	.129	.120	.144	.210	.142	.072	.141	.168	.440	.376	1			
OC: price		.042	.072	.019	.004	.051	-.002	.066	.038	.058	.034	.014	.030	.077	.060	.074	.088	.111	.020	-.010	.039	.051	.174	.265	.301	1		
OC: pp_rat		.170	.172	.150	.089	.124	.036	.174	.161	.119	.122	-.009	-.116	.050	.072	.035	.149	.193	.024	-.021	.119	.150	.461	.485	.356	.560	1	
OC: func_val		.227	.235	.211	.154	.211	.220	.282	.228	.336	.191	.088	-.028	.083	.183	.072	.192	.319	.139	.062	.197	.217	.596	.521	.561	.277	.538	1
OC: rel_qual		.169	.241	.189	.205	.234	.289	.199	.230	.327	.160	.006	-.104	.071	.167	.126	.219	.265	.215	.051	.234	.293	.515	.603	.397	.219	.462	.627

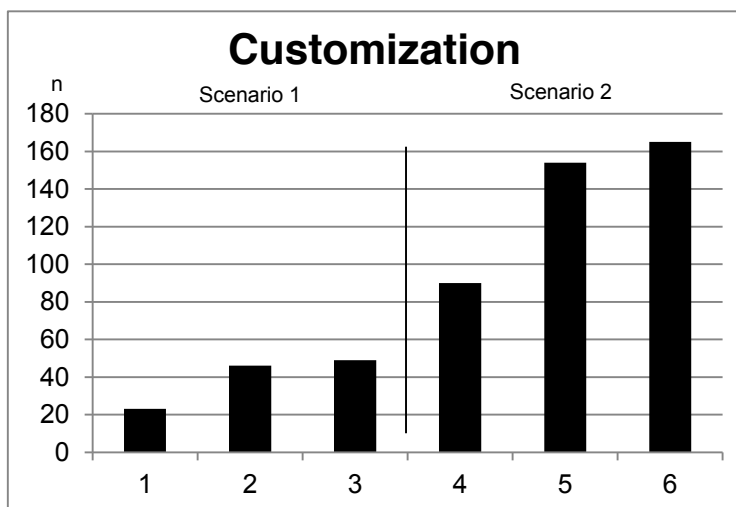
Distribution of Responses to the Scenarios (Today's Situation)



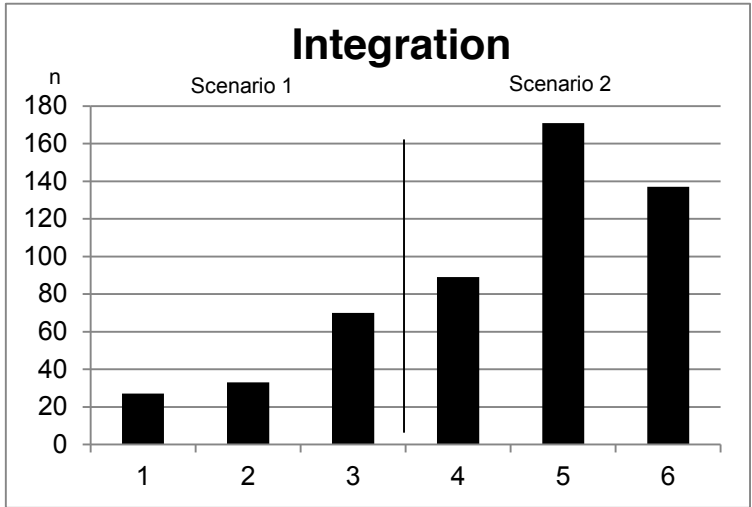
<i>mean</i>	3.96
<i>sd</i>	1.69
K-S Z	4.80 ***



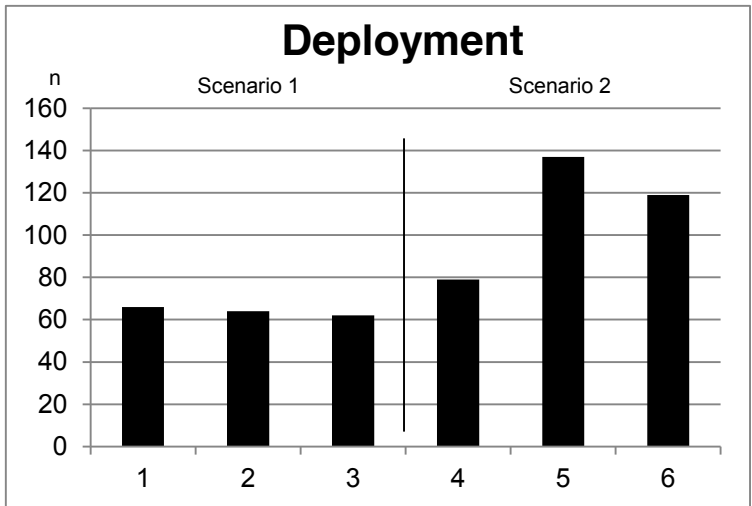
<i>mean</i>	4.42
<i>sd</i>	1.50
K-S Z	5.77 ***



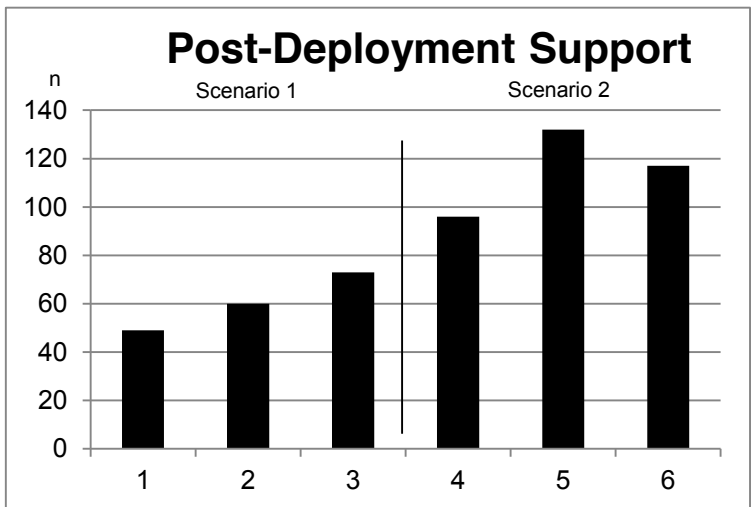
<i>mean</i>	4.52
<i>sd</i>	1.45
K-S Z	5.39 ***



<i>mean</i>	4.43
<i>sd</i>	1.42
K-S Z	5.50 ***



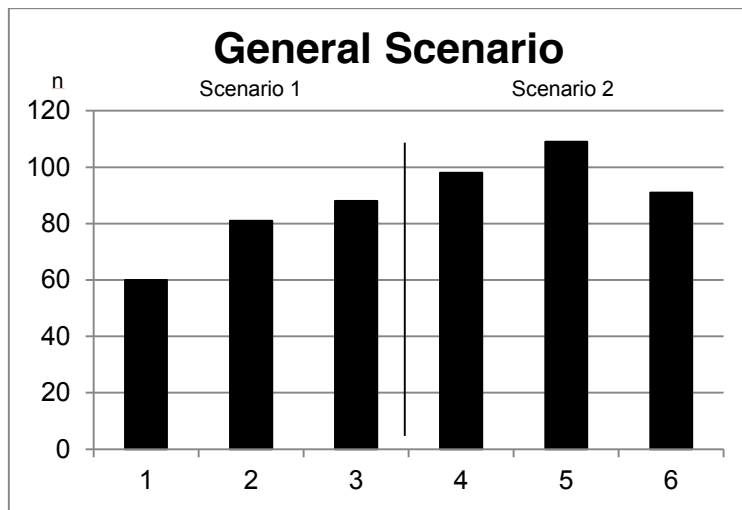
<i>mean</i>	3.98
<i>sd</i>	1.42
K-S Z	4.87 ***



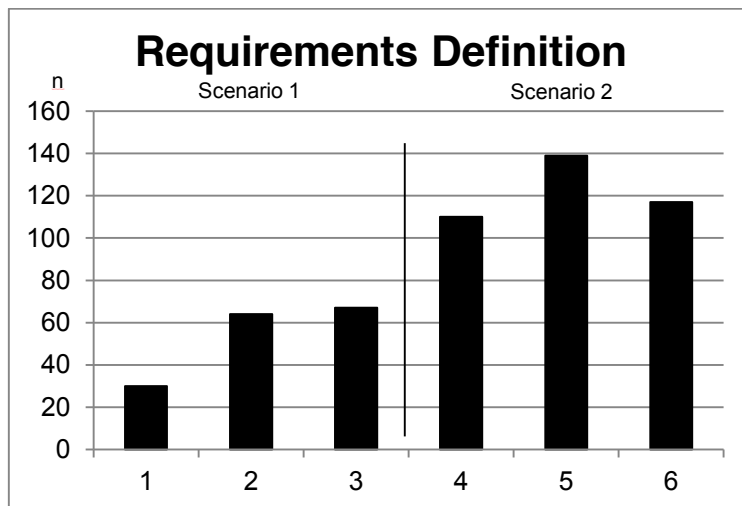
<i>mean</i>	4.05
<i>sd</i>	1.60
K-S Z	4.50 ***

Table A16: Mean, standard deviation, and Kolmogorov-Smirnov (K-S) tests for normal distribution (two-tailed, exact testing) for the SPC variables (today's situation)

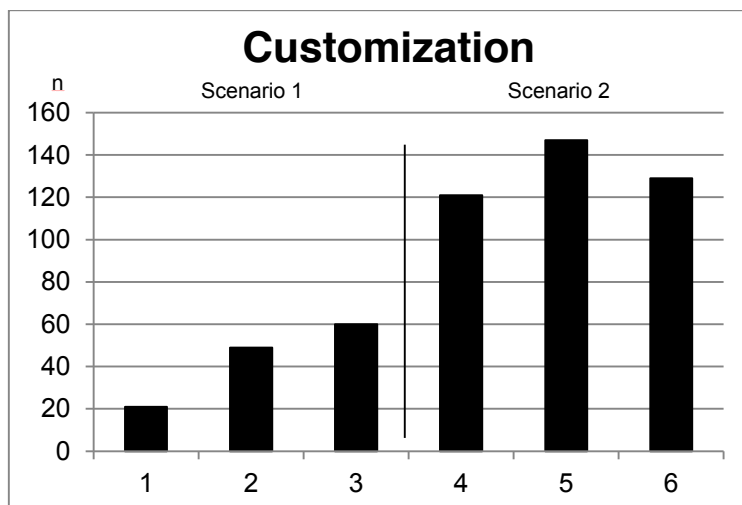
Distribution of Responses to the Scenarios (Situation Five Years ago)



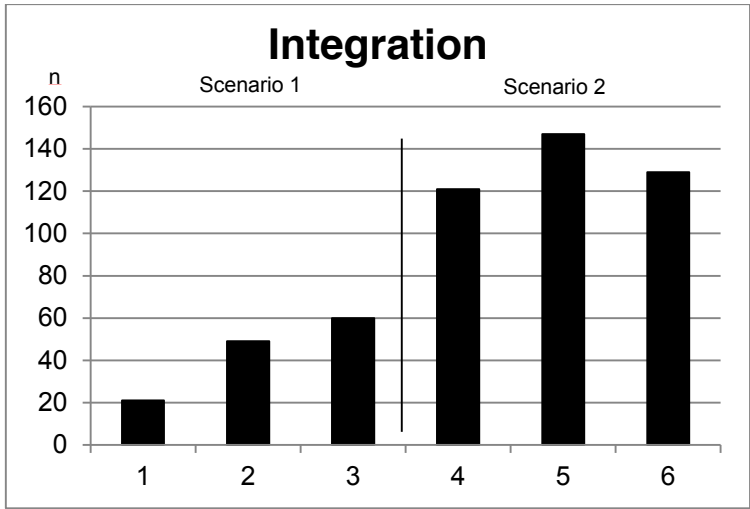
<i>mean</i>	3.74
<i>sd</i>	1.63
K-S Z	3.70 ***



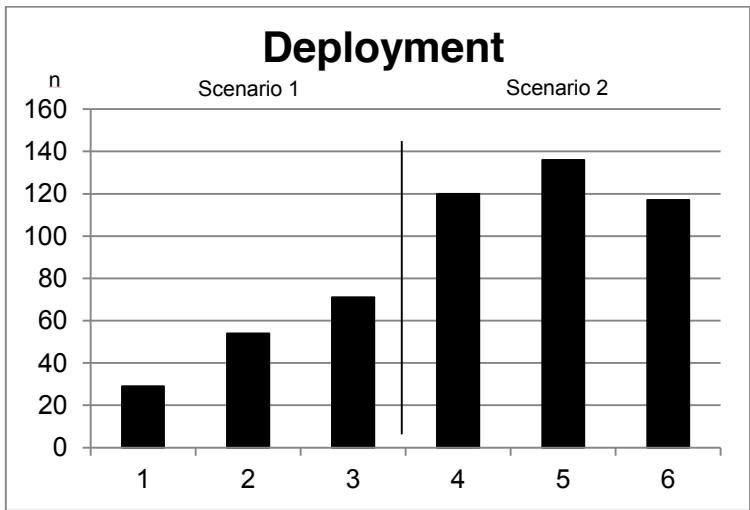
<i>mean</i>	4.17
<i>sd</i>	1.50
K-S Z	4.51 ***



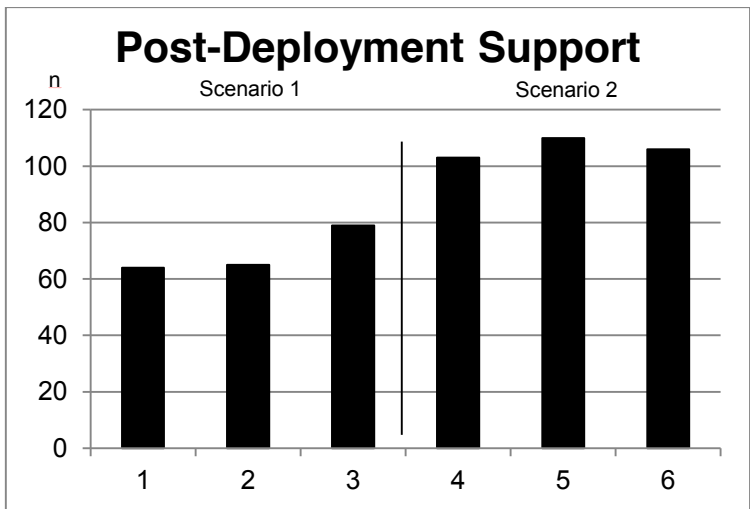
<i>mean</i>	4.35
<i>sd</i>	1.41
K-S Z	4.63 ***



<i>mean</i>	4.20
<i>sd</i>	1.47
K-S Z	4.32 ***



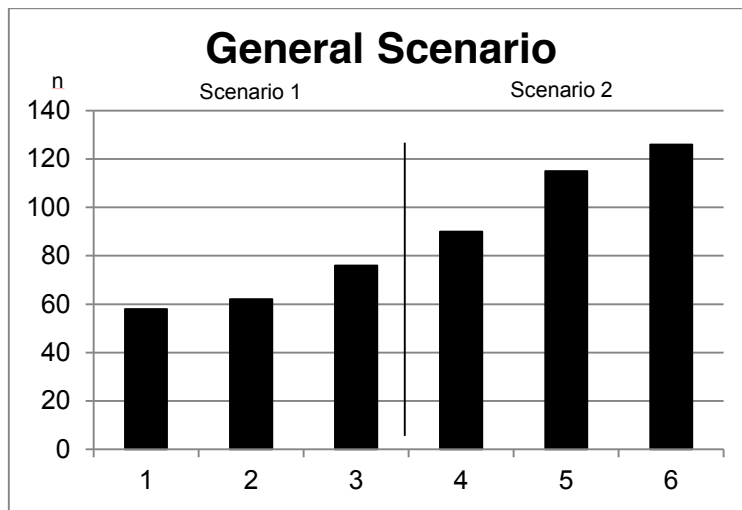
<i>mean</i>	3.95
<i>sd</i>	1.55
K-S Z	3.89 ***



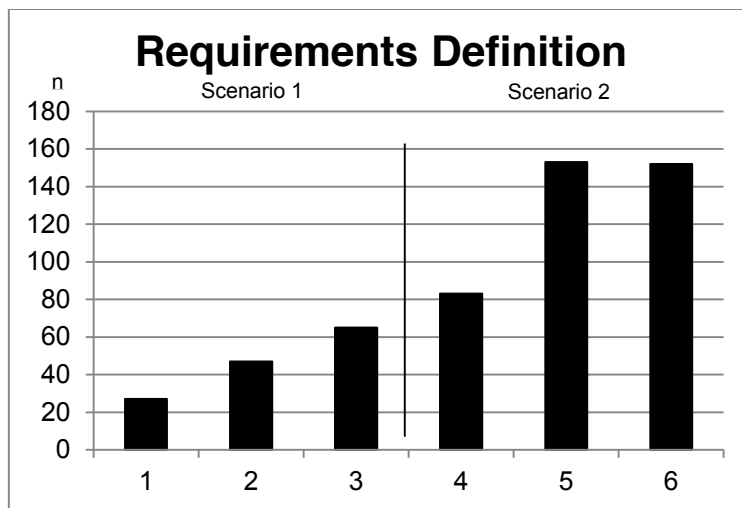
<i>mean</i>	3.85
<i>sd</i>	1.65
K-S Z	3.82 ***

Table A17: Mean, standard deviation, and Kolmogorov-Smirnov (K-S) tests for normal distribution (two-tailed, exact testing) for the SPC variables (situation five years ago)

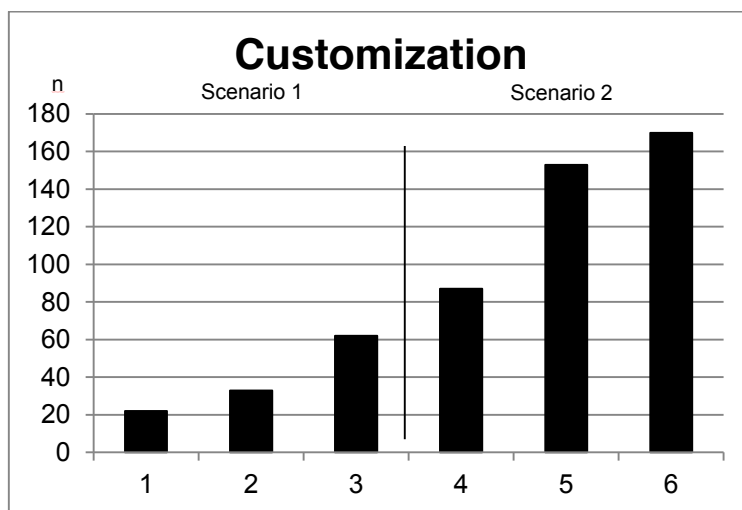
Distribution of Responses to the Scenarios (Situation in Five Years)



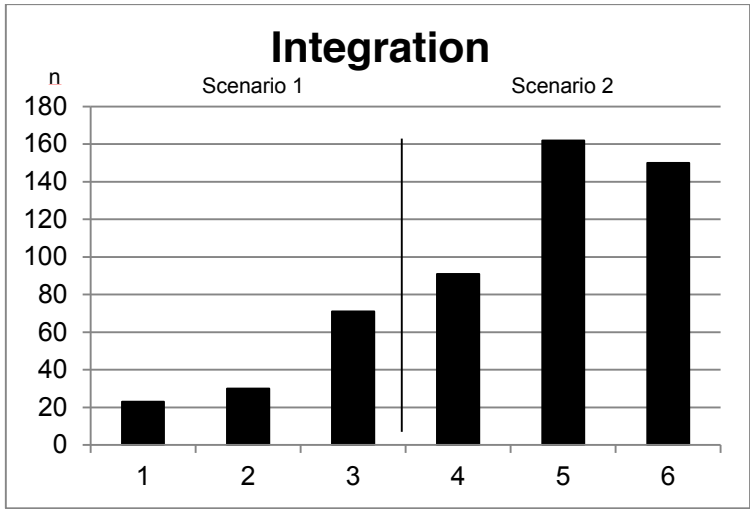
<i>mean</i>	3.99
<i>sd</i>	1.67
K-S Z	4.26 ***



<i>mean</i>	4.41
<i>sd</i>	1.49
K-S Z	5.33 ***



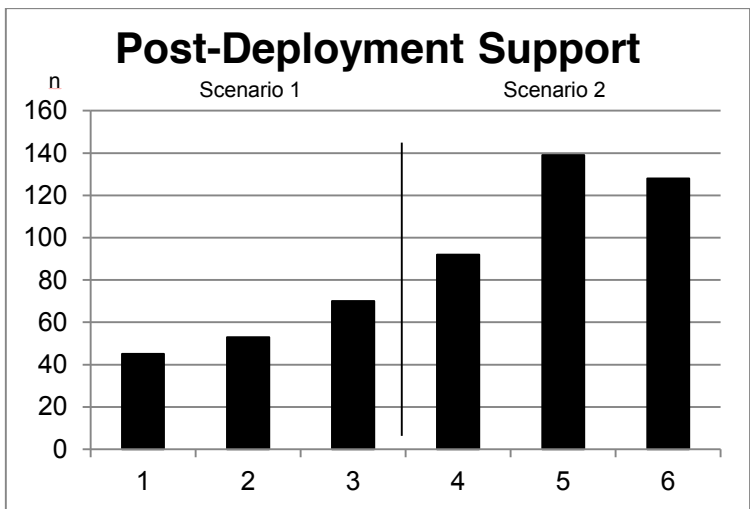
<i>mean</i>	4.57
<i>sd</i>	1.41
K-S Z	5.35 ***



<i>mean</i>	4.50
<i>sd</i>	1.40
K-S Z	5.34 ***



<i>mean</i>	4.16
<i>sd</i>	1.59
K-S Z	4.79 ***



<i>mean</i>	4.08
<i>sd</i>	1.69
K-S Z	4.75 ***

Table A18: Mean, standard deviation, and Kolmogorov-Smirnov (K-S) tests for normal distribution (two-tailed, exact testing) for the SPC variables (in five years)

Design Matrix for First Order Model

$$\log E = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & -1 & 1 \\ 1 & 1 & -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & -1 & 1 & 1 \\ 1 & 1 & 1 & -1 & -1 & 1 \\ 1 & 1 & -1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & -1 \\ 1 & 1 & -1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 & -1 & -1 \\ 1 & 1 & -1 & 1 & -1 & -1 \\ 1 & 1 & 1 & -1 & 1 & -1 \\ 1 & 1 & -1 & -1 & 1 & -1 \\ 1 & 1 & 1 & -1 & -1 & -1 \\ 1 & -1 & 1 & 1 & 1 & 1 \\ 1 & -1 & -1 & 1 & 1 & 1 \\ 1 & -1 & 1 & 1 & -1 & 1 \\ 1 & -1 & -1 & 1 & -1 & 1 \\ 1 & -1 & 1 & -1 & 1 & 1 \\ 1 & -1 & -1 & -1 & 1 & 1 \\ 1 & -1 & 1 & -1 & -1 & 1 \\ 1 & -1 & -1 & -1 & -1 & 1 \\ 1 & -1 & 1 & 1 & 1 & -1 \\ 1 & -1 & -1 & 1 & 1 & -1 \\ 1 & -1 & 1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 & -1 & -1 \\ 1 & -1 & 1 & -1 & 1 & -1 \\ 1 & -1 & -1 & -1 & 1 & -1 \\ 1 & -1 & 1 & -1 & -1 & -1 \\ 1 & -1 & -1 & -1 & -1 & -1 \end{bmatrix} \begin{bmatrix} \lambda_0 \\ \lambda_R \\ \lambda_C \\ \lambda_I \\ \lambda_D \\ \lambda_P \end{bmatrix}$$

Table A19: Design matrix for 1st order CFA (chapter 3.6.2)

Stepwise CFA

In conventional CFA, types and antitypes result from the violation of local independence (Kieser and Victor 1999). However, IF types and antitypes emerge during the analysis, the assumption of local independence for the entire data matrix (= total independence) can no longer be sustained. As a consequence, the estimation of the expected frequencies under the assumption of total independence and the simultaneous existence of types/antitypes might lead to wrong values and thus to phantom types/antitypes, as demonstrated in artificial data sets (Kieser and Victor 1999; Victor 1989).

Two procedures have been proposed to tackle this issue: Kieser-Victor CFA (KV-CFA) (Kieser and Victor 1999; Victor and Kieser 2003)} and functional¹³⁴ CFA (fCFA) (von Eye and Mair 2007; von Eye et al. 2010). Both approaches are very similar; they differ only in the parameter that is used to select the configuration that is to be removed stepwise from the model (LR vs. residuum). Both in CV-CFA and fCFA, the base model differs from conventional CFA: to the *structural* part $\log \mathbf{m} = X_s \lambda_s$ (\mathbf{m} being the vector of the expected frequencies) a functional $X_f \lambda_f$ part is added that contains the types and antitypes and is created during an iterative procedure:

1. Model is fitted. If no fit is achieved, continue with step 2.
2. A contradicting configuration is removed from the model and is replaced by a *structural zero* (selection criterion CV-CFA: highest LR, fCFA: highest residual scores)
3. Go back to step 1

The procedure ends if the model fits or no configurations to be removed are left ($df = 0$). The final result is the selection of types and antitypes that have been removed from the matrix. Due to this sequential testing, α does not need to be protected. Results from stepwise CFA are usually more parsimonious, i.e. fewer types and antitypes emerge (von Eye and Mair 2007; von Eye et al. 2010). For this reason, a stepwise CFA is recommended as an addition to standard CFA (von Eye et al.

¹³⁴ The term functional was chosen because fCFA examines the role that a configuration play for a base model (von Eye and Mair 2007, p. 164)

2010). It is also useful for exploratory purposes, similar to stepwise hierarchical linear regression.

Synopsis of the Results: Confirmatory Standard CFA vs. fCFA vs. KV-CFA

Config.	Standard CFA* 1 st order					fCFA**			KV-CFA**			Hypotheses	
	f_0	f_e	Type	RR-Rank	log P-Rank	f_e	Type	Step	f_e	Type	Step	exp.	conf.
CCCCC	32	1	T	1	1	32	T	1	32	T	2	T	✓/✓/✓/✓
CCCCS	7	2		3	9	7	T	5	4			T	
CCCSC	2	2		11	29	2			3				
CCCSS	4	3		9	27	4	T	9	2				
CCSCC	11	3	T	4	6	8			11			T	✓/---
CCSCS	7	6		10	25	4			8				
CCSSC	5	5		15	30	4			6				
CCSSS	11	10		14	26	11	T	4	11	T	5		
CSCCC	14	4	T	2	4	10			14			T	✓/---
CSCCS	2	7		26	24	4			2	AT	6		
CSCSC	0	6		32	32	0	AT	6	0	AT	4	AT	-/✓/✓
CSCSS	7	12		17	23	7	T		6				
CSSCC	12	11		12	22	20			12	AT	8		
CSSCS	7	20	AT	25	11	9			7	AT	7		
CSSSC	10	19		18	18	9	T	8	16				
CSSSS	15	36	AT	20	7	15			13				
SCCCC	7	3		5	15	6			5				
SCCCS	1	5		30	28	3			4				
SCCSC	2	5		19	31	3			3				
SCCSS	1	9	AT	31	17	1			2				
SCSCC	11	8		8	20	13			10				
SCSCS	4	15	AT	27	14	6			8			AT	✓/---
SCSSC	3	14	AT	29	13	6			6				
SCSSS	10	27	AT	24	8	10	T	7	4				
SSCCC	18	9		7	10	15			14				
SSCCS	7	17		22	16	7			11				
SSCSC	4	16	AT	28	12	7			7				
SSCSS	22	30		16	19	22	T	3	22	T	3		
SSSCC	31	28		13	21	33			29				
SSSCS	21	53	AT	23	3	15			22				
SSSSC	20	49	AT	21	5	15			16			T	
SSSSS	219	93	T	6	2	219	T	2	219	T	1	T	✓/✓/✓/✓

* Bonferroni-adjusted $\alpha = .0015625$; exact binominal testing

** stopped when $p \geq .05$

Table A20: Confirmatory standard CFA vs. fCFA vs. KV-CFA

Linear Contrast ANOVA for Outcome Tests

Descriptives: Differences in Outcomes Depending on Configuration									
		<i>n</i>	<i>mean</i>	<i>s.d.</i>	<i>s.e.</i>	95% CI for mean		<i>min</i>	<i>max</i>
						lower bound	upper bound		
Functional Value	CCCCC	32	4.06	1.08	0.19	3.67	4.45	2	6
	CCCCS	7	4.43	1.27	0.48	3.25	5.61	2	6
	CCSCC	11	4.73	0.91	0.27	4.12	5.33	3	6
	CSCCC	14	4.36	0.84	0.23	3.87	4.84	3	6
	SSSSC	20	4.60	1.00	0.22	4.13	5.07	3	6
	SSSSS	219	4.96	0.84	0.06	4.85	5.07	2	6
Price Premium	CCCCC	32	3.25	1.27	0.23	2.79	3.71	1	6
	CCCCS	7	3.57	1.27	0.48	2.39	4.75	2	6
	CCSCC	11	3.55	1.37	0.41	2.63	4.46	1	6
	CSCCC	14	2.93	1.00	0.27	2.35	3.50	1	5
	SSSSC	20	4.15	0.81	0.18	3.77	4.53	3	6
	SSSSS	219	4.45	1.27	0.09	4.28	4.62	1	6
Uniqueness	CCCCC	32	3.63	1.16	0.21	3.21	4.04	1	6
	CCCCS	7	4.29	1.80	0.68	2.62	5.95	1	6
	CCSCC	11	3.91	1.04	0.32	3.21	4.61	3	6
	CSCCC	14	3.93	1.14	0.31	3.27	4.59	2	6
	SSSSC	20	4.15	1.04	0.23	3.66	4.64	3	6
	SSSSS	219	4.51	1.01	0.07	4.37	4.64	2	6
Relationship	CCCCC	32	4.06	1.27	0.22	3.61	4.52	1	6
	CCCCS	7	4.43	1.27	0.48	3.25	5.61	2	6
	CCSCC	11	4.64	0.81	0.24	4.09	5.18	3	6
	CSCCC	14	4.00	0.88	0.23	3.49	4.51	3	5
	SSSSC	20	4.75	0.64	0.14	4.45	5.05	4	6
	SSSSS	219	5.01	0.87	0.06	4.90	5.13	2	6

Table A21: Descriptives for ANOVA: outcomes depending on configuration

Test of Homogeneity of Variances										
	Original types set					Identified types set				
	Levene statistic	<i>df</i>₁	<i>df</i>₂	<i>p</i>	Levene statistic	<i>df</i>₁	<i>df</i>₂	<i>p</i>		
Functional Value	1.74	5	297	.13	1.60	3	272	.19		
Price Premium	1.78	5	297	.12	1.08	3	272	.36		
Uniqueness	1.38	5	297	.23	0.33	3	272	.81		
Relationship	2.20	5	297	.06	2.68	3	272	.05		

Table A22: Levene test of homogeneity of variances for outcome variables

Linear Contrast ANOVA										
	Original types set					Identified types set				
	Contrast value	<i>s.e.</i>	<i>t</i>	<i>df</i>	<i>p</i>	Contrast value	<i>s.e.</i>	<i>t</i>	<i>df</i>	<i>p</i>
Functional Value	1.22	0.37	3.34	297	< .01	0.66	0.13	5.00	272	< .001
Price Premium	2.56	0.51	5.03	297	<.001	1.21	0.19	6.38	272	< .001
Uniqueness	1.22	0.43	2.83	297	< .01	0.73	0.16	4.74	272	< .001
Relationship	1.68	0.41	4.13	38.93	< .001	0.82	0.15	5.41	71.95	< .001

Table A23: Results of ANOVA with linear contrasts

Validation and Description of Types and Antitypes

$$\text{Cohen's } d: d = \frac{\bar{x}_1 - \bar{x}_2}{s} \text{ with } s = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}} \quad (\text{Aberson 2010; Cohen 1977})$$

Item scale (item form): **uni** = univariate (1-6 agreement), **bi** = bivariate (1-6 agreement to left or right pole). Bivariate for outcome variables: from 1= clearly inferior, 6 = clearly superior to the competition

Type Configuration CCCCC – Components Seller ($n_1 = 32$) vs. the Residual Sample ($n_2 = 495$)

	Item Form	Lev.	F	p	t	df	p	mean CCCCC	mean Rest	Cohen's d
Our customers' needs are mainly met by standard components. - Our customer' needs require customized solutions.	bi	1.70	.193		-6.26	525	< .001	2.69	4.47	1.14
The typical customer expects us to supply the fitting puzzle piece. - The typical customer expects us to solve the whole puzzle.	bi	1.39	.240		-4.50	525	< .001	3.03	4.34	0.82
We include the future development of the customer's needs into the offering.	uni	0.01	.934		-5.94	525	< .001	3.13	4.60	1.08
Sometimes we know even better than the customer himself what he really needs.	uni	1.29	.258		-3.82	525	< .001	3.50	4.43	0.07
Our customers' satisfaction mainly depends on the quality of specific products and services. - Our customers' satisfaction mainly depends on the interplay of our products and services.	bi	11.65	.001		-5.33	39.70	< .001	2.88	4.09	0.71
What sets us apart from other providers is the quality of individual products and services. - What sets us apart from other providers is the way how our products and services work together as a whole.	bi	6.00	.015		-3.75	38.03	.001	3.06	3.98	0.55
We achieve a price premium with the customer for the integration of single products and services into a solution.	uni	0.87	.352		-2.81	525	.005	3.25	3.96	0.51
What we sell to the customer has - as a whole - a higher functional benefit than the sum of its parts.	uni	1.53	.216		-4.62	525	< .001	3.25	4.38	0.84
The quality of the implementation depends primarily on the customer. In principle, he should easily be able to use the offering effectively and efficiently. - The quality of the implementation depends primarily on us. Only with our help, the customer will be able to use the offering effectively and efficiently	bi	4.80	.029		-3.92	36.52	< .001	3.03	4.04	0.63
We respond promptly to problems (e.g., failure, malfunction, "service failure", ...) of our offerings as they occur. - We try to proactively prevent problems of our offerings (e.g., using remote monitoring).	bi	20.99	.000		-4.49	41.10	< .001	2.50	3.47	0.56
Outcome: Product quality	bi	2.09	.149		-3.32	525	< .001	4.03	4.65	0.61
Outcome: Service quality	bi	3.75	.053		-3.35	33.38	.002	4.00	4.78	0.77
Outcome: Uniqueness	bi	0.02	.899		-3.21	525	.001	3.63	4.30	0.59
Outcome: Functional value	bi	0.65	.420		-3.91	525	< .001	4.06	4.74	0.71
Outcome: Customer relationship, in which it is embedded	bi	3.30	.070		-3.15	33.34	.003	4.06	4.78	0.73

Table A24: Description of the Components Seller configuration

Type Configuration SSSSS – Solution Provider ($n_1 = 219$) vs. the Residual Sample ($n_2 = 308$)

	Item Form	Lev. F	p	t	df	p	mean SSSS	mean Rest	Cohen's d
Share of services in the offering in percent	uni ^a	8.87	.003	3.07	500.82	.002	7	6.15	0.27
Our customers' needs are mainly met by standard components. - Our customer' needs require customized solutions.	bi	75.81	.000	8.47	524.97	<.001	5	3.91	0.71
The typical customer expects us to supply the fitting puzzle piece. - The typical customer expects us to solve the whole puzzle.	bi	33.47	.000	8.72	518.33	<.001	4.93	3.79	0.74
We include the future development of the customer's needs into the offering.	uni	57.51	.000	8.08	525	<.001	5.03	4.13	0.68
Sometimes we know even better than the customer himself what he really needs.	uni	9.94	.002	6.00	508.90	<.001	4.77	4.09	0.52
Our customers' satisfaction mainly depends on the quality of specific products and services. - Our customers' satisfaction mainly depends on the interplay of our products and services.	bi	21.54	.000	8.54	503.20	<.001	4.72	3.52	0.74
What sets us apart from other providers is the quality of individual products and services. - What sets us apart from other providers is the way how our products and services work together as a whole.	bi	14.42	.000	8.41	497.98	<.001	4.61	3.44	0.73
We achieve a price premium with the customer for the integration of single products and services into a solution.	uni	2.08	.149	7.91	525	<.001	4.45	3.53	0.70
What we sell to the customer has - as a whole - a higher functional benefit than the sum of its parts.	uni	14.59	.000	9.22	512.74	<.001	4.9	3.89	0.79
The quality of the implementation depends primarily on the customer. In principle, he should easily be able to use the offering effectively and efficiently. - The quality of the implementation depends primarily on us. Only with our help, the customer will be able to use the offering effectively and efficiently	bi	37.85	.000	9.81	519.88	<.001	4.71	3.46	0.83
We respond promptly to problems (e.g., failure, malfunction, "service failure", ...) of our offerings as they occur. - We try to proactively prevent problems of our offerings (e.g., using remote monitoring).	bi	0.05	.829	5.01	525	<.001	3.85	3.10	0.44
We inform customers proactively about new products and services in the context of the offering.	uni	2.35	.126	5.57	525	<.001	4.44	3.75	0.49
We <i>proactively</i> seek feedback on the offering of our customers.	uni	4.64	.032	6.65	492.20	<.001	4.56	3.74	0.58
Outcome: Product quality	uni	12.94	.000	5.43	515.69	<.001	4.89	4.42	0.46
Outcome: Service quality	bi	40.04	.000	5.49	524.28	<.001	5.01	4.54	0.46
Outcome: Uniqueness	bi	4.59	.033	4.35	515.11	<.001	4.51	4.08	0.37
Outcome: Price/performance ratio	bi	13.46	.000	3.05	511.71	.002	4.75	4.51	0.26
Outcome: Functional value	bi	22.11	.000	5.49	510.65	<.001	4.96	4.52	0.47
Outcome: Customer relationship, in which it is embedded	bi	18.75	.000	5.67	511.89	<.001	5.01	4.54	0.49

^a 1 – 11 point scale (0-100 %)

Table A25: Description of the Solution Provider configuration

Solution Providers also have significantly more often a distribution structure based on direct sales ($\chi^2 = 6.45$; $df = 1$; $p < .05$) and collect significantly more often remote

data than firms in other configurations ($\chi^2 = 4.395$; $df = 1$; $p < .05$).

Type Configuration CSCCC – Mass Customizer ($n_1 = 14$) vs. the Residual Sample ($n_2 = 513$)									
	Item Form	Lev. F	p	t	df	p	mean CSCCC	mean Rest	Cohen's d
The typical customer expects us to supply the fitting puzzle piece. - The typical customer expects us to solve the whole puzzle.	uni	1.04	.307	-1.95	513	.051	3.43	4.29	0.53
Our customers' satisfaction mainly depends on the quality of specific products and services. - Our customers' satisfaction mainly depends on the interplay of our products and services.	uni	2.22	.137	-3.84	513	<.001	2.29	4.06	1.04
What sets us apart from other providers is the quality of individual products and services. - What sets us apart from other providers is the way how our products and services work together as a whole.	uni	0.21	.647	-2.89	513	.004	2.64	3.96	0.78
We achieve a price premium with the customer for the integration of single products and services into a solution.	uni	4.04	.045	-3.70	14.42	.002	2.93	3.94	0.73
What we sell to the customer has – as a whole – a higher functional benefit than the sum of its parts.	uni	0.13	.714	-2.46	513	.014	3.43	4.34	0.67
The quality of the implementation depends primarily on the customer. In principle, he should easily be able to use the offering effectively and efficiently. - The quality of the implementation depends primarily on us. Only with our help, the customer will be able to use the offering effectively and efficiently	uni	0.22	.642	-3.34	513	.001	2.57	4.02	0.91
We inform customers proactively about new products and services in the context of the offering.	uni	0.30	.586	-2.75	513	.006	3.00	4.06	0.74
We <i>proactively</i> seek feedback on the offering of our customers.	uni	0.00	.995	-3.04	13.37	.009	2.93	4.12	0.82
Outcome: Customer relationship, in which it is embedded	uni	0.02	.622	-2.83	513	.005	4.00	4.76	0.77

Table A26: Description of the Mass Customizer configuration (vs. all other configurations)

Type Configuration CSCCC – Mass Customizer ($n_1 = 14$) vs. Component Seller ($n_2 = 32$)									
	Item Form	Lev. F	p	t	df	p	mean CSCCC	mean CCCCC	Cohen's d
Our customers' needs are mainly met by standard components. - Our customer' needs require customized solutions.	bi	0.01	.945	2.52	44	.016	3.86	2.69	0.82
We include the future development of the customer's needs into the offering.	uni	0.06	.802	2.59	44	.013	4.29	3.13	0.84

Table A27: Description of the Mass Customizer configuration (vs. Component Seller)

Type Configuration CCSCC – Resources Integrator ($n_1 = 11$) vs. the Residual Sample ($n_2 = 516$)

	Item Form	Lev.	F	p	t	df	p	mean ccsc	mean Rest	Cohen's d
Share of services in the offering in percent	uni ^a	1.31	.253		-2.34	525	.020	4.27	6.55	0.71
Our customers' needs are mainly met by standard components. - Our customer' needs require customized solutions.	bi	1.73	.189		-3.62	525	< .001	2.64	4.40	1.10
What sets us apart from other providers is the quality of individual products and services. - What sets us apart from other providers is the way how our products and services work together as a whole	bi	0.67	.414		-2.02	525	.044	2.91	3.95	0.62
We <i>proactively</i> seek feedback on the offering of our customers.	uni	0.54	.463		-2.70	525	.007	2.91	4.11	0.82

^a 1 – 11 point scale (0-100 percent)

Table A28: Description of the Resources Integrator configuration (vs. all other configurations)

Type Configuration CCSCC – Resources Integrator ($n_1 = 11$) vs. Component Seller ($n_2 = 32$)

	Item Form	Lev.	F	p	t	df	p	mean ccsc	mean ccccc	Cohen's d
The typical customer expects us to supply the fitting puzzle piece. – The typical customer expects us to solve the whole puzzle.	bi	0.13	.721		2.61	41	.013	4.36	3.03	0.92

Table A29: Description of the Resources Integrator configuration (vs. Component Seller)

Type Configuration CCSCC – Resources Integrator ($n_1 = 11$) vs. Mass Customizer ($n_2 = 14$)

	Item Form	Lev.	F	p	t	df	p	mean ccsc	mean csc	Cohen's d
Our customers' needs are mainly met by standard components. - Our customers' needs require customized solutions.	bi	0.12	.731		-2.18	23	.039	2.64	3.86	0.90

Table A30: Description of the Resources Integrator configuration (vs. Mass Customizer)

Antitypes

Antitype Configuration SSSSC – Systems Seller ($n_1 = 20$) vs. the Residual Sample ($n_2 = 507$)

	Item Form	Lev.	F	p	t	df	p	mean SSSSC	mean Rest	Cohen's d
Our customers' satisfaction mainly depends on the quality of specific products and services. - Our customers' satisfaction mainly depends on the interplay of our products and services.	bi	7.20	.008	2.60	22.44	.016	4.70	3.99	0.41	

Table A31: Description of the Systems Seller configuration (vs. all other configurations)

Antitype Configuration SSSSC – Systems Seller ($n_1 = 20$) vs. Solution Provider ($n_2 = 219$)

	Item Form	Lev.	F	p	t	df	p	mean SSSSC	mean SSSSS	Cohen's d
Sometimes we know even better than the customer himself what he really needs.	uni	1.48	.224	-2.21	237	.028	4.15	4.77	0.40	
We inform customers <i>proactively</i> about new products and services in the context of the offering.	uni	0.03	.861	-2.68	237	.008	3.60	4.44	0.63	
We <i>proactively</i> seek feedback on the offering of our customers.	uni	0.34	.563	-2.58	237	.010	3.75	4.56	0.60	
Outcome: Product quality	bi	0.67	.413	-2.63	237	.009	4.35	4.89	0.62	
Outcome: Service quality	bi	7.45	.007	-2.42	20.71	.025	4.35	5.00	0.76	

Table A32: Description of the Systems Seller configuration (vs. Solution Provider)

Antitype Configuration SSSCS – „Pick-up“ Solution Seller ($n_1 = 21$) vs. the Residual Sample ($n_2 = 506$)

	Item Form	Lev.	F	p	t	df	p	mean SSSCS	mean Rest	Cohen's d
We achieve a price premium with the customer for the integration of single products and services into a solution.	uni	0.18	.671	-2.45	525	.015	3.19	3.94	0.54	
What we sell to the customer has – as a whole – a higher functional benefit than the sum of its parts.	uni	0.04	.814	-2.05	525	.041	3.71	4.34	0.46	
Outcome: Price	bi	1.637	.201	-2.36	525	.019	3.43	4.02	0.53	

Table A33: Description of the “Pick-up” Solution Seller configuration (vs. all other configurations)

Antitype Configuration SSSCS – „Pick-up“ Solution Seller ($n_1 = 20$) vs. Solution Provider ($n_2 = 219$)

	Item Form	Lev.	F	p	t	df	p	mean SSSCS	mean SSSSS	Cohen's d
Our customers' satisfaction mainly depends on the quality of specific products and services. - Our customers' satisfaction mainly depends on the interplay of our products and services	bi	2.78	.097	-2.06	22.58	.051 ^a	3.86	4.72	0.56	
What sets us apart from other providers is the quality of individual products and services. - What sets us apart from other providers is the way how our products and services work together as a whole	bi	3.15	.077	-2.47	22.80	.021	3.62	4.44	0.65	
We achieve a price premium with the customer for the integration of single products and services into a solution.	uni	0.85	.357	-4.32	238	<.001	3.19	4.45	0.99	
What we sell to the customer has – as a whole – a higher functional benefit than the sum of its parts.	uni	3.89	.050	-3.81	22.65	.001	3.71	4.90	1.03	
The quality of the implementation depends primarily on the <i>customer</i> . In principle, he should easily be able to use the offering effectively and efficiently. – The quality of the implementation depends primarily on <i>us</i> . Only with our help, the customer will be able to use the offering effectively and efficiently	bi	4.82	.029	-2.04	22.36	.053 ^a	3.95	4.71	0.58	
Outcome: Product quality	bi	1.23	.269	-2.25	238	.026	4.43	4.89	0.52	
Outcome: Service quality	bi	5.37	.021	-2.32	21.82	.030	4.38	5.00	0.72	
Outcome: Uniqueness	bi	1.45	.230	-2.36	238	.019	3.95	4.51	0.55	
Outcome: Price	bi	1.56	.213	-2.58	238	.010	3.43	4.09	0.59	
Outcome: Price/performance ratio	bi	< 0.01	.996	-2.67	238	.008	4.24	4.75	0.60	

^a These differences are marginally insignificant. There are issues with heterogeneous variances.

Table A34: Description of the “Pick-up” Solution Seller configuration (vs. Solution Provider)

Antitype Configuration Block SCSXX ($n_1 = 17$) vs. the Residual Sample ($n_2 = 510$)

	Item Form	Lev. <i>F</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i>	mean SCSXX	mean Rest	Cohen's <i>d</i>
We try to standardize our offering as much as possible.	uni	1.21	.272	2.68	525	.007	4.65	3.70	0.67
Even our standard products and services meet the expectations of our customers.	uni	3.86	.050	2.26	18.72	.036	4.29	3.81	0.36

Table A35: Description of the SCSXX antitype configuration block (vs. all other configurations)

Antitype Configuration Block SCSXX ($n_1 = 17$) vs. Solution Providers ($n_2 = 219$)

	Item Form	Lev. <i>F</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i>	mean SCSXX	mean SSSSS	Cohen's <i>d</i>
Our customers' needs are mainly met by standard components. – Our customers' needs require customized solutions.	bi	2.61	.108	-2.99	234	.003 ^a	4.06	5.00	0.76
We try to standardize our offering as much as possible.	uni	0.93	.335	2.49	234	.014	4.65	3.76	0.63
We make money only with standardized offerings.	uni	< 0.001	.999	-1.93	234	.054	3.65	2.94	0.49
Our customers' satisfaction mainly depends on the quality of specific products and services. – Our customers' satisfaction mainly depends on the interplay of our products and services	bi	< 0.001	.995	-2.06	234	.041	3.71	4.72	0.52
Outcome: Relationship quality	bi	1.07	.302	-1.94	234	0.053	4.59	5.01	0.48

^aThe difference is also significant (.017) if heterogeneity of variances is assumed.

Table A36: Description of the SCSXX antitype configuration block (vs. Solution Provider)

Antitype Configurations CSSXS ($n_1 = 22$) vs. the Residual Sample ($n_2 = 505$)

	Item Form	Lev. F	p	t	df	p	mean CSSXS	mean Rest	Cohen's d
Our customers' needs are mainly met by standard components. – Our customers' needs require customized solutions.	bi	0.20	0.65	-2.98	525	.003	3.36	4.41	0.65
The typical customer expects us to supply the fitting puzzle piece. – The typical customer expects us to solve the whole puzzle.	bi	1.23	0.27	-1.99	525	.047	3.59	4.29	0.43
We include the future development of the customer's needs into the offering.	uni	2.30	.130	-2.21	525	.028	3.86	4.53	0.48

Table A37: Description of the CSSXS antitypes (vs. all other configurations)

Antitype Configurations CSSXS ($n_1 = 22$) vs. CSSXC „Inconspicuous“ Configurations ($n_2 = 22$)

	Item Form	Lev. F	p	t	df	p	mean CSSXS	mean CSSXC	Cohen's d
The quality of the implementation depends primarily on the <i>customer</i> . In principle, he should easily be able to use the offering effectively and efficiently. – The quality of the implementation depends primarily on <i>us</i> . Only with our help, the customer will be able to use the offering effectively and efficiently	bi	1.52	.224	3.45	42	.001	4.45	2.86	1.05
We respond promptly to problems (e.g., failure, malfunction, "service failure", ...) of our offerings as they occur. – We try to proactively prevent problems of our offerings (e.g., using remote monitoring).	bi	0.18	.678	2.61	42	.013	3.86	2.55	0.79
Outcome: Functional value	bi	5.19	.028	2.61	34.25	.012	4.86	4.09	0.48
Outcome: Relationship quality	bi	8.20	.007	2.10	31.86	.044	4.82	4.18	0.64

Table A38: Description of the CSSXS antitypes (vs. the "inconspicuous" CSSXC configurations)

Antitype Configurations CSSXS ($n_1 = 22$) vs. Solution Providers ($n_2 = 219$)

	Item Form	Lev. F	p	t	df	p	mean cssxs	mean sssss	Cohen's d
Our customers' needs are mainly met by standard components. – Our customers' needs require customized solutions.	bi	4.69	.031	-4.76	23.67	< .001	3.36	5.00	1.31
The typical customer expects us to supply the fitting puzzle piece. – The typical customer expects us to solve the whole puzzle.	bi	0.88	.349	-4.47	239	< .001	3.59	4.93	1.01
We include the future development of the customer's needs into the offering.	uni	15.27	.000	-3.27	22.79	.003	3.86	5.03	1.04
Sometimes we know even better than the customer himself what he really needs.	uni	4.90	.028	-2.77	23.75	.011	3.86	4.77	0.75
Our customers' satisfaction mainly depends on the quality of specific products and services. – Our customers' satisfaction mainly depends on the interplay of our products and services.	bi	0.12	.731	-2.28	239	.023	3.95	4.72	0.52
What sets us apart from other providers is the quality of individual products and services. – What sets us apart from other providers is the way how our products and services work together as a whole.	bi	1.43	.233	-2.25	239	.025	3.86	4.61	0.51
We achieve a price premium with the customer for the integration of single products and services into a solution.	uni	0.11	.736	-3.49	239	.001	3.45	4.45	0.78
What we sell to the customer has – as a whole – a higher functional benefit than the sum of its parts.	uni	0.29	.588	-3.22	239	.001	4.09	4.90	0.72
Outcome: Service quality	bi	1.28	.258	-2.72	239	.007	4.50	5.00	0.60
Outcome: Price / performance ratio	bi	0.07	.785	-2.54	239	.012	4.27	4.75	0.57

Table A39: Description of the CSSXS antitype configurations (vs. Solution Provider)

Non-outstanding Configuration SSSCC ($n_1 = 31$) vs. the Residual Sample ($n_2 = 496$)

	Item Form	Lev.	F	p	t	df	p	mean SSSCC	mean Rest	Cohen's d
Our customers' needs are mainly met by standard components. – Our customers' needs require customized solutions.	bi	6.53	.011	2.09	35.39	.044	4.87	4.33	0.33	
We try to standardize our offering as much as possible.	uni	0.06	.802	-2.96	525	.003	3.00	3.78	0.55	
We make money only with standardized offerings.	uni	1.49	.223	-2.62	525	.009	2.39	3.10	0.48	
Even our standard products and services meet the expectations of our customers.	uni	0.05	.825	-2.91	525	.004	3.16	3.87	0.54	
The quality of the implementation depends primarily on the customer. In principle, he should easily be able to use the offering effectively and efficiently. – The quality of the implementation depends primarily on us. Only with our help, the customer will be able to use the offering effectively and efficiently	bi	0.01	.947	-5.33	525	< .001	2.52	4.07	0.98	
We respond promptly to problems (e.g., failure, malfunction, "service failure", ...) of our offerings as they occur. – We try to proactively prevent problems of our offerings (e.g., using remote monitoring).	bi	0.09	.765	-2.44	525	.015	2.68	3.45	0.45	
We inform customers <i>proactively</i> about new products and services in the context of the offering.	uni	1.25	.264	-3.27	525	.001	3.23	4.09	0.60	
We <i>proactively</i> seek feedback on the offering of our customers.	uni	1.25	.264	-3.27	525	.001	3.42	4.13	0.49	

Table A40: Description of the non-outstanding SSSCC configuration (vs. all other configurations)

Non-outstanding Configuration SSSCC ($n_1 = 31$) vs. Solution Provider ($n_2 = 219$)

	Item Form	Lev. F	p	t	df	p	mean ssscc	mean sssss	Cohen's d
We include the future development of the customer's needs into the offering.	uni	18.53	.000	-2.46	34.04	.019	4.32	5.03	0.63
We try to standardize our offering as much as possible.	uni	0.05	.830	-2.75	248	.006	3.00	3.76	0.53
We make money only with standardized offerings.	uni	1.35	.246	-1.99	248	.048	2.39	2.94	0.38
Even our standard products and services meet the expectations of our customers.	uni	0.20	.655	-2.38	248	.018	3.16	3.76	0.46
Our customers' satisfaction mainly depends on the quality of specific products and services. - Our customers' satisfaction mainly depends on the interplay of our products and services.	bi	7.96	.005	-2.57	35.543	.014	3.81	4.72	0.59
What sets us apart from other providers is the quality of individual products and services. - What sets us apart from other providers is the way how our products and services work together as a whole.	bi	7.76	.006	-2.92	35.586	.006	3.58	4.61	0.67
We achieve a price premium with the customer for the integration of single products and services into a solution.	uni	0.00	.970	-2.35	248	.020	3.87	4.45	0.45
The quality of the implementation depends primarily on the customer. In principle, he should easily be able to use the offering effectively and efficiently. – The quality of the implementation depends primarily on us. Only with our help, the customer will be able to use the offering effectively and efficiently	bi	4.44	.036	-7.65	36.266	< .001	2.52	4.71	1.67
We respond promptly to problems (e.g., failure, malfunction, "service failure", ...) of our offerings as they occur. – We try to proactively prevent problems of our offerings (e.g., using remote monitoring).	bi	0.03	.857	-3.56	248	< .001	2.68	3.84	0.68
We inform customers <i>proactively</i> about new products and services in the context of the offering.	uni	2.24	.135	-4.63	248	< .001	3.23	4.44	0.89
We <i>proactively</i> seek feedback on the offering of our customers.	uni	1.43	.233	-4.38	248	< .001	3.42	4.56	0.84

Table A41: Description of the non-outstanding SSSCC configuration (vs. Solution Provider)

Further Explorative Analyses

Small and Medium Sized Enterprises ($n_1 = 353$) vs. Large Enterprises ($n_2 = 174$)

	Item Form	Lev. <i>F</i>	<i>p</i>	<i>t</i>	<i>df</i>	<i>p</i>	mean SME	mean LE	Cohen's <i>d</i>
Service Share	uni	2.29	.131	3.46	525	.001	6.84	5.82	0.32
Even our standard products and services meet the expectations of our customers.	uni	0.40	.525	-2.07	525	.039	3.74	3.99	0.19
Outcome: Product Quality	bi	4.34	.038	-3.10	369.33	.002	4.52	4.80	0.27
Outcome: Uniqueness	bi	0.69	.405	-2.57	525	.010	4.17	4.44	0.23
Outcome: Price	bi	1.94	.165	2.56	525	.011	4.08	3.82	0.23
Outcome: Functional Value	bi	8.64	.003	-2.01	378.74	.045	4.64	4.82	0.19

Table A42: Small and medium sized vs. large enterprises

Appendix Part Ib for Methodological Addendum and Study Ib

Latent Profile Analysis: Categorical vs. Continuous Variables

If originally continuously measured indicator variables are dichotomized before conducting a LCA or CFA¹³⁵, this formally goes along with a reduction of the level of measurement, thus a loss of information. More recent developments in LCA also allow for continuous indicator variables, which is also referred to as *latent profile analysis* (LPA; Collins and Lanza 2010; Vermunt and Magidson 2002). Similar to “standard” (categorical) LCA, LPA also belongs to the *finite mixture approaches*, presupposing the existence of mixed distributions caused by an unknown but countable number of subpopulations. In general, the variables are assumed to distribute normally, whereby each class¹³⁶ is allowed to have its own distribution and parameters that need to be estimated (mean, variances, covariances with other classes, etc.). Since the number of parameters increases substantially with each class added, the models run the risk of not being identified. Therefore, LPA models are usually constrained (Vermunt and Magidson 2002): all within-class covariances are assumed to be zero, as well as the covariances among the indicators (Muthén and Muthén 2012).

In the following, we compare several LPA solutions with varying number of classes with their LCA counterparts in order to assess the amount of information that has been lost due to dichotomization. Since number and nature of the estimated parameters are different (χ^2 -based L^2 parameters are not available), LTA and LPA models cannot be compared by fit indices and information criteria. Instead, the plots are contrasted and interpreted visually, whereby the y-axis for the LPA models

¹³⁵ Alternatively, rating scales can also be treated as ordered polytomous data (ordinal level of measurement). However, this requires (a) very large sample sizes and (b) that every scale point is checked often enough. This is the most likely way to prevent sparse frequency tables since every combination of any ordinal level of any variable is regarded as a response pattern. The ordinal character of the classes must be maintained by means of parameter constraints during analysis (Croon 2002).

¹³⁶ The term *class* will be retained even though the name *LPA* suggests the use of the word *profile*. **Caveat:** the latent variable (= class) in LPA is also categorical, only the indicators are continuous!

indicates estimated means conditional on membership in that class. All values are obtained from Mplus.

Model Summaries for Latent Profile Analysis, 4-10 Classes						
Classes	# Par.	LL	-2LL-Diff ^a	BIC(LL)	AIC(LL)	Entropy
4	28	-4350.56	158.47 ***	8876.59	8757.11	.89
5	34	-4314.95	71.21 ***	8842.99	8697.90	.87
6	40	-4273.61	82.69 ***	8797.91	8627.22	.88
7	46	-4240.87	65.48 ***	8770.03	8573.74	.87
8	52	-4198.20	85.35 ***	8722.29	8500.39	.88
9	58	-4167.19	62.02 ***	8697.87	8450.37	.89
10	64	-4137.67	59.04 ***	8676.43	8403.33	.89

^a bootstrapped LRT *c* vs. *c-1* classes (= *H*₀)

Table A43: Summary table for Latent Profile Analysis (situation today)

Each class added improves model fit significantly, likewise LL, AIC and BIC values decrease. Although each model converges successfully, no decision can be made in favor of a number of classes.

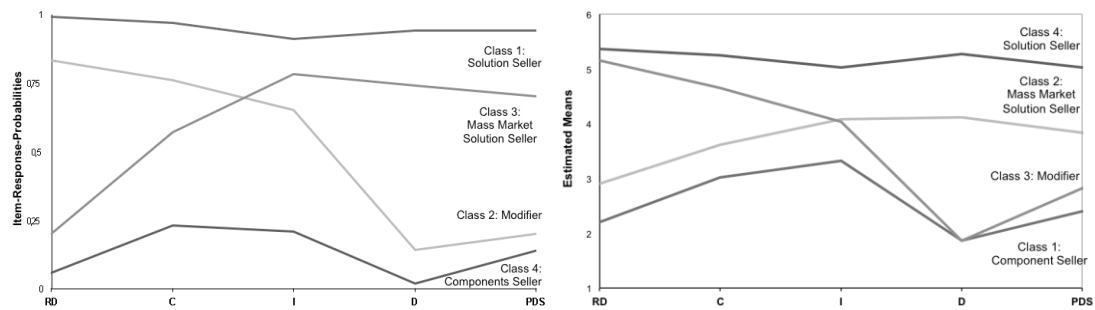


Figure A3: IR probabilities for LCA (left) vs. estimated means for LPA; 4-class solution

The profiles for LCA and LPA with four classes are of remarkably similar shape. In both plots, the largest class comprises about the half of the sample and has constantly high mean values or solution-style IR probabilities across the five process stages (= Solution Provider). The second largest class – 22 respectively 18% – has low means or IR probabilities throughout all SPCM steps (Component Seller). Also the Modifier and Mass Market Solution Seller can be identified in both plots.

The LPA plot looks condensed compared to the LCA plot. This is largely due to less extreme estimated means for the Solution Provider and the Component Seller. The IR probabilities for LCA do not contain this information.

The profiles for a 5-class LPA show a tendency that increases with each class added: The new classes have a similar shape as Solution Provider but lower estimated means and smaller class sizes. The smallest cluster in the nine-class solution has only four members.

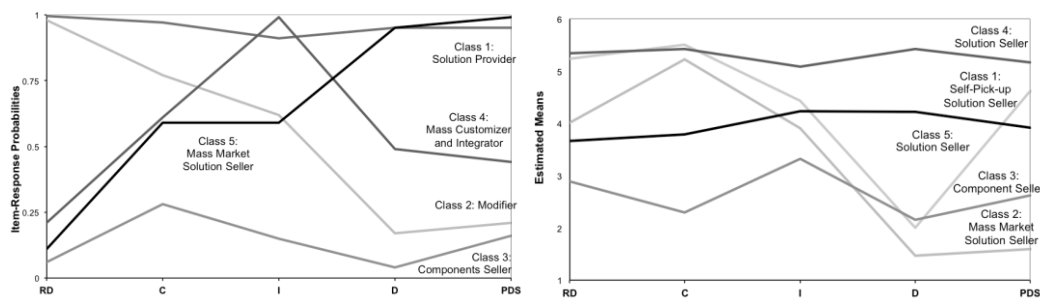


Figure A4: IR probabilities for LCA (left) vs. estimated means for LPA; 5-class solution

Conclusion: The loss of information due to dichotomization is negligible for solutions with a low number of classes; the basic statement remains the same.

Latent Transition Analysis

Conditional Probabilities and Latent Status Prevalences for 4-Class LTM (Model-based)

Label	Latent class			
	1	2	3	4
	Solution Provider SP	Modifier MDF	Components Seller CS	Mass Market Solution Seller MMSS
Probability of membership				
5 years ago	.39	.13	.30	.17
Today	.43	.13	.29	.16
In 5 years	.42	.12	.31	.14
Conditional probability of a solution-style answer (IR probability)				
Requirements Definition	1.00	.68	.58	.27
Customization	1.00	1.00	.71	.08
Integration	.99	.59	.66	.35
Deployment	.99	.02	.64	.18
Post-Deployment Support	.91	.00	.88	.10

Table A44: LTM parameter estimates

Mplus Syntax for Mover-Stayer Latent Transition Analysis

1st order effect only, full measurement invariance, heterogeneous transition probabilities

```
variable: names = lfdn vor1-vor5 heute1-heute5 in1-in5;
          idvariable = lfdn;
          usevar = vor1-vor5 heute1-heute5 in1-in5;
          categorical = vor1-vor5 heute1-heute5 in1-in5;
          classes = c(2) c1(4) c2(4) c3(4);
```

```
analysis: type = mixture;
          parameterization = probability;
          starts = 2000 250;
          stiterations = 20;
          processors = 8;
```

```
model: %OVERALL%
       c1 on c;
```

```
model c:
       %c#1% ! mover class
       c2 ON c1;
       c3 ON c2;

       %c#2% ! stayer class, see coding scheme below
       c2#1 ON c1#1@1; ! p11
       c2#1 ON c1#2@0; ! p21
       c2#1 ON c1#3@0; ! p31
       c2#1 ON c1#4@0; ! p41
       c2#2 ON c1#1@0; ! p12
       c2#2 ON c1#2@1; ! p22
       c2#2 ON c1#3@0; ! p32
       c2#2 ON c1#4@0; ! p42
       c2#3 ON c1#1@0; ! p13
       c2#3 ON c1#2@0; ! p23
       c2#3 ON c1#3@1; ! p33
       c2#3 ON c1#4@0; ! p43 px4 sums to 1
```

c3#1 ON c2#1@1; ! p11
 c3#1 ON c2#2@0; ! p21
 c3#1 ON c2#3@0; ! p31
 c3#1 ON c2#4@0; ! p41
 c3#2 ON c2#1@0; ! p12
 c3#2 ON c2#2@1; ! p22
 c3#2 ON c2#3@0; ! p32
 c3#2 ON c2#4@0; ! p42
 c3#3 ON c2#1@0; ! p13
 c3#3 ON c2#2@0; ! p23
 c3#3 ON c2#3@1; ! p33
 c3#3 ON c2#4@0; ! p43

model c1: ! = LCA measurement model 5 years ago
 %c1#1%
 [vor1\$1-vor5\$1] (1-5); ! constraining for meas. invariance

 %c1#2%
 [vor1\$1-vor5\$1] (6-10);

 %c1#3%
 [vor1\$1-vor5\$1] (11-15);

 %c1#4%
 [vor1\$1-vor5\$1] (16-20);

model c2: ! = LCA measurement model today
 %c2#1%
 [heute1\$1-heute5\$1] (1-5);

 %c2#2%
 [heute1\$1-heute5\$1] (6-10);

 %c2#3%
 [heute1\$1-heute5\$1] (11-15);

 %c2#4%
 [heute1\$1-heute5\$1] (16-20);

model c3: ! = LCA measurement model in 5 years
 %c3#1%
 [in1\$1-in5\$1] (1-5);

 %c3#2%
 [in1\$1-in5\$1] (6-10);

 %c3#3%
 [in1\$1-in5\$1] (11-15);

 %c3#4%
 [in1\$1-in5\$1] (16-20);

Mplus Coding Scheme for Mover-Stayer LTA IR Prob. Constraints, Probability Parameterization

Variables		C ₂ (C ₃)			
	Classes	1	2	3	4
C ₁ (C ₂)	1	p ₁₁ = 1	p ₁₂	p ₁₃	0
	2	p ₂₁	p ₂₂ = 1	p ₂₃	0
	3	p ₃₁	p ₃₂	p ₃₃ = 1	0
	4	p ₄₁	p ₄₂	p ₄₃	0

Table A45: Coding scheme for MS-LTA

Transition Profiles (Based on LCA Classifications) in Descending Order

5 years ago	Today	In 5 years	Count	Percentage
SP	SP	SP	215	40.8
MDF	MDF	MDF	55	10.4
CS	CS	CS	32	6.1
MDF	SP	SP	24	4.6
MMSS	MMSS	MMSS	23	4.4
SP	MMSS	MMSS	15	2.8
CS	SP	SP	14	2.7
MDF	MDF	CS	13	2.5
MDF	MMSS	MMSS	13	2.5
MDF	CS	CS	11	2.1
SP	SP	MMSS	10	1.9
MMSS	SP	MMSS	9	1.7
MMSS	SP	SP	8	1.5
SP	MDF	SP	7	1.3
MDF	SP	MMSS	5	0.9
MDF	MDF	SP	5	0.9
MDF	MDF	MMSS	5	0.9
MMSS	MDF	MMSS	5	0.9
CS	MMSS	MMSS	4	0.8
SP	CS	CS	3	0.6
MDF	CS	SP	3	0.6
MDF	CS	MMSS	3	0.6
MDF	MMSS	MDF	3	0.6
CS	MMSS	SP	3	0.6
MMSS	CS	MMSS	3	0.6
SP	MDF	MDF	2	0.4
SP	CS	SP	2	0.4
SP	MMSS	SP	2	0.4
SP	MMSS	MDF	2	0.4
MDF	CS	MDF	2	0.4
CS	SP	MMSS	2	0.4
CS	MDF	MMSS	2	0.4
CS	CS	MMSS	2	0.4
MMSS	SP	CS	2	0.4
MMSS	MDF	CS	2	0.4
SP	SP	MDF	1	0.2
SP	SP	CS	1	0.2
SP	MDF	MMSS	1	0.2
SP	CS	MDF	1	0.2
SP	MMSS	CS	1	0.2
MDF	SP	MDF	1	0.2
MDF	SP	CS	1	0.2
MDF	MMSS	SP	1	0.2
CS	MDF	SP	1	0.2
CS	MDF	CS	1	0.2
CS	CS	SP	1	0.2
CS	CS	MDF	1	0.2
CS	MMSS	CS	1	0.2
MMSS	MDF	SP	1	0.2
MMSS	MMSS	SP	1	0.2
MMSS	MMSS	CS	1	0.2
SP	MDF	CS	0	0
SP	CS	MMSS	0	0
MDF	MMSS	CS	0	0
CS	SP	MDF	0	0
CS	SP	CS	0	0
CS	MDF	MDF	0	0
CS	MMSS	MDF	0	0
MMSS	SP	MDF	0	0
MMSS	MDF	MDF	0	0
MMSS	CS	SP	0	0
MMSS	CS	MDF	0	0
MMSS	CS	CS	0	0
MMSS	MMSS	MDF	0	0

Table A46: Transition profiles (based on LCA classifications)

Outcomes: Stayer ($n_1 = 329$) vs. Movers ($n_2 = 198$), based on LCA Classifications

	Item Form	Lev. F	p	t	df	p	mean Stayers	mean Movers	Cohen's d
We achieve a price premium with the customer for the integration of single products and services into a solution.	uni	0.41	.524	3.40	525	.001	4.07	3.65	0.31
What we sell to the customer has – as a whole – a higher functional benefit than the sum of its parts.	uni	2.37	.125	2.01	525	.045	4.46	4.07	0.29
Outcome: Service quality	bi	7.66	.006	2.86	344.42	.005	4.81	4.61	0.20
Outcome: Uniqueness	bi	0.82	.367	1.95	525	.052 ^a	4.33	4.13	0.17
Outcome: Price/performance ratio	bi	1.10	.295	1.95	525	.051 ^a	4.67	4.51	0.17

Not significant: Product quality, price, functional value, relationship quality

^a Marginally insignificant

Table A47: Differences in outcomes: Stayers vs. movers

Additional Descriptives: Stayer ($n_1 = 329$) vs. Movers ($n_2 = 198$), based on LCA Classifications

	Item Form	Lev. F	p	t	df	p	mean Stayers	mean Movers	Cohen's d
Sometimes we know even better than the customer himself what he really needs.	uni	0.03	.867	2.70	525	.007	4.50	4.17	0.25
We make money only with standardized offerings.	uni	10.27	.001	-2.19	469.49	.029	2.96	3.24	0.19
Even our standard products and services meet the expectations of our customers.	uni	22.10	.000	-2.55	474.25	.011	3.72	4.01	0.22

^a Marginally insignificant

Table A48: Further descriptions: Stayers vs. movers

Movers into Solution Provider Class ($n_1 = 62$) vs. Firms that were not Solution Providers 5 years Ago ($n_2 = 202$)

	Item Form	Lev. F	p	t	df	p	mean Movers	mean Non-SP	Cohen's d
Our customers' needs are mainly met by standard components. - Our customer' needs require customized solutions.	bi	8.69	.003	4.50	117.02	< .001	4.66	3.66	0.60
The typical customer expects us to supply the fitting puzzle piece. - The typical customer expects us to solve the whole puzzle.	bi	0.55	.459	3.24	262	.001	4.37	3.57	0.47
We include the future development of the customer's needs into the offering.	uni	3.46	.064	3.54	262	< .001	4.74	4.00	0.51
Our customers' satisfaction mainly depends on the quality of specific products and services. - Our customers' satisfaction mainly depends on the interplay of our products and services.	bi	0.46	.500	2.62	262	.009	4.10	3.44	0.38
What sets us apart from other providers is the quality of individual products and services. - What sets us apart from other providers is the way how our products and services work together as a whole.	bi	1.18	.279	2.79	262	.006	4.03	3.36	0.40
What we sell to the customer has – as a whole – a higher functional benefit than the sum of its parts.	uni	0.23	.634	2.87	262	.004	4.42	3.83	0.42
The quality of the implementation depends primarily on the customer. In principle, he should easily be able to use the offering effectively and efficiently. - The quality of the implementation depends primarily on us. Only with our help, the customer will be able to use the offering effectively and efficiently	bi	2.96	.086	5.14	117.49	< .001	4.24	3.13	0.69
We respond promptly to problems (eg, failure, malfunction, "service failure", ...) of our offerings as they occur. - We try to proactively prevent problems of our offerings (e.g., using remote monitoring).	bi	0.32	.573	2.43	262	.016	3.58	2.98	0.35
We inform customers <i>proactively</i> about new products and services in the context of the offering.	uni	6.00	.015	2.94	115.83	.004	4.18	3.59	0.40
We <i>proactively</i> seek feedback on the offering of our customers.	uni	0.63	.429	3.29	262	.001	4.29	3.57	0.48
Outcome: Customer Relationships	bi	4.62	.033	3.84	110.87	< .001	4.97	4.40	0.53

Table A49: Differences between movers into the Solution Provider class and non Solution Providers

Additionally, the continuous measurement of requirements definition reveals a significant difference ($mean_{SP-mover} = 3.66$; $mean_{stayer} = 2.97$; $t = -3.17$; $df = 262$; $p < .01$; $Cohen's d = 0.46$).

Movers from Solution Provider Class ($n_1 = 37$) vs. Staying Solution Providers ($n_2 = 202$)

	Item Form	Lev. F	p	t	df	p	mean Movers	mean Stayers	Cohen's d
Our customers' needs are mainly met by standard components. - Our customer' needs require customized solutions.	bi	6.64	.011	-6.10	44.08	< .001	3.49	5.05	1.25
The typical customer expects us to supply the fitting puzzle piece. - The typical customer expects us to solve the whole puzzle.	bi	0.08	.783	-4.12	261	< .001	3.95	4.90	0.73
We include the future development of the customer's needs into the offering.	uni	11.90	.001	-3.81	43.17	< .001	4.00	4.98	0.82
Sometimes we know even better than the customer himself what he really needs.	uni	0.84	.362	-3.81	261	< .001	3.97	4.77	0.68
We make money only with standardized offerings.	uni	15.36	.000	2.11	69.74	.038	3.38	2.97	0.28
Our customers' satisfaction mainly depends on the quality of specific products and services. - Our customers' satisfaction mainly depends on the interplay of our products and services.	bi	7.82	.006	-2.27	60.54	.027	4.00	4.51	0.32
What sets us apart from other providers is the quality of individual products and services. - What sets us apart from other providers is the way how our products and services work together as a whole.	bi	5.82	.017	-2.27	59.94	.027	3.89	4.41	0.33
We achieve a price premium with the customer for the integration of single products and services into a solution.	uni	0.61	.435	-3.97	261	< .001	3.51	4.38	0.70
What we sell to the customer has – as a whole – a higher functional benefit than the sum of its parts.	uni	1.24	.266	-4.59	261	< .001	3.84	4.79	0.82
The quality of the implementation depends primarily on the customer. In principle, he should easily be able to use the offering effectively and efficiently. - The quality of the implementation depends primarily on us. Only with our help, the customer will be able to use the offering effectively and efficiently	bi	< 0.01	.965	-2.21	261	.028	4.14	4.65	0.39
We <i>proactively</i> seek feedback on the offering of our customers.	uni	9.37	.002	-2.64	60.12	.010	4.00	4.50	0.38
Outcome: Service Quality	bi	2.25	.134	-3.26	261	.001	4.43	4.95	0.59
Outcome: Uniqueness	bi	1.00	.319	-2.60	261	.010	4.03	4.50	0.45
Outcome: Price/performance ratio	bi	0.05	.830	-2.13	261	.034	4.43	4.76	0.38
Outcome: Functional value	bi	5.07	.025	-3.61	261	< .001	4.43	4.96	0.64
Outcome: Customer relationship, in which it is embedded	bi	1.50	.222	-2.78	261	.006	4.59	5.00	0.50

Table A50: Differences between movers from the Solution Provider class and stayers

Movers from Solution Provider Class ($n_1 = 37$) vs. Staying Solution Providers ($n_2 = 202$)

	Item Form	Lev. F	p	t	df	p	mean Movers	mean Stayers	Cohen's d
Requirements definition	bi	10.09	.002	-6.91	40.70	< .001	3.73	5.15	1.70
Customization	bi	0.33	.565	-5.92	261	< .001	4.43	5.20	1.06
Integration	bi	0.34	.561	-2.73	261	.007	4.32	4.87	0.49
Deployment	bi	1.97	.161	-5.45	261	.000	4.43	5.18	0.97
Post-deployment support	bi	0.93	.336	-2.94	261	.004	4.30	4.84	0.52

Table A51: SPCM differences between movers from the Solution Provider class and stayers

Appendix Part II for Study II

Additional Survey Items		
Scale / items	Meas.	Origin / comment
Customer satisfaction		
The offerings from the last purchase ... satisfy me very much.	SAT1	Based on ACSI items (Fornell et al. 1996). Number of scale points adapted to match the rest of the survey. Second item re-formulated as unipolar for translation purposes. No weighting scheme (unlike ASCSI)
... fully meet my expectations.	SAT2	
... – in my eyes – are very close to the ideal of a provider.	SAT3	
Price markup and uniqueness scales (single item each)		
In order to obtain a potential additional value of a complete solution... we are willing to pay more / we are rather not willing to pay more (rev.).	PMU	Own formulation, based on ideas by Sawhney (2006).
What distinguishes this provider from others is... the quality of individual products and services / the way, how its products and services interact with each other as a whole.	UNIQ	
Perceived usefulness of the offering		
Products, services (or solutions) ... help us to save time.	USF1	based on Davis, Bagozzi, and Warshaw (1989); Nysveen, Pedersen, and Thorbjørnsen (2005)
... increase our productivity.	USF2	
... are useful for us.	USF3	
Perceived value of the vendor		
In relation to the costs, the benefits that we receive from these providers, bring us a high value.	VAL1	Based on Beutin (2000); Homburg et al. (2005b)
This provider offers us a very high benefit.	VAL2	
The benefits we receive from the business relationship with this provider, is considerably higher than our costs.	VAL3	
Word of mouth		
I express a positive attitude about my provider to other people.	WOM1	Net Promoter Score (NPS; Reichheld 2003), 1-11 point scale
I recommend my provider to anyone who seeks my advice.	WOM2	
How likely is it that you will recommend this provider to a colleague?	WOM3	
Repurchase intention (decision makers only)		
I see this as my first choice provider for the purchase of products and services in the area in-vitro diagnostics.	REP1	Own formulation
When I need other products and services in the field in-vitro diagnostics, I would also buy from this provider	REP2	Own formulation
I will make the next purchases of products and services in the field in-vitro diagnostics again with this provider.	REP3	Eggert and Ulaga (2002)

All items measured using 6-point scales, except WOM3 (NPS)

Table A52: Additional survey items

Item Descriptives						
Scale / items		mean	sd	skew.	kurt.	ITT
Requirements definition	R					
Collects background information	R1	4.27	1.61	-0.72	-0.73	.57
Considers requirements	R2	4.71	1.24	-0.93	0.05	.87
Considers wishes and ideas	R3	4.62	1.22	-0.83	0.10	.83
Asks for specific problems	R4	4.49	1.40	-0.81	-0.21	.80
Considers future needs	R5	4.21	1.54	-0.57	-0.71	.76
Customization	C					
Adapts offering	C1	4.17	1.40	-0.52	-0.58	.37
Pushes standardized offerings *	C2	4.81	1.45	-1.16	0.40	.37
Integration	I					
Performs integration	I1	3.57	1.80	-0.08	-1.42	0.42
Delivers <i>gestalt</i> benefit	I2	4.50	1.50	-0.81	-0.39	0.42
Deployment	D					
Takes measures for effective use	D1	4.90	1.17	-0.86	-0.29	.49
Offering makes more probs than solved *	D2	4.99	1.36	-1.24	0.51	.51
No problems during use	D3	3.34	1.74	0.06	-1.42	.59
Prove of concept	D4	4.19	1.54	-0.51	-0.97	.70
Post-deployment supports	P					
Proactive measures for availability	P1	4.66	1.39	-1.04	0.13	.63
Informs on better effectiveness	P2	3.86	1.54	-0.25	-1.02	.80
Provider asks for how to improve	P3	3.56	1.64	-0.17	-1.20	.81
Provider asks for satisfaction	P4	4.07	1.52	-0.50	-0.84	.73
Employee solution orientation	SOL-O					
Empl. doesn't hesitate to solve problems	SOL-O1	5.04	1.27	-1.49	1.57	.62
Empl. special effort	SOL-O2	5.01	1.26	-1.43	1.48	.81
Empl. consultative selling	SOL-O3	4.59	1.36	-1.10	0.63	.61
Empl. gives advice	SOL-O4	4.61	1.31	-1.04	0.42	.80
Empl. helps us	SOL-O5	4.56	1.33	-0.94	0.11	.80
Empl. considers specific needs	SOL-O6	4.74	1.23	-1.16	1.07	.88
Empl. finds individual solutions	SOL-O7	4.57	1.24	-0.83	0.08	.86
Employee recalcitrance	REC					
Empl. circumvents guidelines	REC1	3.01	1.60	.31	-1.09	.48
Empl. contradicts customer	REC2	4.17	1.35	-.64	-.25	.48

* Reversely formulated item, recoded item scores used for analyses

sd = standard deviation, skew. = skewness; kurt. = kurtosis, ITT = item to total correlation

Table A53: Item descriptives

Item Descriptives (cont.)						
Scale / items		mean	sd	skew.	kurt.	ITT
Satisfaction	SAT					
Overall satisfied	SAT1	4.67	1.10	-0.98	0.56	.88
Meets expectations	SAT2	4.49	1.22	-0.96	0.41	.90
Provider is close to ideal	SAT3	3.96	1.26	-0.75	-0.06	.82
Usefulness	USEFUL					
Offering helps saving time	USEFUL1	4.75	1.32	-1.18	0.71	.88
Offerings increase productivity	USEFUL2	4.85	1.29	-1.28	0.99	.88
Offerings are useful for us	USEFUL3	5.06	1.03	-1.14	0.88	.83
Value	VAL					
Vendor provides more value than costs	VAL1	4.20	1.30	-0.66	-0.14	.78
Vendor provides high benefit	VAL2	4.24	1.23	-0.58	-0.14	.83
Vendor relationship value	VAL3	3.51	1.30	-0.07	-0.72	.62
Word of mouth	WOM					
Positive WOM to colleagues	WOM1	4.61	1.18	-1.05	0.66	.85
Pos. WOM for s.o. seeking advice	WOM2	4.40	1.30	-0.98	0.43	.86
Probability of recommendation (NPS)	WOM3	8.11	2.61	-1.11	0.48	.82
Repurchase	REP					
Repurchase 1 st choice	REP1	4.18	1.17	-0.55	-0.13	.69
Repurchase other offerings	REP2	4.18	1.17	-0.49	-0.29	.68
Repurchase next	REP3	3.95	1.15	-0.04	-0.36	.73
Uniqueness	UNIQ	3.74	1.69	-.15	-1.25	-
Price markup *	PMU	2.89	1.35	.22	-.91	-

* Reversely formulated item, recoded item scores used for analyses

sd = standard deviation, skew. = skewness; kurt. = kurtosis, ITT = item to total correlation

Table A54: Item descriptives (cont.)

Sample Descriptives			
	md	mean	sd
Laboratory's number of employees	14	33.6	51.3
Number of samples per day in lab	500	2000	5965.0
Persons involved in procurement	4	4.9	3.2
Job experience (years)	24	23.5	8.7

Table A55: Sample descriptives – study II

Usage Intensity				
	Less than once a month	Monthly	Weekly	Daily
Users	0%	0%	4%	96%
Decision makers	2%	5%	2%	92%
Total	1%	2%	3%	94%

Differences n.s.

Table A 56: Usage intensity

Gender		
	Female	Male
Users	76%	24%
Decision makers	48%	52%
Total	64%	36%

Differences significant: $\chi^2 = 11.08, df = 1, p. < .01$

Table A57: Respondents' gender

Age					
in years	20-29	30-39	40-49	50-59	> 60
Users	3%	14%	40%	37%	6%
Decision makers	5%	8%	37%	44%	7%
Total	4%	11%	39%	40%	6%

Differences n.s.

Table A58: Respondents' age

Education (highest formal degree)							
	Habilitation	PhD	Univ. deg.	Abitur ^a	Mittl. Reife ^b	Hauptschule ^c	other
Users	3%	12%	15%	23%	37%	1%	9%
Decision makers	19%	21%	10%	26%	23%	0%	2%
Total	10%	16%	13%	24%	31%	1%	

Differences significant: $\chi^2 = 19.14$, $df = 6$, $p < .01$
^a typically 12 or 13 years school attendance, ^b 10 years, ^c 9 years

Table A59: Respondents' education

Manufacturers of the Last Purchase

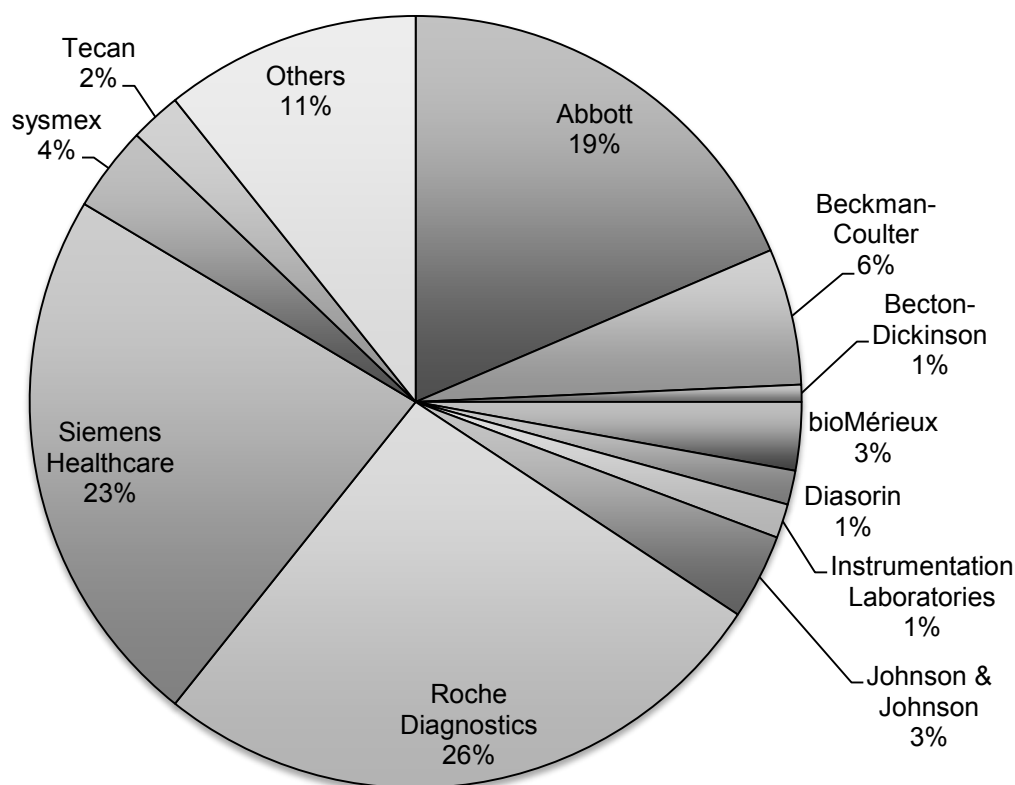


Figure A5: Manufacturers of last purchase

Compared to commercial market size estimates (Feldges 2013; Frost 2010; Tetragon 2009), the “big three” Roche, Siemens and Abbott are over-represented in this sample (2009: Roche 20%, Siemens 12%, Abbott 12%, according to Tetragon (2009)). However, the market is highly dynamic and regularly shaken by large mergers and acquisitions (ibid.).

1st and 2nd Generation Criteria for EFA Solutions and SEM Fit

Dimension	Criterion (= where to look at)	Suggested value	Note	Reference
Measurement model, 1st generation criteria				
Scale reliability	Cronbach α	> .70	> .50 for early stages of research	Nunnally (1978)
Factorial validity	Total variance explained (TVE)	> .50	EFA only, not to be confused with AVE	Netemeyer, Bearden, and Sharma (2003)
Item reliability	Item-to-total-correlations (ITT)	usually >. 300		Churchill (1979)
Measurement model, 2nd generation criteria				
Internal consistency / scale reliability	Composite reliability	> .70	originally for CVB-SEM	Bagozzi and Yi (1988)
Indicator reliability	Indicator loadings	> .70	originally for CVB-SEM	Bagozzi and Yi (1988@@author-year)
Factorial validity	Average variance extracted (AVE)	> .50	originally for CVB-SEM	Bagozzi and Yi (1988)
Discriminant validity	AVE > highest pairwise squared correlations of latent constructs		"Fornell-Larcker" criterion	Fornell and Larcker (1981)
Discriminant validity	Indicator loadings should be higher than all cross-loadings			Hair et al. (2011)
Structural model				
Internal structure fit	Significance of path coefficients	t -value > 1.96	equals rejection of null hypothesis at $p = .05$ level, estimated using bootstrapping	Hair et al. (2011)
Predictive relevance	Stone-Geisser's Q^2	> 0	estimated using blindfolding	Hair et al. (2011)

Table A60: SEM evaluation criteria

Factor Correlations (User Sample, n = 78), Square Root of AVE on Diagonal

	R	C	I	D	P	REC	SOL-O	SAT	MU	UNIQ	FUL	VAL	WOM
R	.887												
C	.620	.807											
I	.410	.387	.826										
D	.647	.666	.241	.803									
P	.574	.539	.385	.611	.846								
REC	.138	.097	.219	.154	.405	.854							
SOL-O	.472	.542	.277	.603	.622	.522	.855						
SAT	.656	.690	.281	.795	.578	.086	.648	.947					
PMU	.195	.113	.246	.040	.204	.143	.050	.113	SI				
UNIQ	.173	.072	.252	.215	.121	.068	.189	.155	.309	SI			
USF	.376	.565	.258	.597	.491	.122	.504	.683	.127	.178	.950		
VAL	.470	.532	.331	.550	.568	.333	.628	.623	.142	.100	.578	.902	
WOM	.584	.643	.210	.760	.594	.122	.632	.902	.034	.046	.682	.669	.951

SI = single item measurement (AVE = 1.000)

Table A61: Factor inter-correlation matrix for user sample

Factor Correlations (Decision Maker Sample, n = 62), Square Root of AVE on Diagonal

	R	C	I	D	P	REC	SOL-O	SAT	MU	REP	UNIQ	USF	VAL	WOM
R	.814													
C	.493	.844												
I	.286	.502	.858											
D	.536	.424	.404	.714										
P	.398	.108	.228	.461	.874									
REC	.165	.063	.065	.159	.274	.869								
SOL-O	.574	.378	.328	.617	.691	.496	.808							
SAT	.458	.248	.260	.599	.582	.252	.703	.933						
PMU	.048	.026	-.034	-.085	.017	.003	.097	.010	SI					
REP	.135	.093	.066	.272	.416	.014	.325	.423	.115	.862				
UNIQ	.314	.187	.203	.138	.198	.313	.288	.154	-.194	-.107	SI			
USF	.496	.233	.201	.483	.489	.072	.524	.562	-.101	.280	.245	.916		
VAL	.426	.172	.243	.420	.349	-.013	.401	.507	.076	.361	-.074	.639	.858	
WOM	.465	.366	.285	.553	.464	.123	.635	.786	.095	.482	.290	.458	.344	.901

SI = single item measurement (AVE = 1.000)

Table A62: Factor inter-correlation matrix for decision maker sample

Item-to-Factor Loadings, Total Sample

	R	C	I	D	P	EMPL SOL-O	EMPL REC	GEN-SAT	Price-MU	UNIQ	USEFUL	VAL	WOM
Considers wishes and ideas	.918	.522	.323	.542	.471	.494	.175	.556	.111	.159	.357	.420	.511
Collects background information	.657	.273	.230	.264	.327	.236	.136	.247	.192	.262	.266	.234	.233
Considers future needs	.858	.518	.287	.552	.443	.407	.035	.550	.132	.235	.442	.399	.537
Considers requirements	.932	.546	.330	.549	.409	.459	.149	.536	.097	.171	.367	.406	.509
Asks for specific problems	.894	.517	.356	.612	.492	.483	.143	.553	.093	.198	.345	.424	.491
Adapts offering	.447	.727	.545	.383	.256	.289	.011	.374	.101	.080	.357	.429	.361
Pushes standardized offerings *	.495	.907	.254	.536	.329	.472	.109	.478	.041	.107	.379	.284	.514
Gestalt benefit	.385	.445	.909	.342	.314	.289	.127	.259	.080	.171	.261	.303	.206
Performs integration	.185	.254	.764	.134	.198	.187	.124	.190	.138	.230	.100	.164	.171
Takes measures for effective use	.590	.456	.268	.752	.528	.519	.133	.596	-.002	.189	.406	.365	.539
Offering makes more probs than solved *	.402	.431	.139	.734	.319	.441	.034	.573	.023	.162	.499	.455	.559
No problems during use	.315	.347	.212	.744	.395	.392	.174	.466	-.009	.079	.311	.277	.462
Prove of concept	.511	.496	.306	.834	.423	.482	.150	.589	-.032	.139	.480	.423	.565
Provider asks for how to improve	.381	.288	.293	.450	.899	.555	.336	.495	.080	.205	.413	.415	.462
Provider asks for satisfaction	.417	.267	.194	.458	.855	.564	.243	.525	.169	.064	.373	.413	.470
Proactive measures for availability	.531	.402	.352	.547	.779	.502	.218	.459	.077	.055	.430	.459	.459
Informs on better effectiveness	.410	.286	.252	.439	.891	.569	.389	.508	.103	.169	.456	.388	.464
Empl. doesn't hesitate to solve problems	.317	.248	.278	.358	.383	.691	.320	.424	-.031	.156	.283	.347	.395
Empl. special effort	.453	.398	.229	.575	.553	.864	.428	.648	.060	.148	.406	.469	.598
Empl. gives advice	.418	.520	.209	.580	.552	.872	.404	.566	.009	.209	.513	.472	.565
Empl. helps us	.357	.383	.206	.432	.520	.857	.464	.498	.066	.168	.408	.533	.497
Empl. finds individual solutions	.538	.523	.340	.599	.573	.915	.415	.642	.075	.230	.514	.531	.587
Empl. considers specific needs	.460	.404	.294	.544	.570	.924	.408	.605	.070	.169	.462	.520	.559
Empl. consultative selling	.347	.269	.151	.392	.572	.701	.555	.449	.113	.176	.345	.377	.438
Empl. circumvents guidelines	.053	.049	.045	.123	.216	.351	.813	.123	.130	.121	.061	.117	.074
Empl. contradicts	.184	.092	.189	.148	.364	.506	.903	.131	.026	.156	.109	.238	.125
Meets expectations	.584	.527	.293	.713	.552	.620	.112	.961	.062	.202	.652	.575	.838
Provider is close to ideal	.504	.425	.180	.652	.498	.593	.145	.914	.028	.081	.527	.494	.763
Overall satisfied	.573	.521	.290	.698	.586	.655	.161	.950	.112	.148	.637	.570	.835
No price markup for solutions *	.134	.076	.121	-.007	.126	.064	.081	.073	SI	.096	.039	.119	.057
Provider uniqueness	.226	.116	.228	.190	.146	.215	.163	.154	.096	SI	.197	.031	.121
Offering helps saving time	.384	.435	.200	.548	.436	.486	.089	.589	.021	.175	.946	.539	.541
Offerings are useful for us	.396	.408	.207	.512	.476	.493	.108	.617	.083	.214	.924	.565	.615
Offerings increase productivity	.388	.400	.248	.507	.458	.452	.090	.609	.003	.164	.946	.554	.572
Vendor relationship value	.428	.396	.250	.456	.472	.536	.224	.557	.115	.043	.589	.946	.576
Vendor provides more value than costs	.372	.311	.244	.410	.384	.444	.197	.432	.089	.028	.404	.785	.465
Vendor provides high benefit	.398	.365	.285	.466	.437	.507	.159	.548	.111	.011	.553	.924	.493
Probability of recommendation (NPS)	.548	.529	.245	.637	.448	.570	.087	.762	.097	.096	.563	.518	.912
Positive WOM to colleagues	.507	.474	.226	.644	.554	.585	.113	.851	.078	.138	.580	.568	.947
Pos. WOM for s.o. seeking advice	.489	.526	.163	.674	.511	.610	.135	.808	-.012	.104	.582	.534	.950

* Reversely formulated item, recoded item scores used for analyses

Table A63: Item-to-factor loadings (total sample)

Item-to-Factor Loadings, User Sample

	R	C	I	D	P	EMPL SOL-O	EMPL REC	GEN-SAT	Price-MU	UNIQ	USEFUL	VAL	WOM
Considers wishes and ideas	.927	.533	.379	.577	.521	.451	.122	.606	.119	.137	.315	.427	.540
Collects background information	.741	.373	.418	.364	.444	.236	.157	.309	.316	.156	.187	.266	.240
Considers future needs	.892	.634	.309	.627	.527	.393	.046	.677	.204	.166	.459	.463	.616
Considers requirements	.954	.575	.331	.563	.500	.468	.168	.592	.158	.119	.342	.438	.543
Asks for specific problems	.905	.602	.371	.664	.583	.478	.126	.644	.153	.201	.331	.450	.562
Adapts offering	.478	.781	.556	.438	.404	.308	.059	.491	.130	.069	.447	.502	.425
Pushes standardized offerings *	.535	.843	.163	.619	.477	.529	.092	.618	.072	.054	.480	.405	.594
Gestalt benefit	.418	.440	.869	.275	.353	.276	.199	.261	.177	.223	.284	.310	.206
Performs integration	.226	.247	.794	.071	.284	.163	.160	.201	.260	.198	.106	.227	.130
Takes measures for effective use	.599	.486	.247	.755	.538	.526	.159	.671	.093	.230	.396	.360	.629
Offering makes more probs than solved *	.439	.563	.076	.817	.398	.462	.071	.651	.062	.230	.567	.502	.597
No problems during use	.373	.409	.179	.740	.494	.408	.180	.509	-.040	.107	.386	.360	.496
Prove of concept	.631	.629	.207	.890	.540	.522	.090	.700	.001	.117	.562	.536	.697
Provider asks for how to improve	.398	.421	.343	.479	.879	.522	.396	.463	.147	.154	.405	.515	.485
Provider asks for satisfaction	.527	.472	.318	.530	.843	.587	.309	.532	.212	.094	.349	.451	.499
Proactive measures for availability	.613	.555	.367	.600	.766	.463	.245	.499	.191	.036	.441	.497	.519
Informs on better effectiveness	.441	.402	.283	.468	.891	.528	.400	.472	.145	.115	.478	.470	.515
Empl. doesn't hesitate to solve problems	.337	.293	.288	.430	.395	.773	.408	.475	-.017	.267	.320	.431	.437
Empl. special effort	.487	.508	.206	.610	.567	.889	.397	.672	.019	.143	.438	.531	.629
Empl. gives advice	.426	.588	.216	.606	.583	.904	.412	.591	.029	.154	.543	.574	.629
Empl. helps us	.321	.391	.207	.411	.504	.849	.527	.448	.011	.176	.382	.605	.464
Empl. finds individual solutions	.506	.548	.250	.607	.580	.947	.424	.673	.082	.152	.508	.612	.635
Empl. considers specific needs	.403	.460	.287	.496	.524	.925	.442	.575	.053	.165	.448	.548	.546
Empl. consultative selling	.275	.273	.167	.377	.554	.662	.561	.383	.123	.092	.332	.436	.381
Empl. circumvents guidelines	.004	.046	.131	.105	.258	.367	.816	.090	.228	.051	.112	.201	.074
Empl. contradicts	.202	.108	.230	.147	.412	.511	.890	.062	.042	.064	.099	.351	.129
Meets expectations	.656	.698	.328	.806	.585	.623	.098	.966	.100	.219	.705	.626	.873
Provider is close to ideal	.584	.583	.193	.693	.463	.579	.036	.921	.065	.083	.572	.541	.822
Overall satisfied	.628	.665	.269	.758	.598	.640	.110	.955	.154	.134	.663	.603	.867
No price markup for solutions *	.201	.121	.257	.040	.205	.050	.145	.113	SI	.309	.127	.142	.034
Provider uniqueness	.175	.075	.253	.216	.119	.189	.068	.155	.309	SI	.178	.100	.046
Offering helps saving time	.375	.565	.221	.611	.462	.488	.092	.642	.129	.190	.957	.562	.628
Offerings are useful for us	.350	.547	.208	.560	.467	.483	.139	.667	.151	.149	.943	.533	.689
Offerings increase productivity	.358	.512	.268	.541	.480	.464	.119	.640	.082	.167	.949	.553	.625
Vendor relationship value	.445	.551	.321	.519	.547	.589	.327	.594	.136	.089	.573	.949	.642
Vendor provides more value than costs	.374	.383	.267	.441	.489	.489	.236	.481	.116	.050	.407	.802	.564
Vendor provides high benefit	.450	.539	.295	.534	.512	.613	.326	.603	.133	.123	.565	.949	.608
Probability of recommendation (NPS)	.531	.621	.282	.698	.569	.615	.156	.842	.047	.021	.674	.644	.943
Positive WOM to colleagues	.588	.594	.185	.729	.591	.576	.057	.893	.075	.055	.629	.643	.957
Pos. WOM for s.o. seeking advice	.549	.592	.120	.739	.540	.612	.138	.836	-.028	.054	.644	.623	.953

* Reversely formulated item, recoded item scores used for analyses

Table A64: Item-to-factor loadings (user sample)

Item-to-Factor Loadings, Decision Maker Sample

	R	C	I	D	P	EMPL SOL-O	EMPL REC	GEN-SAT	Price-MU	UNIQ	USEFUL	VAL	WOM	REP
Considers wishes and ideas	.897	.513	.229	.493	.409	.599	.242	.483	.103	.188	.441	.443	.475	.153
Collects background information	.572	.141	-.043	.090	.163	.254	.106	.141	.023	.424	.417	.198	.225	-.040
Considers future needs	.806	.360	.237	.418	.321	.438	.006	.303	.025	.356	.414	.273	.346	.061
Considers requirements	.890	.509	.295	.524	.278	.452	.110	.438	.011	.262	.420	.344	.435	.122
Asks for specific problems	.860	.389	.308	.531	.371	.509	.170	.401	.015	.186	.375	.412	.360	.176
Adapts offering	.398	.810	.545	.308	.051	.250	-.066	.178	.061	.102	.204	.301	.240	.038
Pushes standardized offerings *	.427	.882	.343	.400	.115	.371	.135	.233	-.004	.199	.195	.042	.361	.107
Gestalt benefit	.331	.497	.879	.439	.267	.317	.034	.261	-.038	.107	.235	.300	.223	.134
Performs integration	.112	.373	.840	.235	.091	.236	.089	.175	-.017	.267	.093	.088	.279	-.046
Takes measures for effective use	.555	.394	.268	.726	.520	.519	.085	.452	-.141	.120	.430	.391	.351	.067
Offering makes more probs than solved *	.341	.212	.223	.623	.196	.409	-.022	.431	-.037	.060	.367	.363	.479	.351
No problems during use	.211	.236	.239	.744	.257	.381	.161	.393	.031	.040	.184	.133	.407	.255
Prove of concept	.327	.330	.395	.756	.278	.427	.236	.422	-.068	.161	.361	.275	.356	.143
Provider asks for how to improve	.359	.081	.214	.407	.930	.632	.245	.553	-.012	.286	.437	.242	.442	.364
Provider asks for satisfaction	.230	-.050	.007	.327	.861	.519	.135	.513	.107	.020	.424	.346	.426	.521
Proactive measures for availability	.398	.200	.320	.467	.798	.588	.182	.392	-.074	.086	.420	.414	.369	.293
Informs on better effectiveness	.366	.121	.204	.399	.903	.663	.372	.572	.003	.262	.430	.238	.391	.306
Empl. doesn't hesitate to solve problems	.261	.176	.234	.214	.377	.528	.192	.329	-.047	-.049	.222	.227	.330	.124
Empl. special effort	.365	.151	.285	.500	.545	.810	.503	.594	.135	.165	.331	.320	.515	.348
Empl. gives advice	.395	.383	.177	.519	.517	.807	.399	.518	-.019	.301	.456	.281	.427	.282
Empl. helps us	.446	.332	.212	.493	.572	.888	.349	.624	.160	.183	.480	.325	.594	.353
Empl. finds individual solutions	.592	.487	.474	.584	.579	.845	.412	.580	.069	.367	.528	.381	.482	.174
Empl. considers specific needs	.561	.289	.311	.647	.652	.926	.350	.667	.094	.190	.491	.454	.599	.355
Empl. consultative selling	.509	.246	.135	.430	.620	.788	.554	.597	.100	.341	.380	.252	.599	.174
Empl. circumvents guidelines	.136	.016	-.041	.151	.157	.338	.814	.180	-.002	.244	-.029	-.073	.078	-.028
Empl. contradicts	.147	.068	.129	.133	.300	.503	.920	.250	.006	.296	.126	.032	.129	.040
Meets expectations	.437	.233	.235	.523	.507	.622	.138	.950	.001	.177	.539	.468	.756	.375
Provider is close to ideal	.355	.169	.150	.580	.554	.638	.317	.910	-.023	.075	.446	.432	.668	.446
Overall satisfied	.465	.283	.327	.576	.576	.706	.253	.939	.047	.177	.585	.517	.772	.368
No price markup for solutions *	.047	.029	-.033	-.086	.020	.097	.003	.010	SI	-.194	-.101	.076	.095	.115
Provider uniqueness	.332	.184	.211	.140	.200	.288	.313	.154	-.194	SI	.245	-.074	.290	-.107
Offering helps saving time	.417	.227	.137	.438	.402	.485	.094	.482	-.145	.150	.919	.513	.349	.266
Offerings are useful for us	.502	.186	.190	.436	.500	.519	.065	.515	-.024	.334	.892	.657	.446	.202
Offerings increase productivity	.461	.235	.206	.463	.427	.427	.043	.544	-.121	.167	.938	.568	.456	.309
Vendor relationship value	.407	.167	.130	.350	.340	.411	.029	.485	.077	-.022	.636	.940	.412	.345
Vendor provides more value than costs	.366	.212	.208	.367	.212	.341	.120	.333	.046	-.001	.405	.746	.237	.222
Vendor provides high benefit	.320	.118	.279	.387	.315	.285	-.145	.466	.068	-.155	.570	.876	.219	.342
Probability of recommendation (NPS)	.582	.358	.188	.512	.250	.468	-.035	.593	.183	.239	.321	.244	.827	.336
Positive WOM to colleagues	.343	.256	.325	.464	.500	.620	.220	.762	.083	.313	.472	.386	.927	.474
Pos. WOM for s.o. seeking advice	.367	.375	.256	.531	.475	.615	.119	.753	.012	.231	.433	.290	.945	.478
Repurchase 1 st choice	.223	.125	.069	.338	.488	.399	-.028	.511	.018	-.069	.337	.359	.501	.916
Repurchase next	-.021	.083	.013	.119	.309	.183	.012	.262	.123	-.055	.175	.252	.358	.851
Repurchase other offerings	.041	-.011	.056	.177	.200	.182	.086	.228	.223	-.175	.151	.299	.340	.816

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* Reversely formulated item, recoded item scores used for analyses

Table A65: Item-to-factor loadings (decider sample)

Testing Mediating Effects in PLS SEM

See Hair et al. (2013, p. 224)

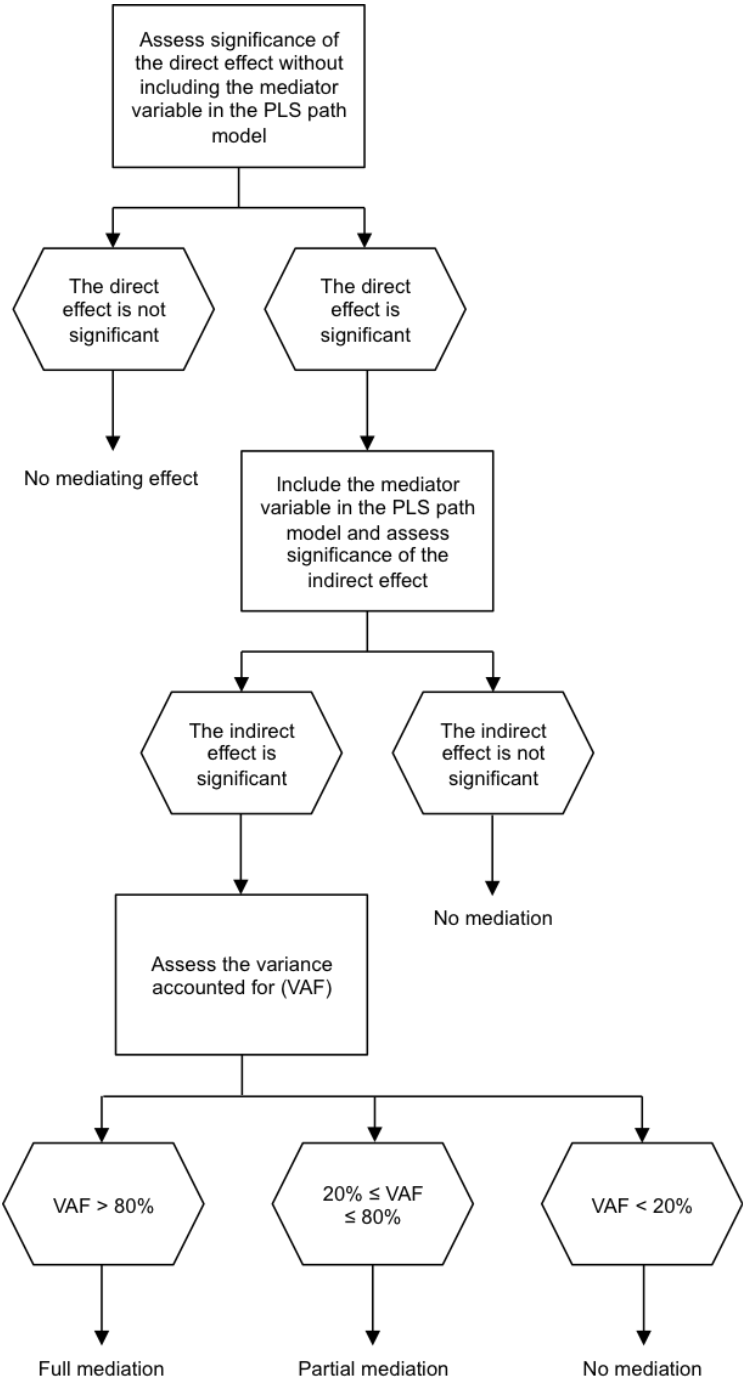


Figure A6: Mediators in PLS SEM

Direct Effects in the Structural Model + Group Differences

IV/EX	DV/EN	Total sample (n = 140)			User sample (n = 78)			Decider sample (n = 62)			Δ p
		β	t	f ²	β	t	f ²	β	t	f ²	
R	→ REC	-.021	0.171		-.106	0.605		.057	0.328		.754
R	→ SOL-O	.102	1.451		.049	0.424		.221	3.015 **	0.122	.906
R	→ SAT	.122	1.608		.151	1.497		.025	0.174		.219
R	→ PMU	.119	0.909		.148	0.764		.123	0.522		.494
R	→ UNIQ	.177	1.435		.049	0.328		.316	1.739		.872
R	→ USF	-.012	0.110		-.195	1.351		.261	1.203		.976 *
C	→ SAT	.049	0.620		.144	1.465		-.068	0.484		.096
C	→ PMU	.048	0.397		.062	0.328		.031	0.167		.446
C	→ UNIQ	-.148	1.264		-.294	1.730		-.006	0.031		.876
C	→ USF	.144	1.348		.276	1.878		-.054	0.317		.067
I	→ SAT	-.025	0.421		.010	0.131		-.005	0.042		.454
I	→ PMU	.052	0.492		.052	0.357		-.025	0.136		.384
I	→ UNIQ	.202	1.869		.311	2.209 *	0.081	.165	0.892		.263
I	→ USF	-.026	0.372		.040	0.393		-.023	0.208		.343
D	→ REC	-.040	0.333		-.103	0.646		.018	0.100		.689
D	→ SOL-O	.331	4.673 ***	0.155	.386	3.631 ***	0.174	.272	2.835 **	0.168	.206
D	→ SAT	.377	4.901 ***	0.186	.410	3.996 ***	0.251	.259	1.706		.190
D	→ PMU	-.234	1.558		-.346	1.765		-.266	1.227		.607
D	→ UNIQ	.081	0.607		.296	1.483		-.137	0.856		.045 *
D	→ USF	.262	2.626 **	0.052	.345	2.338 *	0.083	.168	0.909		.223
P	→ REC	.384	3.598 ***	0.111	.526	3.299 ***	0.192	.246	1.684		.101
P	→ SOL-O	.287	4.261 ***	0.127	.208	1.785		.395	5.236 ***	0.405	.913
P	→ SAT	.132	1.676		.030	0.322		.147	1.125		.772
P	→ PMU	.117	1.032		.193	1.241		-.026	0.126		.190
P	→ UNIQ	-.094	0.889		-.135	0.878		.048	0.272		.795
P	→ USF	.206	2.172 *	0.036	.153	1.171		.196	1.208		.586
REC	→ SOL-O	.343	6.156 ***	0.264	.374	4.665 ***	0.270	.309	4.219 ***	0.314	.274
REC	→ SAT	-.157	2.487 *	0.047	-.199	2.469 *	0.093	-.074	0.769		.848
REC	→ PMU	.051	0.406		.186	1.193		-.072	0.383		.145
REC	→ UNIQ	.084	0.795		-.059	0.430		.273	1.729		.939
REC	→ USF	-.136	1.803		-.097	0.917		-.169	1.475		.323
SOL-O	→ SAT	.355	3.662 ***	0.135	.339	2.923 **	0.184	.492	2.914 **	0.141	.785
SOL-O	→ PMU	-.103	0.613		-.327	1.514		.398	1.466		.979 *
SOL-O	→ UNIQ	.106	0.769		.173	1.013		-.027	0.106		.263
SOL-O	→ USF	.235	1.668		.188	1.007		.246	1.330		.588
SAT	→ PMU	.085	0.499		.190	0.808		-.036	0.141		.262
SAT	→ WOM	.767	13.407 ***	1.252	.757	12.218 ***	1.674	.775	7.032 ***	1.077	.592
UNIQ	→ PMU	.088	0.919		.321	2.759 **	0.111	-.208	1.284		.003 *
UNIQ	→ WOM	-.014	0.318		-.104	2.260 *	0.067	.167	2.130 *	0.066	.999 **
USF	→ PMU	-.070	0.550		.054	0.277		-.250	1.272		.128
USF	→ VAL	.588	8.891 ***	0.527	.576	6.912 ***	0.495	.637	7.568 ***	0.682	.702
USF	→ WOM	.067	1.135		.093	1.637		.006	0.064		.195
VAL	→ PMU	.126	0.874		.066	0.325		.146	0.708		.613
VAL	→ WOM	.094	1.874		.156	2.945 **	0.089	-.037	0.325		.082
SAT	→ REP							.354	2.310 *	0.108	
UNIQ	→ REP							-.157	1.194		
USF	→ REP							.017	0.096		
VAL	→ REP							.159	0.855		

Thresholds for t-values, indicating significance of path coefficients β : $p = .05$ (*) $\cong 1.96$; $p = .01$ (**) $\cong 2.58$; $p = .001$ (***) $\cong 3.29$
 Group comparison (last column): $p < .05$ or $p > .95$ for significance

Table A66: Direct effects in the structural model

Total Effects of Solution Processes (Focal Hypotheses) + Group Differences

IV/EX	DV/EN	Total sample (n = 140)		User sample (n = 78)		Decider sample (n = 62)		Δ p
		β	t	β	t	β	t	
R	→ REC	-.021	0.171	-.106	0.605	.057	0.328	.754
R	→ SOL-O	.095	1.194	.009	0.077	.239	2.935 **	.944 (*)
R	→ SAT	.158	1.939	.175	1.542	.138	0.961	.413
R	→ PMU	.138	1.056	.160	0.828	.093	0.447	.422
R	REP					.034	0.350	
R	→ UNIQ	.186	1.469	.057	0.392	.325	1.757	.870
R	→ USF	.013	0.124	-.183	1.331	.310	1.408	.986 *
R	→ VAL	.008	0.123	-.105	1.318	.197	1.364	.986 *
R	→ WOM	.121	1.750	.093	0.896	.156	1.263	.664
C	→ SAT	.049	0.620	.144	1.465	-.068	0.484	.096
C	→ PMU	.040	0.333	.021	0.103	.043	0.240	.528
C	REP					-.029	0.374	
C	→ UNIQ	-.148	1.264	-.294	1.730	-.006	0.031	.876
C	→ USF	.144	1.348	.276	1.878	-.054	0.317	.067
C	→ VAL	.084	1.311	.159	1.776	-.034	0.315	.078
C	→ WOM	.057	0.844	.190	2.229 *	-.052	0.477	.034 *
I	→ SAT	-.025	0.421	.010	0.131	-.005	0.042	.454
I	→ PMU	.067	0.662	.158	1.141	-.056	0.310	.175
I	REP					-.030	0.458	
I	→ UNIQ	.202	1.869	.311	2.209 *	.165	0.892	.263
I	→ USF	-.026	0.372	.040	0.393	-.023	0.208	.343
I	→ VAL	-.015	0.369	.023	0.391	-.015	0.207	.348
D	→ WOM	-.025	0.508	-.018	0.264	.024	0.235	.629
D	→ REC	-.040	0.333	-.103	0.646	.018	0.100	.689
D	→ SOL-O	.318	3.977 ***	.348	2.936 **	.278	2.795 **	.324
D	→ SAT	.496	7.092 ***	.548	5.859 ***	.394	2.819 **	.158
D	→ PMU	-.215	1.696	-.220	1.200	-.178	0.883	.561
D	REP					.189	1.939	
D	→ UNIQ	.112	0.862	.362	1.995 *	-.140	0.844	.024 *
D	→ USF	.342	3.778 ***	.420	3.166 **	.233	1.263	.208
D	→ VAL	.201	3.446 ***	.242	2.816 **	.149	1.216	.269
D	→ WOM	.421	6.820 ***	.454	5.092 ***	.278	2.352 *	.101
P	→ REC	.384	3.598 ***	.526	3.299 ***	.246	1.684	.101
P	→ SOL-O	.419	5.949 ***	.404	3.512 ***	.471	5.294 ***	.674
P	→ SAT	.220	2.894 **	.062	0.661	.360	3.203 **	.983 *
P	→ PMU	.112	1.062	.156	1.066	.068	0.415	.342
P	REP					.143	2.012 *	
P	→ UNIQ	-.017	0.169	-.096	0.638	.102	0.718	.839
P	→ USF	.252	3.107 **	.178	1.581	.271	2.103 *	.710
P	→ VAL	.148	2.873 **	.103	1.510	.172	2.012 *	.751
P	→ WOM	.200	3.112 **	.089	1.023	.291	3.241 **	.949 (*)

Thresholds for t-values, indicating significance of path coefficients β : $p = .05 (*) \cong 1.96$; $p = .01 (**) \cong 2.58$; $p = .001 (***) \cong 3.29$
 Group comparison (last column): $p < .05$ or $p > .95$ for significance

Table A67: Total effects of the SPCM elements

Other Total Effects (Further Hypotheses) + Group Differences

IV/EX	DV/EN	Total sample (n = 140)		User sample (n = 78)		Decider sample (n = 62)		Δ p
		β	t	β	t	β	t	
REC	→ SOL-O	.343	6.156 ***	.374	4.665 ***	.309	4.219 ***	.274
REC	→ SAT	-.035	0.559	-.072	0.872	.078	0.855	.892
REC	→ PMU	.023	0.234	.049	0.374	.008	0.050	.422
REC	→ REP					-.025	0.395	
REC	→ UNIQ	.121	1.293	.006	0.048	.265	2.012 *	.922
REC	→ USF	-.055	0.839	-.027	0.298	-.093	0.852	.322
REC	→ VAL	-.032	0.837	-.016	0.298	-.059	0.845	.311
REC	→ WOM	-.036	0.676	-.060	0.798	.106	1.391	.942
SOL-O	→ SAT	.355	3.662 ***	.339	2.923 **	.492	2.914 **	.785
SOL-O	→ PMU	-.062	0.405	-.190	0.897	.347	1.373	.942
SOL-O	→ REP					.207	1.699	
SOL-O	→ UNIQ	.106	0.769	.173	1.013	-.027	0.106	.263
SOL-O	→ USF	.235	1.668	.188	1.007	.246	1.330	.588
SOL-O	→ VAL	.138	1.598	.108	0.976	.157	1.293	.619
SOL-O	→ WOM	.300	3.554 ***	.273	2.551 *	.372	2.890 **	.730
SAT	→ PMU	.085	0.499	.190	0.808	-.036	0.141	.262
SAT	→ REP					.354	2.310 *	
SAT	→ WOM	.767	13.407 ***	.757	12.218 ***	.775	7.032 ***	.592
UNIQ	→ PMU	.088	0.919	.321	2.759 **	-.208	1.284	.003 *
UNIQ	→ REP					-.157	1.194	
UNIQ	→ WOM	-.014	0.318	-.104	2.260 *	.167	2.130 *	.999 **
USF	→ PMU	.004	0.033	.091	0.476	-.157	0.814	.171
USF	→ REP					.118	0.911	
USF	→ VAL	.588	8.891 ***	.576	6.912 ***	.637	7.568 ***	.702
USF	→ WOM	.122	1.903	.183	2.862 **	-.017	0.165	.051 (*)
VAL	→ PMU	.126	0.874	.066	0.325	.146	0.708	.613
VAL	→ REP					.159	0.855	
VAL	→ WOM	.094	1.874	.156	2.945 **	-.037	0.325	.082

Thresholds for t-values, indicating significance of path coefficients β : $p = .05$ (*) $\cong 1.96$; $p = .01$ (**) $\cong 2.58$; $p = .001$ (***) $\cong 3.29$
 Group comparison (last column): $p < .05$ or $p > .95$ for significance

Table A68: Other total effects

Coefficient of Determination (R^2) and Predictive Relevance (Stone-Geisser's Q^2) of the Endogenous Constructs (DVs)

	Total sample (n = 140)		User sample (n = 78)		Decider sample (n = 62)	
	R^2	Q^2 ^a	R^2	Q^2 ^b	R^2	Q^2 ^b
REC	.126	.074	.182	.129	.080	.072
SOL-O	.609	.416	.579	.417	.720	.457
SAT	.653	.571	.746	.668	.561	.441
PMU	.067	.055	.224	.244	.145	.133
UNIQ	.110	-.003	.142	.131	.207	.196
USF	.405	.337	.459	.388	.408	.344
VAL	.345	.267	.331	.268	.406	.286
WOM	.756	.649	.846	.766	.647	.517
REP					.228	.177

Distances for Stone-Geisser' Q^2 : d = 6^(a); d = 7^(b)

Table A69: Coefficient of Determination and predictive relevance of endogenous constructs (DVs)

Detailed Analyses of the User Sample

Direct effects: A different picture emerges in the user sample. Integrating the offering increases the perceived *uniqueness* ($\beta = .311$; $p < .05$), which partially supports H₁₃. However, the corresponding R^2 value is rather low, as well as the effect size f^2 of the path coefficient ($= 0.081$; see table A66). The provider's solution orientation during the *deployment* stage has positive effects on *usefulness* ($\beta = .345$; $p < .05$) and *satisfaction* ($\beta = .410$; $p < .001$). *Post-deployment support* does not influence any of the outcome constructs directly.

Further Hypotheses: Similar to the total sample, perceived *usefulness* of the offering has a positive effect on the *value* of the provider ($\beta = .576$; $p < .001$) and *satisfaction* on WOM ($\beta = .757$; $p < .001$). Three additional significant relationships emerge: WOM is also elicited by perceived *value*, albeit weaker ($\beta = .156$; $p < .05$). Perceived *uniqueness* increases the *willingness to pay a price premium* ($\beta = .321$; $p < .01$) and hence supports H_{UNIQ}. At the same time, *uniqueness* has a *negative* impact on WOM ($\beta = -.104$; $p < .05$) but the effect size is low ($f^2 = 0.067$).

Total Effects: *Integration* does not increase the *willingness to pay a price premium*, neither directly, nor through *uniqueness*. Even though *customization* has no direct influence on any other construct, there is a weak positive total effect on WOM ($\beta = .190$; $p < .05$). There is a similar effect for the link between *deployment* and *uniqueness*; only the total effect is significant ($\beta = .362$; $p < .05$).

Deployment also has a positive total effect on the “downstream” outcomes *value* ($\beta = .242$; $p < .01$) and WOM ($\beta = .454$; $p < .001$). The latter is also influenced by SOL-O ($\beta = .273$; $p < .05$) and *usefulness*.

Although *requirements definition* is positively related to the perception of the employee's *recalcitrant behavior*, the resulting indirect effects to any of the outcome constructs are not significant. Put differently, *post-deployment support* is largely isolated in the user sample. *Requirements definition* has neither a direct nor an indirect effect on any other construct.

Detailed Analyses of the User Sample

Direct effects: There are no significant direct effects of the SPCM elements, i.e. solution-oriented activities by the provider or solution-related characteristics of the offering, on the outcome constructs.

Further Hypotheses: *Satisfaction* has a positive influence on WOM ($\beta = .775$; $p < .001$) and on the *repurchase intention* ($\beta = .354$; $p < .05$), the latter effect supports H_{s3}. WOM in turn is positively affected by *uniqueness* ($\beta = .167$; $p < .05$). The effect size is similarly as low as in the user sample ($f^2 = 0.066$), where this effect was negative. Both effects cancel each other out; consequently the effect in the total sample is not significant.

Perceived usefulness of the offering has a positive impact on provider value ($\beta = .637$; $p < .001$). Although *usefulness* receives no significant input from other constructs, its total R^2 is comparatively high because a number of effects are moderately strong without becoming significant.

Total Effects: If total effects are considered, three significant effects of the SPCM constructs (re-) emerge (Figure 46): *Deployment* influences *satisfaction* ($\beta = .394$; $p < .01$), *post-deployment support* increases *satisfaction* ($\beta = .360$; $p < .01$) and *usefulness* ($\beta = .271$; $p < .05$). These were the three relationships that disappeared, when the *employee's solution orientation* was taken into account.

Post-deployment support also has a positive impact on the “downstream” outcomes *value* ($\beta = .172$; $p < .05$), WOM ($\beta = .291$; $p < .01$), and on the *repurchase intention* ($\beta = .143$; $p < .05$). Positive WOM is also indirectly elicited by solution-oriented *deployment activities* ($\beta = .278$; $p < .05$) and *the employee's solution-oriented behavior* ($\beta = .372$; $p < .01$).

Finally, *recalcitrant behavior* by the employee increases the perceived *uniqueness* of the offering ($\beta = .265$; $p < .05$).

11 References

- Aarikka-Stenroos, Leena and Elina Jaakkola (2012), "Value Co-Creation in Knowledge Intensive Business Services: A Dyadic Perspective on the Joint Problem Solving Process," *Industrial Marketing Management*, 41 (1), 15-26.
- Aberson, Christopher L. (2010), *Applied Power Analysis for the Behavioral Sciences*. New York: Routledge.
- Abrahamson, Eric (1996), "Management Fashion," *Academy of Management Review*, 21 (1), 254-285.
- (1991), "Managerial Fads and Fashions: The Diffusion and Rejection of Innovations," *Academy of Management Review*, 16 (3), 586-612.
- Abrahamson, Eric and Gregory Fairchild (1999), "Management Fashion: Lifecycles, Triggers, and Collective Learning Processes," *Administrative Science Quarterly*, 44 (4), 708-740.
- Achrol, Ravi S. and Philip Kotler (1999), "Marketing in the Network Economy," *Journal of Marketing*, 63 (4), 146-163.
- (2006), "The Service-Dominant Logic for Marketing: A Critique," in *The Service-Dominant Logic of Marketing: Dialog, Debate, and Directions*, Robert F. Lusch and Stephen L. Vargo, eds. Armonk: ME Sharpe.
- Adams, William James and Janet L. Yellen (1976), "Commodity Bundling and the Burden of Monopoly," *The Quarterly Journal of Economics*, 475-498.
- Adamson, Brent, Matthew Dixon, and Nicholas Toman (2012), "The End of Solution Sales," *Harvard Business Review*, 90 (7/8), 60-68.
- Adler, Lee (1967), "Systems Approach to Marketing," *Harvard Business Review*, 45 (3), 105-118.
- Agresti, Alan (2002), *Categorical Data Analysis*. Hoboken: John Wiley & Sons.
- Aijo, Toivo S. (1996), "The Theoretical and Philosophical Underpinnings of Relationship Marketing: Environmental Factors Behind the Changing Marketing Paradigm," *European Journal of Marketing*, 30 (2), 8-18.
- Akerlof, George A. (1970), "The Market for "Lemons": Quality Uncertainty and the Market Mechanism," *The Quarterly Journal of Economics*, 84 (3), 488-500.
- Alderson, Wroe and Reavis Cox (1948), "Towards a Theory of Marketing," *Journal of Marketing*, 13 (2), 137-152.
- Altman, Douglas G. (1990), *Practical Statistics for Medical Research*: CRC Press.
- Anderson, Eric T. (2002), "Sharing the Wealth: When Should Firms Treat Customers as Partners?," *Management Science*, 48 (8), 955-971.
- Anderson, Erin (1985), "The Salesperson as Outside Agent or Employee: A Transaction Cost Analysis," *Marketing Science*, 4 (3), 234-254.
- Anderson, Erin and Sandy D. Jap (2005), "The Dark Side of Close Relationships," *Sloan Management Review*, 46 (3), 75-82.
- Anderson, Eugene W. (1998), "Customer Satisfaction and Word of Mouth," *Journal of Service Research*, 1 (1), 5-17.

- Anderson, Eugene W., Claes Fornell, and Roland T. Rust (1997), "Customer Satisfaction, Productivity, and Profitability: Differences between Goods and Services," *Marketing Science*, 16 (2), 129-145.
- Anderson, Eugene W. and Vikas Mittal (2000), "Strengthening the Satisfaction-Profit Chain," *Journal of Service Research*, 3 (2), 107-120.
- Anderson, James C, Håkan Håkansson, and Jan Johanson (1994), "Dyadic Business Relationships within a Business Network Context," *Journal of Marketing*, 58 (4), 1-15.
- Antico, Michael, Rudy K. Moenaert, Adam Lindgreen, and Martin G. M. Wetzels (2008), "Organizational Antecedents to and Consequences of Service Business Orientations in Manufacturing Companies," *Journal of the Academy of Marketing Science*, 36 (3), 337-358.
- Armstrong, J. Scott and Terry S. Overton (1977), "Estimating Nonresponse Bias in Mail Surveys," *Journal of Marketing Research*, 14 (3), 396-402.
- Ashley, Christy, Stephanie M. Noble, Naveen Donthu, and Katherine N. Lemon (2011), "Why Customers Won't Relate: Obstacles to Relationship Marketing Engagement," *Journal of Business Research*, 64 (7), 749-756.
- Asparouhov, Tihomir and Bengt Muthén (2013), "Auxiliary Variables in Mixture Modeling: 3-Step Approaches Using Mplus," *Mplus Webnotes*, 15, 1-24
- Athaide, Gerard A., Patricia W. Meyers, and David L. Wilemon (1996), "Seller-Buyer Interactions During the Commercialization of Technological Process Innovations," *Journal of Product Innovation Management*, 13 (5), 406-421.
- Auguste, Byron G., Eric P. Harmon, and Vivek Pandit (2006), "The Right Service Strategies for Product Companies," *McKinsey Quarterly*, 1, 40-51.
- Auramo, Jaana; Ala-Risku, Timo (2005), "Challenges for Going Downstream.," *International Journal of Logistics: Research & Applications*, 8 (4), 333-345.
- Aurich, J.C, N. Wolf, M. Siener, and E. Schweitzer (2009), "Configuration of Product-Service Systems," *Journal of Manufacturing Technology Management*, 20 (5), 591-605.
- Azarenko, A., R. Roy, E. Shehab, and A. Tiwari (2009), "Technical Product-Service Systems: Some Implications for the Machine Tool Industry," *Journal of Manufacturing Technology Management*, 20 (5), 700-722.
- Azen, Razia and Cindy M. Walker (2010), *Categorical Data Analysis for the Behavioral and Social Sciences*. New York: Routledge.
- Azimont, Frank, Bernard Cova, and Robert Salle (1998), "Solution Selling and Project Marketing: A Convergence Towards Customer Intimacy for a Joint Construction of Offer and Demand," presented at 14th IMP Annual Conference, Turku
- Baas, Jens, Ute Brauer, Dieter R. Dannhorn, Wolfgang Hoffmann, Michael Kuhn, Kai Kück, Wolfgang Pfohler, Franz Porzsolt, Thomas Schmitz-Rod, Thomas Schweins, Peter C. Scriba, Friedrich Stähler, Hans-Jürgen Wildau, and Walter-G. Wrobel (2012), "Abschlußbericht Nationaler Strategieprozess Innovationen in der Medizintechnik". Berlin: VDI Technologiezentrum GmbH.
- Bacharach, Samuel B. (1989), "Organizational Theories: Some Criteria for Evaluation," *Academy of Management Review*, 14 (4), 496-515.
- Backhaus, Klaus (1997), *Industriegütermarketing* (5 ed.). München: Vahlen.

- Backhaus, Klaus, Kai Lügger, and Matthias Koch (2011), "The Structure and Evolution of Business-to-Business Marketing: A Citation and Co-Citation Analysis," *Industrial Marketing Management*, 40 (6), 940–951.
- Backhaus, Klaus and Markus Voeth (2010), *Industriegütermarketing* (9. ed.). München: Vahlen.
- Bagozzi, Richard P. (1974), "Marketing as an Organized Behavioral System of Exchange," *Journal of Marketing*, 38 (4), 77-81.
- (1975), "Marketing as Exchange," *Journal of Marketing*, 38, (4), 32-39.
- (1984), "A Prospectus for Theory Construction in Marketing," *Journal of Marketing*, 48 (1), 11-29.
- Bagozzi, Richard P., Willem J. M. I. Verbeke, Wouter E. van den Berg, Wim J. R. Rietdijk, Roeland C. Dietvorst, and Loek Worm (2012), "Genetic and Neurological Foundations of Customer Orientation: Field and Experimental Evidence," *Journal of the Academy of Marketing Science*, 40 (5), 639-658.
- Bagozzi, Richard P. and Youjae Yi (1988), "On the Evaluation of Structural Equation Models," *Journal of the Academy of Marketing Science*, 16 (1), 74-94.
- Bahari, Siti Fatimah (2012), "Qualitative Versus Quantitative Research Strategies: Contrasting Epistemological and Ontological Assumptions," *Jurnal Teknologi*, 52 (1), 17–28.
- Baines, Tim S., Howard W. Lightfoot, Ornella Benedettini, and John M. Kay (2009), "The Servitization of Manufacturing: A Review of Literature and Reflection on Future Challenges," *Journal of Manufacturing Technology Management*, 20 (5), 547-567.
- Bar-Eli, Michael, Ofer H. Azar, Ilana Ritov, Yael Keidar-Levin, and Galit Schein (2007), "Action Bias among Elite Soccer Goalkeepers: The Case of Penalty Kicks," *Journal of Economic Psychology*, 28 (5), 606-621.
- Barney, Jay B. (1991), "Firm Resources and Sustained Competitive Advantage," *Journal of Management*, 17 (1), 99-120.
- (2001), "Resource-Based Theories of Competitive Advantage: A Ten-Year Retrospective on the Resource-Based View," *Journal of Management*, 27 (6), 643-650.
- (1986), "Strategic Factor Markets: Expectations, Luck, and Business Strategy," *Management Science*, 32 (10), 1231-1241.
- Baron, Reuben M. and David A. Kenny (1986), "The Moderator–Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *Journal of personality and social psychology*, 51 (6), 1173-1182.
- Bartels, Robert (1951), "Can Marketing Be a Science?," *Journal of Marketing*, 15 (3), 319-328.
- Baveja, Sarabjit Singh, Jim Gilbert, and Dianne Ledingham (2004), "From Products to Services: Why It's Not So Simple," *Harvard Management Update*, 9 (4), 3-5.
- Becker, Jochen (2009), *Das Kundenbeziehungsrisiko aus Unternehmenssicht*. Wiesbaden: Gabler.
- Belz, Christian (1988), "Leistungssysteme zur Profilierung auswechselbarer Produkte im Wettbewerb," *Der Markt*, 27 (2), 60-68.

- Belz, Christian, Klaus Backhaus, and Gary Lilien (2013), "Trends im Industriegütermarketing - Fortschritte, Entwicklungen und zukünftiger Forschungsbedarf," *Marketing Review St. Gallen*, 04 (30), 10-25.
- Bennet, Jeff, Deven Sharma, and Andrew Tipping (2001), "Customer Solutions: Building a Strategically Aligned Business Model," *Organization & Strategic Leadership Practice*, (July), 1-5.
- Bennett, Robert J. and Paul J.A. Robson (2001), "Exploring the Market Potential and Bundling of Business Association Services," *Journal of Services Marketing*, 15 (3), 222-239.
- Bentler, P.M. and Chih Ping Chou (1987), "Practical Issues in Structural Modeling," *Sociological Methods & Research*, 16 (1), 78-117.
- Bergen, Mark, Shantanu Dutta, and Orville C. Walker Jr (1992), "Agency Relationships in Marketing: A Review of the Implications and Applications of Agency and Related Theories," *Journal of Marketing*, 56 (3), 1-24.
- Bergkvist, Lars and John R. Rossiter (2007), "The Predictive Validity of Multiple-Item Versus Single-Item Measures of the Same Constructs," *Journal of Marketing Research*, 44 (2), 175-184.
- Bergman, Lars R. and David Magnusson (1997), "A Person-Oriented Approach in Research on Developmental Psychopathology," *Development and Psychopathology*, 9 (02), 291-319.
- Bergman, Lars R. and Kari Trost (2006), "The Person-Oriented Versus the Variable-Oriented Approach: Are They Complementary, Opposites, or Exploring Different Worlds?," *Merrill-Palmer Quarterly*, 52 (3), 601-632.
- Berlin, Kristoffer S., Gilbert R. Parra, and Natalie A. Williams (2013), "An Introduction to Latent Variable Mixture Modeling (Part 2): Longitudinal Latent Class Growth Analysis and Growth Mixture Models," *Journal of Pediatric Psychology*.
- Berlin, Kristoffer S., Natalie A. Williams, and Gilbert R. Parra (2013), "An Introduction to Latent Variable Mixture Modeling (Part 1): Overview and Cross-Sectional Latent Class and Latent Profile Analyses," *Journal of Pediatric Psychology*.
- Berman, Lawrence E. and Donald A. Dunn (1987), "Service Bundling and Strategic Equilibrium in the Information Services Industry," *Journal of Economics and Business*, 39 (2), 115-129.
- Berry, Leonard L. (1983), "Relationship Marketing," in *Emerging Perspectives on Services Marketing*, Leonard L. Berry and G. Lynn Shostack and Gergory Upah, eds. Chicago: American Marketing Association.
- Bettencourt, Lance A. and Kevin Gwinner (1996), "Customization of the Service Experience: The Role of the Frontline Employee," *International Journal of Service Industry Management*, 7 (2), 3-20.
- Bettencourt, Lance A., Amy L. Ostrom, Stephen W. Brown, and Robert I. Roundtree (2002), "Client Co-Production in Knowledge-Intensive Business Services," *California Management Review*, 44 (4), 100-128.
- Beuren, Fernanda Hänsch, Marcelo Gitirana Gomes Ferreira, and Paulo A. Cauchick Miguel (2013), "Product-Service Systems: A Literature Review on Integrated Products and Services," *Journal of Cleaner Production*, 47 (May), 222-231.

- Beutin, Nikolas (2000), *Kundennutzen in Industriellen Geschäftsbeziehungen*. Wiesbaden: Gabler.
- Beverland, Michael and Adam Lindgreen (2010), "What Makes a Good Case Study? A Positivist Review of Qualitative Case Research Published in Industrial Marketing Management, 1971–2006," *Industrial Marketing Management*, 39 (1), 56-63.
- Bhargava, Hemant K. (2012), "Retailer-Driven Product Bundling in a Distribution Channel," *Marketing Science*, 31 (6), 1014-1021.
- Biggemann, Sergio, Christian Kowalkowski, Jane Maley, and Staffan Brege (2013), "Development and Implementation of Customer Solutions: A Study of Process Dynamics and Market Shaping," *Industrial Marketing Management*, 42 (7), 1083–1092.
- Boehm, Matthias and Oliver Thomas (2013), "Looking Beyond the Rim of One's Teacup: A Multidisciplinary Literature Review Of product-Service Systems in Information Systems, Business Management, and Engineering & Design," *Journal of Cleaner Production*, 51 (July), 245-260.
- Bolck, Annabel, Marcel Croon, and Jacques Hagenaars (2004), "Estimating Latent Structure Models with Categorical Variables: One-Step Versus Three-Step Estimators," *Political Analysis*, 12 (1), 3-27.
- Bolton, Ruth N., Katherine N. Lemon, and Peter C. Verhoef (2006), "Expanding Business-to-Business Customer Relationships: Modeling the Customer's Upgrade Decision," *Journal of Marketing*, 72 (1), 46-64.
- (2004), "The Theoretical Underpinnings of Customer Asset Management: A Framework and Propositions for Future Research," *Journal of the Academy of Marketing Science*, 32 (3), 271-292.
- Bonnemeier, Sebastian (2009), *Wertschaffung und Wertaneignung als Erfolgsfaktoren von Lösungsanbietern: Eine konzeptionelle und empirische Untersuchung Organisationaler Kompetenzen*. Wiesbaden: Gabler.
- Bonnemeier, Sebastian, Ferdinand Buriánek, and Ralf Reichwald (2009), "Hybride Wertschöpfung - Die Fähigkeit zur Kundenintegration," *Industrie Management*, 25 (2), 29-32.
- Bonney, F. Leff and Brian C. Williams (2009), "From Products to Solutions: The Role of Salesperson Opportunity Recognition," *European Journal of Marketing*, 43 (7/8), 1032-1052-1052.
- Borghini, Stefania, Antonella Carù, and Bernard Cova (2010), "Representing BtoB Reality in Case Study Research: Challenges and New Opportunities," *Industrial Marketing Management*, 39 (1), 16-24.
- Bosworth, Michael T. (1995), *Solution Selling - Creating Buyers in Difficult Selling Markets*. New York: McGraw-Hill.
- Boulding, Kenneth E. (1956), "General Systems Theory - the Skeleton of Science," *Management Science*, 2 (3), 197-208.
- Bowen, John (1990), "Development of a Taxonomy of Services to Gain Strategic Marketing Insights," *Journal of the Academy of Marketing Science*, 18 (1), 43-49.
- Boyd, Brian K., Katalin Takacs Haynes, Michael A. Hitt, Donald D. Bergh, and David J. Ketchen (2011), "Contingency Hypotheses in Strategic Management

- Research: Use, Disuse, or Misuse?," *Journal of Management*, 38 (1), 278-313-313.
- Boyt, Tom and Michael Harvey (1997), "Classification of Industrial Services: A Model with Strategic Implications," *Industrial Marketing Management*, 26 (4), 291-300.
- Brady, Michael K., J. Joseph Cronin, and Richard R. Brand (2002), "Performance-Only Measurement of Service Quality: A Replication and Extension," *Journal of Business Research*, 55 (1), 17-31.
- Brady, Michael K. and J. Joseph Cronin Jr (2001a), "Customer Orientation: Effects on Customer Service Perceptions and Outcome Behaviors," *Journal of Service Research*, 3 (3), 241.
- (2001b), "Some New Thoughts on Conceptualizing Perceived Service Quality: A Hierarchical Approach," *Journal of Marketing*, 65 (3), 34-49.
- Brady, Tim and Andrew Davies (2004), "Building Project Capabilities: From Exploratory to Exploitative Learning," *Organization Studies*, 25 (9), 1601-1621.
- Brady, Tim, Andrew Davies, and David Gann (2005), "Creating Value by Delivering Integrated Solutions," *International Journal of Project Management*, 23, 360-365.
- Brandt, D. Randall (1988), "How Service Marketers Can Identify Value-Enhancing Service Elements," *Journal of Services Marketing*, 2 (3), 35-41.
- Brax, Saara. A. and Katrin Jonsson (2009), "Developing Integrated Solution Offerings for Remote Diagnostics: A Comparative Case Study of Two Manufacturers," *International Journal of Operations & Production Management*, 29 (5), 539-560.
- Breidbach, Christoph F., Darl G. Kolb, and Ananth Srinivasan (2013), "Connectivity in Service Systems: Does Technology-Enablement Impact the Ability of a Service System to Co-Create Value?," *Journal of Service Research*.
- Brodie, Roderick J, Nicole E Coviello, and Heidi Winklhofer (2008), "Contemporary Marketing Practices Research Program: A Review of the First Decade," *Journal of Business & Industrial Marketing*, 23 (2), 84-94.
- Brodie, Roderick J., Nicole E. Coviello, Richard W. Brookes, and Victoria Little (1997), "Towards a Paradigm Shift in Marketing? An Examination of Current Marketing Practices," *Journal of Marketing Management*, 13 (5), 383-406.
- Brodie, Roderick J., Michael Saren, and Jaqueline Pels (2011), "Theorizing About the Service Dominant Logic: The Bridging Role of Middle Range Theory," *Marketing Theory*, 11 (1), 75-91.
- Brown, Stephen W. (2000), "The Move to Solutions Providers," *Marketing Management*, 9 (1), 10-11.
- Brown, Tom J., Gilbert A. Churchill Jr, and J. Paul Peter (1993), "Research Note: Improving the Measurement of Service Quality," *Journal of Retailing*, 69 (1), 127.
- Brown, Tom J., John C. Mowen, D. Todd Donavan, and Jane W. Licata (2002), "The Customer Orientation of Service Workers: Personality Trait Effects on Self- and Supervisor Performance Ratings," *Journal of Marketing Research*, 39 (1), 110-119.

- Bruhn, Manfred (2011), "Commodities im Dienstleistungsbereich," in *Commodity Marketing*. Wiesbaden: Gabler.
- Brusoni, Stefano, Andrea Prencipe, and Keith Pavitt (2001), "Knowledge Specialization, Organizational Coupling, and the Boundaries of the Firm: Why Do Firms Know More Than They Make?," *Administrative Science Quarterly*, 46 (4), 597-621.
- Bryman, Alan (1984), "The Debate About Quantitative and Qualitative Research: A Question of Method or Epistemology?," *British Journal of Sociology*, 75-92.
- (2004), *Social Research Methods* (2 ed.). Oxford: Oxford University Press.
- Bundschuh, Russell G. and Theodore M. Dezvane (2003), "How to Make after-Sales Services Pay Off," *McKinsey Quarterly* (4), 116-127.
- Buriánek, Ferdinand, Sebastian Bonnemeier, Christoph Ihl, and Ralf Reichwald (2007), "Typologisierung Hybrider Produkte". Technische Universität München, München.
- Burstein, Meyer L. (1960), "The Economics of Tie-in Sales," *The Review of Economics and Statistics*, 42 (1), 68-73.
- Buse, Christian, Jörg Freiling, and Sven Weissenfels (2001), "Turning Product Business into Service Business: Performance Contracting as a Challenge of Sme Customer/Supplier Networks," presented at the 17. Annual IMP Conference, Oslo
- Byrne, Barbara M. and Gail Crombie (2003), "Modeling and Testing Change: An Introduction to the Latent Growth Curve Model," *Understanding Statistics*, 2 (3), 177-203.
- Campbell, Donald T. and Donald W. Fiske (1959), "Convergent and Discriminant Validation by the Multitrait-Multimethod Matrix," *Psychological Bulletin*, 56 (2), 81.
- Cantù, Chiara, Daniela Corsaro, Renato Fiocca, and Annalisa Tunisini (2013), "IMP Studies: A Bridge between Tradition and Innovation," *Industrial Marketing Management*, 42 (7), 1007–1016.
- Cantù, Chiara, Daniela Corsaro, and Ivan Snehota (2012), "Roles of Actors in Combining Resources into Complex Solutions," *Journal of Business Research*, 65 (2), 139-150.
- Carman, James M. and Eric Langeard (1980), "Growth Strategies for Service Firms," *Strategic Management Journal*, 1 (1), 7-22.
- Carroll, Glenn R (1984), "Organizational Ecology," *Annual Review of Sociology*, 10, 71-93.
- Ceci, Federica and Andrea Prencipe (2008), "Configuring Capabilities for Integrated Solutions: Evidence from the It Sector," *Industry & Innovation*, 15 (3), 277-296.
- Cerasale, Mark and Merlin Stone (2004), *Business Solutions on Demand: Transform the Business to Deliver Real Customer Value*. London: Kogan Page.
- Cespedes, Frank V., Alston Gardner, Steve Kerr, Randall D. Kelley, and Andrea L. Dixon (2006), "Old Hand or New Blood?," *Harvard Business Review*, 84 (7/8), 28-40.
- Chae, Bongsug (2012), "A Framework for New Solution Development: An Adaptive Search Perspective," *The Service Industries Journal*, 32 (1), 127-149.

- Challagalla, Goutam, R. Venkatesh, and Ajay K. Kohli (2009), "Proactive Postsales Service: When and Why Does It Pay Off?," *Journal of Marketing*, 73 (2), 70-87.
- Charles, Shepherd. and Pervaiz K. Ahmed (2000), "From Product Innovation to Solutions Innovation: A New Paradigm for Competitive Advantage," *European Journal of Innovation Management*, 3 (2), 100-106.
- Cheng, Cheng-Feng, Man-Ling Chang, and Chu-Shiu Li (2013), "Configural Paths to Successful Product Innovation," *Journal of Business Research*, 66 (12), 2561–2573.
- Cheung, Gordon W. and Roger B. Rensvold (2002), "Evaluating Goodness-of-Fit Indexes for Testing Measurement Invariance," *Structural equation modeling*, 9 (2), 233-255.
- Chin, Wynne W. (1998), "The Partial Least Squares Approach to Structural Equation Modeling," in *Modern Methods for Business Research*, George A. Marcoulides, ed. Mahwah: Lawrence Erlbaum Associates Publishers.
- Chin, WynneW (2010), "How to Write up and Report PLS Analyses," in *Handbook of Partial Least Squares*, Vincenzo Esposito Vinzi and Wynne W. Chin and Jörg Henseler and Huiwen Wang, eds. Berlin: Springer.
- Chiou, Jyh-Shen and Cornelia Droge (2006), "Service Quality, Trust, Specific Asset Investment, and Expertise: Direct and Indirect Effects in a Satisfaction-Loyalty Framework," *Journal of the Academy of Marketing Science*, 34 (4), 613-627.
- Christensen, Ronald (1997), *Log-Linear Models and Logistic Regression* (2nd. ed.). New York: Spinger.
- Churchill, Gilbert A. (1979), "A Paradigm for Developing Better Measures of Marketing Constructs," *Journal of Marketing Research*, 16 (1), 64-73.
- Clogg, Clifford C. (1995), "Latent Class Models," in *Handbook of Statistical Modeling for the Social and Behavioral Sciences*, Gerhard Aminger and Clifford C. Clogg and Michael E. Sobel, eds. New York: Plenum Press.
- Coase, Ronald H. (1937), "The Nature of the Firm," *Economica*, 4 (16), 386-405.
- (1960), "The Problem of Social Cost," *Journal of Law and Economics*, 3, 1-44.
- Cohen, Jacob (1983), "The Cost of Dichotomization," *Applied Psychological Measurement*, 7 (3), 249-253.
- (1977), *Statistical Power Analysis for the Behavioral Sciences*. Mahwah: Lawrence Erlbaum Associates.
- Cohen, Merris A., Carl Cull, Hau L. Lee, and Don Willen (2000), "Saturn's Supply-Chain Innovation: High Value in after-Sales Service.," *Sloan Management Review*, 41 (4).
- Cohen, Morris A., Narendra Agrawal, and Vipul Agrawal (2006), "Winning in the Aftermarket," *Harvard Business Review*, 84 (5), 129-138.
- Collins, Linda M. and Brian P. Flaherty (2002), "Latent Class Models for Longitudinal Data," in *Applied Latent Class Analysis*, Jacques A. Hagenaars and Allan L. McCutcheon, eds. Cambridge: Cambridge University Press.
- Collins, Linda M. and Stephanie T. Lanza (2010), *Latent Class and Latent Transition Analysis with Applications in the Social, Behavioral, and Health Sciences*. Hoboken: Wiley.

- Committee for the Economic Sciences Prize (2010), "Scientific Background: Oliver E. Williamson's Contributions to Transaction Cost Economics," *Journal of Retailing*, 86 (3), 211-214.
- Constantinides, Efthymios (2006), "The Marketing Mix Revisited: Towards the 21st Century Marketing," *Journal of Marketing Management*, 22 (3-4), 407-438.
- Converse, Paul D. (1945), "The Development of the Science of Marketing: An Exploratory Survey," *Journal of Marketing*, 10 (1), 14-23.
- Cornet, Edward, Raul Katz, Richard Molloy, Jens Schädler, Deven Sharma, and Andrew Tipping (2000), "Customer Solutions: From Pilots to Profits," *Booz Allen & Hamilton, New York*.
- Cova, Bernard and Karin Holstius (1993), "How to Create Competitive Advantage in Project Business," *Journal of Marketing Management*, 9 (2), 105-121.
- Cova, Bernard and Robert Salle (2007), "Introduction to the Imm Special Issue on 'Project Marketing and the Marketing of Solutions': A Comprehensive Approach to Project Marketing and the Marketing of Solutions," *Industrial Marketing Management*, 36 (2), 138-146.
- (2008), "Marketing Solutions in Accordance with the S-D Logic: Co-Creating Value with Customer Network Actors," *Industrial Marketing Management*, 37 (3), 270-277.
- Coviello, Nicole E. and Roderick J. Brodie (2001), "Contemporary Marketing Practices of Consumer and Business-to-Business Firms: How Different Are They?," *Journal of Business & Industrial Marketing*, 16 (5), 382-400.
- Coviello, Nicole E., Roderick J. Brodie, Peter J. Danaher, and Wesley J. Johnston (2002), "How Firms Relate to Their Markets: An Empirical Examination of Contemporary Marketing Practices," *Journal of Marketing*, 66 (3), 33-46.
- Cronin Jr, J. Joseph and Steven A. Taylor (2004), "Servperf Versus SERVQUAL: Reconciling Performance-Based and Perceptions-Minus-Expectations," *Journal of Marketing*, 58 (1), 125.
- Crook, T. Russell, David J. Ketchen, James G. Combs, and Samuel Y. Todd (2008), "Strategic Resources and Performance: A Meta-Analysis," *Strategic Management Journal*, 29 (11), 1141-1154.
- Croon, Marcel (2002), "Ordering the Classes," in *Applied Latent Class Analysis*, Jacques A. Hagenaars and Allan L. McCutcheon, eds. Cambridge: Cambridge University Press.
- Cross, Mark E., Thomas G. Brashear, Edward E. Rigdon, and Danny N. Bellenger (2007), "Customer Orientation and Salesperson Performance," *European Journal of Marketing*, 41 (7/8), 821-835.
- Crowe, Ellen and E. Tory Higgins (1997), "Regulatory Focus and Strategic Inclinations: Promotion and Prevention in Decision-Making," *Organizational Behavior and Human Decision Processes*, 69 (2), 117-132.
- Dabholkar, Pratibha A. and Jeffrey W. Overby (2005), "Linking Process and Outcome to Service Quality and Customer Satisfaction Evaluations: An Investigation of Real Estate Agent Service," *International Journal of Service Industry Management*, 16 (1), 10-27.
- Dachs, Bernhard, Sabine Biege, Martin Borowiecki, Gunter Lay, Angela Jager, and Doris Scharinger (2014), "Servitisation of European Manufacturing:

- Evidence from a Large Scale Database," *Service Industries Journal*, 34 (1), 5-23.
- Danaher, Peter J., Denise M. Conroy, and Janet R. McColl-Kennedy (2008), "Who Wants a Relationship Anyway? Conditions When Consumers Expect a Relationship with Their Service Provider," *Journal of Service Research*, 11 (1), 43-62.
- Daniel, Kerry. and David N. Darby (1997), "A Dual Perspective of Customer Orientation: A Modification, Extension and Application of the SOCO Scale," *International Journal of Service Industry Management*, 8 (2), 131-147.
- Darby, Michael R. and Edi Karni (1973), "Free Competition and the Optimal Amount of Fraud," *Journal of Law & Economics*, 16 (1), 67-88.
- Darlington, Richard B. and Andrew F. Hayes (2000), "Combining Independent P Values: Extensions of the Stouffer and Binomial Methods," *Psychological Methods*, 5 (4), 496.
- Davenport, Thomas H (2005), "The Coming Commoditization of Processes," *Harvard Business Review*, 83 (6), 100-108.
- Davies, Andrew (2004), "Moving Base into High-Value Integrated Solutions: A Value Stream Approach.," *Industrial and Corporate Change*, 13 (5), 727-756.
- Davies, Andrew and Tim Brady (2000), "Organisational Capabilities and Learning in Complex Product Systems: Towards Repeatable Solutions," *Research Policy*, 29 (7-8), 931-953.
- Davies, Andrew, Tim Brady, and Michael Hobday (2006), "Charting a Path toward Integrated Solutions," *MIT Sloan Management Review*, 47 (3), 39 - 48.
- (2007), "Organizing for Solutions: Systems Seller vs. Systems Integrator," *Industrial Marketing Management*, 36 (2), 183-193.
- Davies, Andrew and Michael Hobday (2006), "Strategies for Solutions," in *Commercial Management of Projects: Defining the Discipline*, David Lowe and Roine Leiringer, eds.: Blackwell Publishing.
- Davis, Fred D., Richard P. Bagozzi, and Paul R. Warshaw (1989), "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management Science*, 35 (8), 982-1004.
- Day, George S. (1994), "The Capabilities of Market-Driven Organizations," *Journal of Marketing*, 58 (4), 37-52.
- de Winter, Jost C.F (2013), "Using the Student's T-Test with Extremely Small Sample Sizes " *Practical Assessment, Research & Evaluation*, 18 (10), 1-13.
- DeCoster, Jamie, Anne-Marie R. Iselin, and Marcello Gallucci (2009), "A Conceptual and Empirical Examination of Justifications for Dichotomization," *Psychological Methods*, 14 (4), 349-366.
- Della Porta, Donatella (2008), "Comparative Analysis: Case-Oriented Versus Variable-Oriented Research," in *Approaches and Methodologies in the Social Sciences*, Donatella Della Porta and Michael Keating, eds. Oxford: University Press.
- Dellaert, Benedict G.C. and Stefan Stremersch (2005), "Marketing Mass-Customized Products: Striking a Balance between Utility and Complexity," *Journal of Marketing Research*, 42 (2), 219-227.

- Demers, Christiane (2007), *Organizational Change Theories: A Synthesis*. Thousand Oaks: Sage.
- Demsetz, Harold (1967), "Toward a Theory of Property Rights," *The American Economic Review*, 57 (2), 347-359.
- Digman, John M. (1990), "Personality Structure: Emergence of the Five-Factor Model," *Annual Review of Psychology*, 41 (1), 417-440.
- Doster, Daniel and Eric Roegner (2000), "Setting the Pace with Solutions," *Marketing Management*, 9 (1), 51-54.
- Doty, D. Harold and William H. Glick (1994), "Typologies as a Unique Form of Theory Building: Toward Improved Understanding and Modeling," *Academy of Management Review*, 19 (2), 230-251.
- Doty, D. Harold, William H. Glick, and George P. Huber (1993), "Fit, Equifinality, and Organizational Effectiveness: A Test of Two Configurational Theories," *Academy of Management Journal*, 36 (6), 1196-1250-1250.
- Dowling, Grahame R. (1983), "The Application of General Systems Theory to an Analysis of Marketing Systems," *Journal of Macromarketing*, 3 (2), 22-32.
- Drazin, Robert and Andrew H. Van De Ven (1985), "Alternative Forms of Fit in Contingency Theory," *Administrative Science Quarterly*, 30 (4), 514-539.
- Drucker, Peter F. (1973), *Management: Tasks, Responsibilities, Practices* New York: Harper Business.
- (1954), *The Practice of Management* (3 ed.). New York: Harper Business.
- Dubois, Anna and Lars-Erik Gadde (2002), "Systematic Combining: An Abductive Approach to Case Research," *Journal of Business Research*, 55 (7), 553-560.
- Duffy, Bobby, Kate Smith, George Terhanian, and John Bremer (2005), "Comparing Data from Online and Face-to-Face Surveys," *International Journal of Market Research*, 47 (6), 615-639.
- Dumouchel, William (1999), "Bayesian Data Mining in Large Frequency Tables, with an Application to the Fda Spontaneous Reporting System," *The American Statistician*, 53 (3), 177-190.
- Duncan, Robert B. (1976), "The Ambidextrous Organization: Designing Dual Structures for Innovation," in *The Management of Organization*, Ralph H. Kilmann and Louis R. Pondy and Dennis P. Slevin, eds. New York: New Holland.
- Duncan, Terry E. and Susan C. Duncan (1995), "Modeling the Processes of Development Via Latent Variable Growth Curve Methodology," *Structural Equation Modeling: A Multidisciplinary Journal*, 2 (3), 187-213.
- Duncan, Terry E., Susan C. Duncan, and Lisa A. Strycker (2006), *An Introduction to Latent Variable Growth Curve Modeling: Concepts, Issues, and Application*. Mahwah: Lawrence Erlbaum Associates.
- Dunn Jr., Dan T. and Claude A. Thomas (1986), "Strategy for Systems Sellers: A Grid Approach," *The Journal of Personal Selling and Sales Management*, 1-10.
- Dwyer, F. Robert, Paul H. Schurr, and Sejo Oh (1987), "Developing Buyer-Seller Relationships," *Journal of Marketing*, 51 (2), 11-27.
- Egan, John (2008), *Relationship Marketing: Exploring Relational Strategies in Marketing* (3 ed.). London: Pearson.

- Eggert, Andreas, Jens Hogreve, Wolfgang Ulaga, and Eva Muenkhoff (2011), "Industrial Services, Product Innovations, and Firm Profitability: A Multiple-Group Latent Growth Curve Analysis," *Industrial Marketing Management*, 40 (5), 661-670.
- (2014), "Revenue and Profit Implications of Industrial Service Strategies," *Journal of Service Research*, 17 (1), 23-39.
- Eggert, Andreas and Wolfgang Ulaga (2002), "Customer Perceived Value: A Substitute for Satisfaction in Business Markets?," *Journal of Business & Industrial Marketing*, 17 (2/3), 107-118.
- Eisenhardt, Kathleen M. (1989a), "Agency Theory: An Assessment and Review," *Academy of Management Review*, 14 (1), 57-74.
- (1989b), "Building Theories from Case Study Research," *Academy of Management Review*, 14 (4), 532-550.
- Eisenhardt, Kathleen M. and Jeffrey A. Martin (2000), "Dynamic Capabilities: What Are They?," *Strategic Management Journal*, 21 (10-11), 1105-1121.
- Eisinga, Rob, Manfredte Grotenhuis, and Ben Pelzer (2013), "The Reliability of a Two-Item Scale: Pearson, Cronbach, or Spearman-Brown?," *International Journal of Public Health*, 58 (4), 637-642.
- Engelhardt, Werner H., Michael Kleinaltenkamp, and Martin Reckenfelderbäumer (1993), "Leistungsbündel als Absatzobjekte. Ein Ansatz zur Überwindung der Dichotomie von Sach- und Dienstleistungen," *Zeitschrift für betriebswirtschaftliche Forschung*, 45 (5), 395-426.
- Eppen, Gary D., Ward A. Hanson, and R. Kipp. Martin (1991), "Bundling - New Products, New Markets, Low Risk," *Sloan Management Review*, 32 (4), 7-14.
- Etgar, Michael (1976), "Effects of Administrative Control on Efficiency of Vertical Marketing Systems," *Journal of Marketing Research*, 13 (1), 12-24.
- Evanschitzky, Heiner, Florian v. Wangenheim, and David M. Woisetschläger (2011), "Service & Solution Innovation: Overview and Research Agenda," *Industrial Marketing Management*, 40 (5), 657-660.
- Fang, Eric, Robert W. Palmatier, and Jan-Benedict E. M. Steenkamp (2008), "Effect of Service Transition Strategies on Firm Value," *Journal of Marketing*, 72 (5), 1-14.
- Fang, Shyh-Rong, Yong-Sheng Chang, and Yan-Chiun Peng (2011), "Dark Side of Relationships: A Tensions-Based View," *Industrial Marketing Management*, 40 (5), 774-784.
- Feldges, Dominik (2013), "Diagnostik-Branche verliert an Glanz," *Finanz und Wirtschaft*, 11.09.2013.
- Fenn, Jackie and Mark Raskino (2008), *Mastering the Hype Cycle: How to Choose the Right Innovation at the Right Time*. Harvard: Harvard Business Press.
- Field, Andy (2013), *Discovering Statistics Using IBM SPSS Statistics* (4. ed.). London: Sage Publications.
- Finch, W. Holmes and Kendall Cotton Bronk (2011), "Conducting Confirmatory Latent Class Analysis Using Mplus," *Structural Equation Modeling: A Multidisciplinary Journal*, 18 (1), 132-151.
- Finne, Max, Saara Brax, and Jan Holmström (2013), "Reversed Servitization Paths: A Case Analysis of Two Manufacturers," *Service Business*, 7 (4), 513-537.

- Finne, Max, Mari Tanskanen, and Saara Brax (2012), "Path Dependence Approach to Servitization: A Case Study with Two Companies," *Journal of Service Business*, 25 (6), 15-33.
- Firat, A. Fuat, Nikhilesh Dholakia, and Alladi Venkatesh (1995), "Marketing in a Postmodern World," *European Journal of Marketing*, 29 (1), 40-56.
- Fischer, Marc (1993), *Make-or-Buy-Entscheidungen im Marketing*. Wiesbaden: Gabler Verlag.
- Fischhoff, Baruch and Ruth Beyth (1975), "I Knew It Would Happen: Remembered Probabilities of Once-Future Things," *Organizational Behavior and Human Performance*, 13 (1), 1-16.
- Fiss, Peer C. (2011), "Building Better Causal Theories : A Fuzzy Set Approach to Typologies in Organization Research," *Academy of Management Journal*, 54 (2), 393-420.
- (2007), "A Set-Theoretic Approach to Organizational Configurations," *Academy of Management Review*, 32 (4), 1180-1198.
- Foote, Nathaniel W., Jay R. Galbraith, Quentin Hope, and Danny Miller (2001), "Making Solutions the Answer," *McKinsey Quarterly* (3), 84-93.
- Ford, David (1980), "The Development of Buyer-Seller Relationships in Industrial Markets," *European Journal of Marketing*, 14 (5/6), 339.
- Ford, Gary T., Darlene B. Smith, and John L. Swasy (1988), "An Empirical Test of the Search, Experience and Credence Attributes Framework," in *Advances in Consumer Research*, Michael J. Houston, ed. Vol. 15. Provo: Association for Consumer Research.
- Fornell, Claes, Michael D. Johnson, Eugene W. Anderson, Cha Jaesung, and Barbara Everitt Bryant (1996), "The American Customer Satisfaction Index: Nature, Purpose, and Findings," *Journal of Marketing*, 60 (4), 7-18.
- Fornell, Claes and David F. Larcker (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research*, 18 (1), 39-50.
- (1987), "A Second Generation of Multivariate Analysis: Classification of Methods and Implications for Marketing Research," *Review of marketing*, 87, 407-450.
- Forrester, Jay W. (1995), "The Beginning of System Dynamics," *McKinsey Quarterly* (4), 4-17.
- (1958), "Industrial Dynamics," *Harvard Business Review*, 36 (4), 37-66.
- Frambach, Ruud T., Peer C. Fiss, and Paul T.M. Ingenbleek (2010), "When Does Costumer Orientation Pay Off? A Configurational Analysis of the Performance Effects of Orientations, Strategies, and Market Conditions." Steamboat Springs: University of Amsterdam.
- Frambach, Ruud T., Inge Wels-Lips, and Arjan Gundlach (1997), "Proactive Product Service Strategies: An Application in the European Health Market," *Industrial Marketing Management*, 26 (4), 341-352.
- Franke, George R. and Jeong-Eun Park (2006), "Salesperson Adaptive Selling Behavior and Customer Orientation: A Meta-Analysis," *Journal of Marketing Research*, 43 (4), 693-702.

- Franke, Nikolaus, Peter Keinz, and Christoph J. Steger (2009), "Testing the Value of Customization: When Do Customers Really Prefer Products Tailored to Their Preferences?," *Journal of Marketing*, 73 (5), 103-121-121.
- Frauendorf, Janine, Elena Kähm, and Michael Kleinaltenkamp (2007), "Business-to-Business Markets – Status Quo and Future Trends," *Journal of Business Market Management*, 1 (1), 7-40.
- Freeman, John (1977), "The Population Ecology of Organizations," *American Journal of Sociology*, 82 (5), 929-964.
- Frösén, Johanna, Matti Jaakkola, Jukka Luoma, and Henriikki Tikkanen (2013), "Combining Different Forms of Marketing Control: A Configurational Approach to Marketing Performance Measurement and Market Orientation". Las Vegas.
- Frost (2010), "Strategic Analysis of the Global in Vitro Diagnostics Market". Frost & Sullivan, San Antonio.
- Frühwirth-Schnatter, Sylvia (2006), *Finite Mixture and Markov Switching Models*. New York: Springer.
- Funke, Stefan, Patrick Mair, Alexander von Eye, and Joachim Harloff (2011), "CFA: Analysis of Configuration Frequencies (CFA)". Computer program.
- Galbraith, Jay R. (2005a), "Become Customer-Centric," *T+D*, 59 (10), 14-15.
- (2005b), *Designing the Customer-Centric Organization: A Guide to Strategy, Structure, and Process*. San Francisco: Jossey-Bass.
- (2002), "Organizing to Deliver Solutions," *Organizational Dynamics*, 31 (2), 194-207.
- Gann, David M. and Ammon J. Salter (2000), "Innovation in Project-Based, Service-Enhanced Firms: The Construction of Complex Products and Systems," *Research Policy*, 29 (7-8), 955-972.
- Ganter, Alois and Achim Hecker (2014), "Configurational Paths to Organizational Innovation: Qualitative Comparative Analyses of Antecedents and Contingencies," *Journal of Business Research*, 67 (6), 1285–1292.
- Gardner, David M., Frank Johnson, Moonkyu Lee, and Ian Wilkinson (2000), "A Contingency Approach to Marketing High Technology Products," *European Journal of Marketing*, 34 (9/10), 1053-1077.
- Gatignon, Aline and Hubert Gatignon (2010), "Erin Anderson and the Path Breaking Work of TCE in New Areas of Business Research: Transaction Costs in Action," *Journal of Retailing*, 86 (3), 232-247.
- Gebauer, Heiko (2008), "Identifying Service Strategies in Product Manufacturing Companies by Exploring Environment-Strategy Configurations," *Industrial Marketing Management*, 37 (3), 278-291.
- (2007), "An Investigation of Antecedents for the Development of Customer Support Services in Manufacturing Companies," *Journal of Business-to-Business Marketing*, 14 (3), 59-96.
- Gebauer, Heiko, Bo Edvardsson, Anders Gustafsson, and Lars Witell (2010), "Match or Mismatch: Strategy-Structure Configurations in the Service Business of Manufacturing Companies," *Journal of Service Research*, 13 (2), 198-215.
- Gebauer, Heiko, Marco Paiola, and Nicola Saccani (2013), "Characterizing Service Networks for Moving from Products to Solutions," *Industrial Marketing Management*, 42 (1), 31-46.

- Geiser, Christian (2011), *Datenanalyse Mit Mplus: eine Anwendungsorientierte Einführung*. Wiesbaden: VS Verlag.
- Gerstner, Louis V. (2002), *Who Says Elephants Can't Dance?: Inside Ibm's Historic Turnaround*. New York: HarperCollins.
- Geyskens, Inge, Jan-Benedict E. M. Steenkamp, and Nirmalya Kumar (2006), "Make, Buy, or Ally: A Transaction Cost Theory Meta-Analysis," *Academy of Management Journal*, 49 (3), 519-543.
- Ghosh, Mrinal, Shantanu Dutta, and Stefan Stremersch (2006), "Customizing Complex Products: When Should the Vendor Take Control?," *Journal of Marketing Research*, 43 (4), 664-679.
- Gibson, Cristina B. and Julian Birkinshaw (2004), "The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity," *Academy of Management Journal*, 47 (2), 209-226.
- Gilmore, James H. and B. Joseph Pine II (1997), "The Four Faces of Mass Customization," *Harvard Business Review*, 75 (1), 91-101.
- Ginsberg, Ari and N. Venkatraman (1985), "Contingency Perspectives If Organizational Strategy: A Critical Review of the Empirical Research," *Academy of Management Review*, 10 (3), 421-434.
- Glas, Andreas H. (2012), *Public Performance-Based Contracting: Ergebnisorientierte Beschaffung und leistungsabhängige Preise im öffentlichen Sektor*. Wiesbaden: Springer.
- Goad, Emily A. and Fernando Jaramillo (2014), "The Good, the Bad and the Effective: A Meta-Analytic Examination of Selling Orientation and Customer Orientation on Sales Performance," *Journal of Personal Selling & Sales Management*, in press.
- Goedkoop, Mark J., Cees J.G. van Halen, Harry R.M. te Riele, and Peter J.M. Rommens (1999), "Product Service Systems: Ecological and Economic Basics". PRé Consultants, The Netherlands.
- Goo, Jahyun, Rajiv Kishore, H. Raghav Rao, and Kichan Nam (2009), "The Role of Service Level Agreements in Relational Management of Information Technology Outsourcing: An Empirical Study," *Management Information Systems Quarterly*, 33 (1), 119-146.
- Goodman, Leo A. (2002), "Latent Class Analysis: The Empirical Study of Latent Types, Latent Variables, and Latent Structures," in *Applied Latent Class Analysis*, Jacques A. Hagenaars and Allan L. McCutcheon, eds. Cambridge: Cambridge University Press.
- Gordon, Theodore J. and Howard Hayward (1968), "Initial Experiments with the Cross Impact Matrix Method of Forecasting," *Futures*, 1 (2), 100-116.
- Gounaris, Spiros (2005), "Measuring Service Quality in B2b Services: An Evaluation of the SERVQUAL Scale "Vis-À-Vis" the Indserv Scale," *Journal of Services Marketing*, 19 (6), 421-435.
- Grayson, Kent (2007), "Friendship Versus Business in Marketing Relationships," *Journal of Marketing*, 71 (4), 121-139.
- Grayson, Kent and Tim Ambler (1999), "The Dark Side of Long-Term Relationships in Marketing Services," *Journal of Marketing Research*, 36 (1), 132-141.
- Grewal, Rajdeep and Gary L. Lilien (2012), "Business-to-Business Marketing: Looking Back, Looking Forward," in *Handbook of Business-to-Business*

- Marketing*, Gary L. Lilien and Rajdeep Grewal, eds. Cheltenham: Edward Elgar.
- Grimsey, Darrin and Mervyn K. Lewis (2004), *Public and Private Partnerships. The Worldwide Revolution in Infrastructure Provision and Project Finance*. Cheltenham: Edward Elgar.
- Grönroos, Christian (1982), "An Applied Service Marketing Theory," *European Journal of Marketing*, 16 (7), 30-41.
- (1997), "From Marketing Mix to Relationship Marketing - Towards a Paradigm Shift in Marketing," *Management Decision*, 35 (4), 322-339.
- (2001), "The Perceived Service Quality Concept – a Mistake?," *Managing Service Quality*, 11 (3), 150-152.
- (1994), "Quo Vadis, Marketing? Toward a Relationship Marketing Paradigm," *Journal of Marketing Management*, 10 (5), 347-360.
- (1990), "Relationship Approach to Marketing in Service Contexts: The Marketing and Organizational Behavior Interface," *Journal of Business Research*, 20 (1), 3-11.
- (1984), "A Service Quality Model and Its Marketing Implications," *European Journal of Marketing*, 18 (4), 36-44.
- Grüner, Hans (2011), "CFA (Configural Frequency Analysis). SPSS Dialogue". FU Berlin.
- Gschwandtner, Gerhard (1987), "An Interview with Buck Rodgers: Selling Solutions at IBM," *Management Review*, 76 (7), 48.
- Guiltinan, Joseph P. (1987), "The Price Bundling of Services: A Normative Framework," *Journal of Marketing*, 51 (2), 74-85.
- Gulati, Ranjay (2007), "Silo Busting: Breaking Down Barriers to Build High-Growth Organizations," *Harvard Business Review*, 85 (5), 98-108.
- Gummesson, Evert (1994), "Broadening and Specifying Relationship Marketing," *Asia-Australia Marketing Journal*, 2 (1), 31-43.
- (1987), "The New Marketing—Developing Long-Term Interactive Relationships," *Long Range Planning*, 20 (4), 10-20.
- (1978), "Toward a Theory of Professional Service Marketing," *Industrial Marketing Management*, 7 (2), 89-95.
- Gummesson, Evert and Christian Grönroos (2012), "The Emergence of the New Service Marketing: Nordic School Perspectives," *Journal of Service Management*, 23 (4), 479-497.
- Günter, Bernd (1979), *Das Marketing von Großanlagen - Strategieprobleme des Systems Selling*. Berlin: Duncker & Humblot.
- Gwinner, Kevin P., Mary Jo Bitner, Stephen W. Brown, and Ajith Kumar (2005), "Service Customization through Employee Adaptiveness," *Journal of Service Research*, 8 (2), 131-148.
- Hadjikhani, Amjad and Peter LaPlaca (2013), "Development of B2B Marketing Theory," *Industrial Marketing Management*, 42 (3), 294-305.
- Hagerty, Michael R., James M. Carman, and Gary J. Russell (1988), "Estimating Elasticities with PIMS Data: Methodological Issues and Substantive Implications," *Journal of Marketing Research*, 25 (1), 1-9.

- Hair, Joseph F., G. Tomas M. Hult, Christian Ringle, and Marko Sarstedt (2013), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Los Angeles: SAGE.
- Hair, Joseph F., Christian M. Ringle, and Marko Sarstedt (2011), "PLS-SEM: Indeed a Silver Bullet," *Journal of Marketing Theory and Practice*, 19 (2), 139-152.
- Håkansson, Håkan (1982), *International Marketing and Purchasing of Industrial Goods*. Chichester: Wiley.
- Halinen, Aino (1997), *Relationship Marketing in Professional Services: A Study of Agency-Client Dynamics in the Advertising Sector*. London: Routledge.
- Hanan, Mack (2009), *Consultative Selling* (8. ed.). New York: Amacom.
- Hanan, Mack, James J. Cribbin, and Herman C. Heiser (1970), *Consultative Selling*. New York: Amacom.
- Hancock, Gregory R. and Ralph O. Mueller (2010), *The Reviewer's Guide to Quantitative Methods in the Social Sciences*. New York: Routledge.
- Hannaford, William J. (1974), "Contractually Integrated Systems for the Marketing of Industrial Supplies," *Journal of the Academy of Marketing Science*, 2 (4), 567-581.
- (1976), "Systems Selling: Problems and Benefits for Buyers and Sellers," *Industrial Marketing Management*, 5 (2-3), 139-145.
- Hannan, Michael T. and John Freeman (1989), *Organizational Ecology*. Harvard: Harvard University Press.
- Hanson, Ward and R. Kipp Martin (1990), "Optimal Bundle Pricing," *Management Science*, 36 (2), 155-174.
- Harris, Judy and Edward A. Blair (2006), "Functional Compatibility Risk and Consumer Preference for Product Bundles," *Journal of the Academy of Marketing Science*, 34 (1), 19-26.
- Hart, Christopher W.L. (1995), "Mass Customization: Conceptual Underpinnings, Opportunities and Limits," *International Journal of Service Industry Management*, 6 (2), 36-45.
- Harvey, David (1969), *Explanation in Geography*. London: Edward Arnold.
- Havránek, Tomas and Gustav A. Lienert (1984), "Local and Regional Vs. Global Contingency Testing," *Biometrical journal*, 26 (5), 483-494.
- Hax, Arnaldo C and Dean L Wilde II (2003), "The Delta Model-a New Framework of Strategy," *Journal of Strategic Management Education*, 1 (1), 1-21.
- Hax, Arnaldo C. and Dean L. Wilde II (1999), "The Delta Model: Adaptive Management for a Changing World," *Sloan Management Review*, 40 (2), 11-28.
- Hax, Herbert (1991), "Theorie der Unternehmung: Information, Anreize und Vertragsgestaltung," in *Betriebswirtschaftslehre und Ökonomische Theorie*, Dieter Ordelheide and Bernd Rudolph and Elke Büsselmann, eds. Stuttgart: Poeschel.
- Hayes, Andrew F. (2009), "Beyond Baron and Kenny: Statistical Mediation Analysis in the New Millennium," *Communication Monographs*, 76 (4), 408-420.
- (2013), *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York: Guilford Press.

- Hedges, Larry V., Harris Cooper, and Brad J. Bushman (1992), "Testing the Null Hypothesis in Meta-Analysis: A Comparison of Combined Probability and Confidence Interval Procedures," *Psychological Bulletin*, 111 (1), 188-194.
- Heide, Jan B. and George John (1992), "Do Norms Matter in Marketing Relationships?," *Journal of Marketing*, 56 (2), 32-44.
- (1988), "The Role of Dependence Balancing in Safeguarding Transaction-Specific Assets in Conventional Channels," *Journal of Marketing*, 52 (1), 20-35.
- Helander, Anton and Kristian Möller (2007), "System Supplier's Customer Strategy," *Industrial Marketing Management*, 36 (6), 719-730.
- (2009), "System Supplier's Roles from Equipment Supplier to Performance Provider," *Journal of Business & Industrial Marketing*, 23 (7/8), 577-585.
- Helfat, Constance E. and Marvin B. Lieberman (2002), "The Birth of Capabilities: Market Entry and the Importance of Pre-History," *Industrial and Corporate Change*, 11 (4), 725-760.
- Helfat, Constance E. and Margaret A. Peteraf (2003), "The Dynamic Resource-Based View: Capability Lifecycles," *Strategic Management Journal*, 24 (10), 997-1010.
- Helm, René (2004), *Vertrieb im Systemgütergeschäft: Gestaltungsparameter für eine Vertriebskonzeption*. Wiesbaden: Gabler.
- Helmer, Olaf and Nicholas Rescher (1959), "On the Epistemology of the Inexact Sciences," *Management Science*, 6 (1), 25-52.
- Hennig-Thurau, Thorsten (2004), "Customer Orientation of Service Employees: Its Impact on Customer Satisfaction, Commitment, and Retention," *International Journal of Service Industry Management*, 15 (5), 460-478.
- Hennig-Thurau, Thorsten and Claudia Thurau (2003), "Customer Orientation of Service Employees — toward a Conceptual Framework of a Key Relationship Marketing Construct," *Journal of Relationship Marketing*, 2 (1-2), 23-41.
- Henseler, Jörg and Wynne W. Chin (2010), "A Comparison of Approaches for the Analysis of Interaction Effects between Latent Variables Using Partial Least Squares Path Modeling," *Structural Equation Modeling: A Multidisciplinary Journal*, 17 (1), 82-109.
- Henseler, Jörg and Georg Fassott (2010), "Testing Moderating Effects in PLS Path Models: An Illustration of Available Procedures," in *Handbook of Partial Least Squares*: Springer.
- Henseler, Jörg, Christian M Ringle, and Rudolf R Sinkovics (2009), "The Use of Partial Least Squares Path Modeling in International Marketing," *Advances in International Marketing*, 20, 277-319.
- Herzberg, Frederick I. (1966), *Work and the Nature of Man*. Cleveland: World Publishing.
- Higgins, E. Tory (1998), "Promotion and Prevention: Regulatory Focus as a Motivational Principle," *Advances in Experimental Social Psychology*, 30 (1), 1-46.
- Hinterhuber, Andreas (2004), "Towards Value-Based Pricing—an Integrative Framework for Decision Making," *Industrial Marketing Management*, 33 (8), 765-778.

- Hobday, Michael, Andrew Davies, and Andrea Prencipe (2005), "Systems Integration: A Core Capability of the Modern Corporation," *Industrial and Corporate Change*, 14 (6), 1109-1143.
- Hobday, Mike (1998), "Product Complexity, Innovation and Industrial Organisation," *Research Policy*, 26 (6), 689-710.
- Hoffer, Charles W. (1975), "Toward a Contingency Theory of Business Strategy," *Academy of Management Journal*, 18 (4), 784-810.
- Homburg, Christian, Martin Artz, and Jan Wieseke (2012), "Marketing Performance Measurement Systems: Does Comprehensiveness Really Improve Performance?," *Journal of Marketing*, 76 (3), 56-77.
- Homburg, Christian, Martin Fassnacht, and Christof Guenther (2003), "The Role of Soft Factors in Implementing a Service-Oriented Strategy in Industrial Marketing Companies," *Journal of Business-to-Business Marketing*, 10 (2), 23-51.
- Homburg, Christian, Wayne D. Hoyer, and Martin Fassnacht (2002a), "Service Orientation of a Retailer's Business Strategy: Dimensions, Antecedents, and Performance Outcomes," *Journal of Marketing*, 66 (4), 86-101.
- Homburg, Christian, Ove Jensen, and Harley Krohmer (2008), "Configurations of Marketing and Sales: A Taxonomy," *Journal of Marketing*, 72 (2), 133-154.
- Homburg, Christian and Phoebe Keibel (2001), "The Impact on Complexity on the Quality Perception of Services," *Schmalenbach Business Review*, 53 (3), 242
- Homburg, Christian, Nicole Koschate, and Wayne D. Hoyer (2005a), "Do Satisfied Customers Really Pay More? A Study of the Relationship between Customer Satisfaction and Willingness to Pay," *Journal of Marketing*, 69 (2), 84-96.
- Homburg, Christian, Sabine Küster, Nikolas Beutin, and Ajay Menon (2005b), "Determinants of Customer Benefits in Business-to-Business Markets: A Cross-Cultural Comparison," *Journal of International Marketing*, 13 (3), 1-31.
- Homburg, Christian, Michael Muller, and Martin Klarmann (2011a), "When Should the Customer Really Be King? On the Optimum Level of Salesperson Customer Orientation in Sales Encounters," *Journal of Marketing*, 75 (2), 55-74-74.
- Homburg, Christian, Matthias Staritz, and Stephan Bingemer (2011b), "Commodity-Differenzierung – Ein branchenübergreifender Ansatz," in *Commodity Marketing*, Margit Enke and Anja Geigenmüller, eds.: Gabler.
- Homburg, Christian, Ruth Stock, and Sven Kühlborn (2005c), "Die Vermarktung von Systemen im Industriegütermarketing," *DBW*, 65 (6), 537-662.
- Homburg, Christian, John P. Workman Jr, and Ove Jensen (2002b), "A Configurational Perspective on Key Account Management," *Journal of Marketing*, 66 (2), 38-60.
- Hoon, Christina (2013), "Meta-Synthesis of Qualitative Case Studies: An Approach to Theory Building," *Organizational Research Methods*, 16 (4), 522-556.
- Hunt, Shelby D (1994), "On Rethinking Marketing: Our Discipline, Our Practice, Our Methods," *European Journal of Marketing*, 28 (3), 13-25.
- Hunt, Shelby D. (2002), *Foundations of Marketing Theory: Toward a General Theory of Marketing*. Armonk: ME Sharpe.

- (1983), "General Theories and the Fundamental Explananda of Marketing," *Journal of Marketing*, 47 (4), 9-17.
- (2013), "A General Theory of Business Marketing: R-A Theory, Alderson, the ISBM Framework, and the IMP Theoretical Structure," *Industrial Marketing Management*, 42 (3), 283-293.
- (2010), *Marketing Theory: Foundations, Controversy, Strategy, Resource-Advantage Theory*. New York: ME Sharpe.
- (1971), "The Morphology of Theory and the General Theory of Marketing," *Journal of Marketing*, 35 (2), 65-68.
- (1976), "The Nature and Scope of Marketing," *Journal of Marketing*, 40 (3), 17-28.
- (1991), "Positivism and Paradigm Dominance in Consumer Research: Toward Critical Pluralism and Rapprochement," *Journal of Consumer Research*, 18 (1), 32.
- Hypko, Phillipp, Meike Tilebein, and Ronald Gleich (2010a), "Benefits and Uncertainties of Performance-Based Contracting in Manufacturing Industries: An Agency Theory Perspective.," *Journal of Service Management*, 21 (4), 460 - 489.
- (2010b), "Clarifying the Concept of Performance-Based Contracting in Manufacturing Industries: A Research Synthesis.," *Journal of Service Management*, 21 (5), 625 - 655.
- IBM (2012), "Newton-Raphson Method (Loglinear Models Algorithms). Help Text for SPSS GENLOG Modul".
- Iyer, Gopalkrishnan R. and Jon M. Shapiro (1999), "Ethnic Entrepreneurial and Marketing Systems: Implications for the Global Economy," *Journal of International Marketing*, 7 (4), 83-110.
- Jacob, Frank, Ulrich Kleipañ, and Alexander Pohl (2014), "Nature and Role of Customer Satisfaction in the Solution Business," *European Management Journal*, 32 (3), 487-498.
- Jacob, Frank and Wolfgang Ulaga (2008), "The Transition from Product to Service in Business Markets: An Agenda for Academic Inquiry," *Industrial Marketing Management*, 37 (3), 247-253.
- Jap, Sandy D. (2001), "Perspectives on Joint Competitive Advantages in Buyer-Supplier Relationships," *International Journal of Research in Marketing*, 18 (1-2), 19-35.
- Jaramillo, Fernando and Douglas B. Grisaffe (2009), "Does Customer Orientation Impact Objective Sales Performance? Insights from a Longitudinal Model in Direct Selling," *Journal of Personal Selling and Sales Management*, 29 (2), 167-178.
- Jaramillo, Fernando, Daniel M. Ladik, Greg W. Marshall, and Jay Prakash Mulki (2007), "A Meta-Analysis of the Relationship between Sales Orientation-Customer Orientation (SOCO) and Salesperson Job Performance," *Journal of Business & Industrial Marketing*, 22 (5), 302-310.
- Jarvis, Cheryl Burke, Scott B. MacKenzie, and Philip M. Podsakoff (2003), "A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research," *Journal of Consumer Research*, 30 (2), 199-218.

- Jaworski, Bernard J. and Ajay K. Kohli (1993), "Market Orientation: Antecedents and Consequences," *Journal of Marketing*, 57 (3), 53.
- Jensen, Michael C. and William H. Meckling (1976), "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics*, 3 (4), 305-360.
- Jiao, Jianxin, Qin Hai Ma, and Mitchell M. Tseng (2003), "Towards High Value-Added Products and Services: Mass Customization and Beyond," *Technovation*, 23 (10), 809-821.
- Johansson, Juliet E., Chandru Krishnamurthy, and Henry E. Schliessberg (2003), "Solving the Solutions Problem.," *McKinsey Quarterly* (3), 116 - 125.
- John, George and Torger Reve (2010), "Transaction Cost Analysis in Marketing: Looking Back, Moving Forward," *Journal of Retailing*, 86 (3), 248-256.
- Johnston, Wesley J. and Thomas V. Bonoma (1981), "The Buying Center: Structure and Interaction Patterns," *Journal of Marketing*, 45 (3), 143-156.
- Jones, Eli, Steven P. Brown, Andris A. Zoltners, and Barton A. Weitz (2005), "The Changing Environment of Selling and Sales Management," *Journal of Personal Selling & Sales Management*, 25 (2), 105-111.
- Joshi, Ashwin W. and Rodney L. Stump (1999), "The Contingent Effect of Specific Asset Investments on Joint Action in Manufacturer-Supplier Relationships: An Empirical Test of the Moderating Role of Reciprocal Asset Investments, Uncertainty, and Trust," *Journal of the Academy of Marketing Science*, 27 (3), 291-305.
- Jung, Tony and K. A. S. Wickrama (2008), "An Introduction to Latent Class Growth Analysis and Growth Mixture Modeling," *Social and Personality Psychology Compass*, 2 (1), 302-317.
- Kano, Noriaki, Nobuhiko Seraku, Fumio Takahashi, and Shinichi Tsuji (1984), "Attractive Quality and Must-Be Quality," *Journal of the Japanese Society for Quality Control*, 14 (2), 147-156.
- Kanuk, Leslie and Conrad Berenson (1975), "Mail Surveys and Response Rates: A Literature Review," *Journal of Marketing Research*, 12 (4), 440-453.
- Kaplan, Abraham (1964), *The Conduct of Inquiry: Methodology for Behavioral Science*. San Francisco: Chandler.
- Kaplan, David (2008), "An Overview of Markov Chain Methods for the Study of Stage-Sequential Developmental Processes," *Developmental Psychology*, 44 (2), 457-467.
- Kast, Fremont E. and James E. Rosenzweig (1972), "General System Theory: Applications for Organization and Management," *Academy of Management Journal*, 15 (4), 447-465.
- Kelley, Scott W. (1992), "Developing Customer Orientation among Service Employees," *Journal of the Academy of Marketing Science*, 20 (1), 27-36.
- Kieser, Meinhard and Norbert Victor (1999), "Configural Frequency Analysis (CFA) Revisited — a New Look at an Old Approach," *Biometrical journal*, 41 (8), 967-983.
- Kim, Sang-Hyun, Morris A. Cohen, and Serguei Netessine (2007), "Performance Contracting in after-Sales Service Supply Chains," *Management Science*, 53 (12), 1843-1858.

- Klar, Yechiel and Eilath E Giladi (1997), "No One in My Group Can Be Below the Group's Average: A Robust Positivity Bias in Favor of Anonymous Peers," *Journal of Personality and Social Psychology*, 73 (5), 885.
- Klein, Saul, Gary L. Frazier, and Victor J. Roth (1990), "A Transaction Cost Analysis Model of Channel Integration in International Markets," *Journal of Marketing Research*, 27 (2), 196-208.
- Kleinaltenkamp, Michael (2001), *Gabler-Wirtschaftslexikon* (15. ed.). Wiesbaden: Gabler.
- (2010), "Is Marketing Academia Losing Its Way? – a Commentary from a German Perspective," *Australasian Marketing Journal (AMJ)*, 18 (3), 171-173.
- (2013), "Nutzungsprozesse – Die vernachlässigte Seite der Wertschöpfung," in *Theorie und Praxis des Dienstleistungsmarketing*, Gertrud Schmitz, ed.: Springer Fachmedien Wiesbaden.
- (1994), "Typologien von Business-to-Business-Transaktionen - Kritische Würdigung und Weiterentwicklung," *Marketing – ZFP*, 16 (2), 77-88.
- Kleinaltenkamp, Michael and Frank Jacob (2002), "German Approaches to Business-to-Business Marketing Theory: Origins and Structure," *Journal of Business Research*, 55 (2), 149-155.
- Kleinaltenkamp, Michael, Wulff Plinke, Frank Jacob, and Albrecht Söllner (2006), *Markt- und Produktmanagement: Die Instrumente des Business-to-Business-Marketing*. Berlin: Springer.
- Koffka, Kurt (1922), "Perception: An Introduction to the Gestalt-Theorie," *Psychological Bulletin*, 19 (10), 531-585.
- Kohli, Ajay K. (2011), "Looking through the Lens of B2B and Beyond," *Industrial Marketing Management*, 40 (2), 193-194.
- Kohli, Ajay. K. and Bernard J. Jaworski (1990), "Market Orientation: The Construct, Research Propositions, and Managerial Implications," *Journal of Marketing*, 54, 1-18.
- Korell, Markus and Walter Ganz (2000), "Design Hybrider Produkte — Der Weg Vom Produkthersteller zum Problemlöser," in *Wettbewerbsfaktor Kreativität*, Hans-Jörg Bullinger and Sibylle Hermann, eds. Wiesbaden: Gabler.
- Kraemer, Helena C. and Gavin Andrews (1982), "A Nonparametric Technique for Meta-Analysis Effect Size Calculation," *Psychological Bulletin*, 91 (2), 404-412.
- Krauth, Joachim (1993), *Einführung in die Konfigurationsfrequenzanalyse (KFA): Ein multivariates nichtparametrisches Verfahren zum Nachweis und zur Interpretation von Typen und Syndromen*: Beltz, Psychologie-Verlag-Union.
- Krauth, Joachim and Gustav Adolf Lienert (1995), *Die Konfigurationsfrequenzanalyse (KFA) und ihre Anwendung in Psychologie und Medizin; ein multivariates nichtparametrisches Verfahren zur Aufdeckung von Typen und Syndromen*: Beltz, Psych.-Verlag-Union.
- Krishnamurthy, Chandru, Juliet Johansson, and Hank Schliessberg (2003), "Solutions Selling: Is the Pain Worth the Gain". McKinsey Marketing & Sales Practice.
- Krosnick, Jon A. (1991), "Response Strategies for Coping with the Cognitive Demands of Attitude Measures in Surveys," *Applied Cognitive Psychology*, 5 (3), 213-236.

- Kruger, Justin (1999), "Lake Wobegon Be Gone! The 'Below-Average Effect' and the Egocentric Nature of Comparative Ability Judgments," *Journal of Personality and Social Psychology*, 77 (2), 221.
- Kühlborn, Sven (2004), *Systemanbieterstrategien im Industriegütermarketing*. Dissertation Universität Mannheim.
- Kuhn, Thomas S. (2012), *The Structure of Scientific Revolutions*. University of Chicago press.
- Kujala, Saara, Karlos Artto, Pertti Aaltonen, and Virpi Turkulainen (2010), "Business Models in Project-Based Firms—Towards a Typology of Solution-Specific Business Models," *International Journal of Project Management*, 28 (2), 96-106.
- Kumar, Nirmalya (2004), *Marketing as Strategy: Understanding the Ceo's Agenda for Driving Growth and Innovation*. Harvard Business Review Press.
- Kurtz, David L., H Robert. Dodge, and Jay E. Klompmaker (1976), *Professional Selling*. Dallas: Business Publications Inc.
- Kuruzovich, Jason, Shu Han, Nevena T. Koukova, and T. Ravichandran (2013), "Testing the Steve Jobs Hypothesis in a B2B Context: Will a Portfolio of Hierarchically Related Technology Products Improve Customer Outcomes?," *Journal of Service Research*.
- Kuß, Alfred (2013), *Marketing-Theorie*. Wiesbaden: Springer.
- Kyj, Myroslaw J. (1987), "Customer Service as a Competitive Tool," *Industrial Marketing Management*, 16 (3), 225-230.
- Lakatos, Imre (1970), *Criticism and the Growth of Knowledge*. Cambridge: University Press.
- Lam, Shun Yin, Venkatesh Shankar, M. Krishna Erramilli, and Bysan Murthy (2004), "Customer Value, Satisfaction, Loyalty, and Switching Costs: An Illustration from a Business-to-Business Service Context," *Journal of the Academy of Marketing Science*, 32 (3), 293-311.
- Lampel, Joseph and Henry Mintzberg (1996), "Customizing Customization," *Sloan Management Review*, 38 (1), 21-30.
- Langeheine, Rolf (1994), "Discrete-Time Mixed Markov Latent Class Models," in *Analyzing Social and Political Change. A Casebook of Methods*, Angela Dale and Richard A. Davies, eds. London: Sage.
- (1988), "Manifest and Latent Markov Chain Models for Categorical Panel Data," *Journal of Educational and Behavioral Statistics*, 13 (4), 299-312.
- Langeheine, Rolf and Frank Van de Pol (2000), "Fitting Higher Order Markov Chains," *Methods of Psychological Research Online*, 5 (1), 32-55.
- (2002), "Latent Markov Chains," in *Applied Latent Class Analysis*, Jacques A. Hagenaars and Allan L. McCutcheon, eds. Cambridge: Cambridge University Press.
- Lanza, Stephanie T., Xianming Tan, and Bethany C. Bray (2013), "Latent Class Analysis with Distal Outcomes: A Flexible Model-Based Approach," *Structural Equation Modeling: A Multidisciplinary Journal*, 20 (1), 1-26.
- Lapierre, Jozée (1997), "What Does Value Mean in Business-to-Business Professional Services?," *International Journal of Service Industry Management*, 8 (5), 377-397.

- LaPlaca, Peter J. and Jerome M. Katrichis (2009), "Relative Presence of Business-to-Business Research in the Marketing Literature," *Journal of Business-to-Business Marketing*, 16 (1-2), 1-22.
- Large, David and Terry Conrod (2003), "Vertical Solutions Marketing: Ensuring a Successful Transition," *Ivey Business Journal*, 67 (5), 1-6.
- Larwood, Laurie and William Whittaker (1977), "Managerial Myopia: Self-Serving Biases in Organizational Planning," *Journal of Applied Psychology*, 62 (2), 194-198.
- Lautsch, Erwin, Alexander von Eye, and Stefan von Weber (2003), "CFA-Software – an Overview," *Psychology Science*, 45 (2), 437-441.
- Lay, Gunter (2003), "Betreiben statt Verkaufen: Häufigkeit des Angebots von Betreibermodellen in der deutschen Investitionsgüterindustrie". *Mitteilungen aus der Produktionsinnovationserhebung* (29), Fraunhofer ISI, Karlsruhe, 1-12.
- Lay, Gunter, Giacomo Copani, Angela Jäger, and Sabine Biege (2010), "The Relevance of Service in European Manufacturing Industries," *Journal of Service Management*, 21 (5), 715-726.
- Layton, Roger A (2007), "Marketing Systems – a Core Macromarketing Concept," *Journal of Macromarketing*, 27 (3), 227-242.
- Lee, Milind M. (1997), "After-Sales Service - Necessary Evil or Strategic Opportunity?," *Managing Service Quality*, 7 (3), 141 - 145.
- Leigh, Thomas W. and Greg W. Marshall (2001), "Research Priorities in Sales Strategy and Performance," *Journal of Personal Selling & Sales Management*, 21 (2), 83-93.
- Leroy, Julie, Bernard Cova, and Robert Salle (2013), "Zooming in vs. Zooming out on Value Co-Creation: Consequences for BtoB Research," *Industrial Marketing Management*, 42 (7), 1102–1111.
- Levitt, Theodore (1980), "Marketing Success through Differentiation - of Anything," *Harvard Business Review* (January / February), 83-91.
- Li, Ling-ye (2011), "Marketing of Competence-Based Solutions to Buyers in Exploratory Relationships: Perspective of OEM Suppliers," *Industrial Marketing Management*, 40 (7), 1206–1213.
- Lienert, Gustav Adolf (1968), "Die „Konfigurationsfrequenzanalyse“ als Klassifikationsmethode in der Klinischen Psychologie," presented at 26. Kongreß der Deutschen Gesellschaft für Psychologie, Tübingen,
- Lindell, Michael K. and David J. Whitney (2001), "Accounting for Common Method Variance in Cross-Sectional Research Designs," *Journal of Applied Psychology*, 86 (1), 114-121.
- Lindemann, Udo (2013), "Sonderforschungsbereich (SFB) 768: Zyklenmanagement von Innovationsprozessen – Verzahnte Entwicklung von Leistungsbündeln auf Basis Technischer Produkte," (accessed 19.09.2013, [available at <http://www.sfb768.tum.de/%5D>]).
- Lindgreen, Adam, Roger Palmer, and Joëlle Vanhamme (2004), "Contemporary Marketing Practice: Theoretical Propositions and Practical Implications," *Marketing Intelligence & Planning*, 22 (6), 673-692.

- Lindgreen, Adam and Finn Wynstra (2005), "Value in Business Markets: What Do We Know? Where Are We Going?," *Industrial Marketing Management*, 34 (7), 732-748.
- Liu, Annie H. and Mark P. Leach (2001), "Developing Loyal Customers with a Value-Adding Sales Force: Examining Customer Satisfaction and the Perceived Credibility of Consultative Salespeople," *Journal of Personal Selling & Sales Management*, 21 (2), 147-156.
- Lohmöller, Jan-Bernd (1989), *Latent Variable Path Modeling with Partial Least Squares*. Heidelberg: Physica-Verlag.
- Lusch, Robert F. and Stephen L. Vargo (2006a), "Service-Dominant Logic as a Foundation for a General Theory," in *The Service-Dominant Logic of Marketing: Dialog, Debate, and Directions*, Robert F. Lusch and Stephen L. Vargo, eds. Armonk: ME Sharpe.
- (2006b), "Service-Dominant Logic: Reactions, Reflections and Refinements," *Marketing Theory*, 6 (3), 281-288.
- MacCallum, Robert C., Shaobo Zhang, Kristopher J. Preacher, and Derek D. Rucker (2002), "On the Practice of Dichotomization of Quantitative Variables," *Psychological Methods*, 7 (1), 19-40.
- Macher, Jeffrey T. and Barak D. Richman (2008), "Transaction Cost Economics: An Assessment of Empirical Research in the Social Sciences," *Business and Politics*, 10 (1), 1-63.
- MacKenzie, Scott B. and Philip M. Podsakoff (2012), "Common Method Bias in Marketing: Causes, Mechanisms, and Procedural Remedies," *Journal of Retailing*, 88 (4), 542-555.
- Maclaran, Pauline, Michael Saren, Barbara Stern, and Mark Tadajewski (2009), "Introduction Chapter," in *The Sage Handbook of Marketing Theory*, Pauline Maclaran and Michael Saren and Barbara Stern and Mark Tadajewski, eds. London: SAGE.
- Makadok, Richard (2001), "Toward a Synthesis of the Resource-Based and Dynamic-Capability Views of Rent Creation," *Strategic Management Journal*, 22 (5), 387-401.
- Mardia, Kanti V. (1970), "Measures of Multivariate Skewness and Kurtosis with Applications," *Biometrika*, 57 (3), 519-530.
- Marradi, Alberto (1990), "Classification, Typology, Taxonomy," *Quality and Quantity*, 24 (2), 129-157.
- Mathieu, Valérie (2001), "Product Services: From a Service Supporting the Product to a Service Supporting the Client," *Journal of Business & Industrial Marketing*, 16 (1), 39-61.
- Mathieu, Valérie (2001), "Service Strategies within the Manufacturing Sector: Benefits, Costs and Partnership.," *International Journal of Service Industry Management*, 12 (5), 451 - 475.
- Matthyssens, Paul and Tine Buyl (2005), "From Product to Total Solution: An Enriched Channel Perspective". IMP Group.
- Matthyssens, Paul and Koen Vandenbempt (1998), "Creating Competitive Advantage in Industrial Services," *The Journal of Business and Industrial Marketing*, 13 (4-1), 339-355.

- (2008), "Moving from Basic Offerings to Value-Added Solutions: Strategies, Barriers and Alignment," *Industrial Marketing Management*, 37 (3), 316-328.
- (2010), "Service Addition as Business Market Strategy: Identification of Transition Trajectories.," *Journal of Service Management*, 21 (5), 693 - 714.
- Matthyssens, Paul, Koen Vandenbempt, and Sara Weyns (2009), "Transitioning and Co-Evolving to Upgrade Value Offerings: A Competence-Based Marketing View," *Industrial Marketing Management*, 38 (5), 504-512.
- Mattsson, Lars-Gunnar (1973), "Systems Selling as a Strategy on Industrial Markets," *Industrial Marketing Management*, 3 (2), 107-120.
- Mattsson, Lars- Gunnar (1997), "'Relationship Marketing' and the 'Markets- as- Networks Approach' — a Comparative Analysis of Two Evolving Streams of Research," *Journal of Marketing Management*, 13 (5), 447-461.
- Matzler, Kurt and Hans H. Hinterhuber (1998), "How to Make Product Development Projects More Successful by Integrating Kano's Model of Customer Satisfaction into Quality Function Deployment," *Technovation*, 18 (1), 25-38.
- McCrae, Robert R. and Paul T. Costa (1987), "Validation of the Five-Factor Model of Personality across Instruments and Observers," *Journal of Personality and Social Psychology*, 52 (1), 81-90.
- McCutcheon, Allan L. (2002), "Basic Concepts and Procedures in Single-and Multiple-Group Latent Class Analysis," in *Applied Latent Class Analysis*, Jacques A. Hagenaars and Allan L. McCutcheon, eds. Cambridge: Cambridge University Press.
- McKelvey, Bill (1975), "Guidance for the Empirical Classification of Organizations," *Administrative Science Quarterly*, 20 (4), 509-525.
- (1978), "Organizational Systematics: Taxonomic Lessons from Biology," *Management Science*, 24 (13), 1428-1440.
- McLachlan, Geoffrey J. and David Peel (2000), *Finite Mixture Models*. New York Wiley.
- Merton, Robert K. (1967), "On Sociological Theories of the Middle Range," in *On Theoretical Sociology: Five Essays, Old and New*. New York: Free Press.
- (1968), *Social Theory and Social Structure*. New York: Free Press.
- Meuer, Johannes (2011), *Configurations of Inter-Firm Relations in Management Innovation. A Study in China's Biopharmaceutical Industry*. Dissertation Erasmus University Rotterdam.
- Meyer, Alan D., Anne S. Tsui, and C. R. Hinings (1993), "Configurational Approaches to Organizational Analysis," *Academy of Management Journal*, 36 (6), 1175-1195.
- Michael, Steven C. and Sung Min Kim (2005), "The Organizational Ecology of Retailing: A Historical Perspective," *Journal of Retailing*, 81 (2), 113-123.
- Miles, Raymond E. and Charles C. Snow (1978), *Organizational Strategy, Structure, and Process*: Stanford University Press.
- Miller, Danny, Quentin Hope, Russell Eisenstat, Nathaniel Foote, and Jay Galbraith (2002), "The Problem of Solutions: Balancing Clients and Capabilities," *Business Horizons*, 45 (2), 3-12.
- Minculescu, Ioana and Michael Kleinaltenkamp (2013), "Einzelkundenbezogene Dienstleistungserstellung," in *Theorie und Praxis des*

- Dienstleistungsmarketing*, Gertrud Schmitz, ed.: Springer Fachmedien Wiesbaden.
- Minculescu, Ioana, Michael Kleinaltenkamp, and Doreén Pick (2011), "Wider die Commoditisierung – Ansätze zur Messung der Individualisierung," in *Commodity Marketing*, Margit Enke and Anja Geigenmüller, eds.: Gabler.
- Mintzberg, Henry (1978), "Patterns in Strategy Formation," *Management Science*, 24 (9), 934-948.
- Mishra, Debi Prasad, Jan B. Heide, and Stanton G. Cort (1998), "Information Asymmetry and Levels of Agency Relationships," *Journal of Marketing Research*, 35 (3), 277-295.
- Mitra, Kaushik, Michelle C. Reiss, and Louis M. Capella (1999), "An Examination of Perceived Risk, Information Search and Behavioral Intentions in Search, Experience and Credence Services," *Journal of Services Marketing*, 13 (3), 208-228.
- Mitřęga, Maciej and Judy Zolkiewski (2012), "Negative Consequences of Deep Relationships with Suppliers: An Exploratory Study in Poland," *Industrial Marketing Management*, 41 (5), 886-894.
- Mittal, Vikas and Wagner A. Kamakura (2001), "Satisfaction, Repurchase Intent, and Repurchase Behavior: Investigating the Moderating Effect of Customer Characteristics," *Journal of Marketing Research*, 38 (1), 131-142.
- Mittelstaedt, Robert A (1990), "Economics, Psychology, and the Literature of the Subdiscipline of Consumer Behavior," *Journal of the Academy of Marketing Science*, 18 (4), 303-311.
- Molinari, Lori K., Russell Abratt, and Paul Dion (2008), "Satisfaction, Quality and Value and Effects on Repurchase and Positive Word-of-Mouth Behavioral Intentions in a B2B Services Context," *Journal of Services Marketing*, 22 (5), 363-373.
- Möller, Kristian (2013), "Theory Map of Business Marketing: Relationships and Networks Perspectives," *Industrial Marketing Management*, 42 (3), 324-335.
- Mont, Oksana (2002), "Clarifying the Concept of Product-Service System," *Journal of Cleaner Production*, 10 (3), 237-245.
- (2004a), "Institutionalisation of Sustainable Consumption Patterns Based on Shared Use," *Ecological Economics*, 50 (1-2), 135-153.
- (2000), "Product-Service Systems". Final Report, IIIIEE, Lund University.
- (2004b), "Reducing Life-Cycle Environmental Impacts through Systems of Joint Use," *Greener Management International* (45), 63-77.
- Morgan, Robert M. and Shelby D. Hunt (1994), "The Commitment-Trust Theory of Relationship Marketing," *Journal of Marketing*, 58(3), 20-38.
- Morris, Michael H. and Duane L. Davis (1992), "Measuring and Managing Customer Service in Industrial Firms," *Industrial Marketing Management*, 21 (4), 343-353.
- Morwitz, Vicki G. (1997), "It Seems Like Only Yesterday: The Nature and Consequences of Telescoping Errors in Marketing Research," *Journal of Consumer Psychology*, 6 (1), 1-29.
- Muller, Emmanuel and Andrea Zenker (2001), "Business Services as Actors of Knowledge Transformation: The Role of KIBS in Regional and National Innovation Systems," *Research Policy*, 30 (9), 1501-1516.

- Murray, Thomas J (1964), "Systems Selling: Industrial Marketing's New Tool," *Dun's Review and Modern Industry*, 10, 51-99.
- Muthén, Bengt (2013), "Three-Step Latent Transition Analysis," presented at Modern Modeling Methods Conference, University of Connecticut
- Muthén, Bengt and Linda K. Muthén (2000), "Integrating Person-Centered and Variable-Centered Analyses: Growth Mixture Modeling with Latent Trajectory Classes," *Alcoholism: Clinical and Experimental Research*, 24 (6), 882-891.
- Muthén, Linda K. and Bengt Muthén (2012), *Mplus User's Guide. Seventh Edition*. Los Angeles: Muthén & Muthén.
- Narver, John C. and Stanley F. Slater (1990), "The Effect of a Market Orientation on Business Profitability," *Journal of Marketing*, 54 (4), 20-35.
- Narver, John C., Stanley F. Slater, and Douglas L. MacLachlan (2004), "Responsive and Proactive Market Orientation and New-Product Success," *Journal of Product Innovation Management*, 21 (5), 334-347.
- Naumann, Earl and Douglas J. Lincoln (1989), "Systems Theory Approach to Conducting Industrial Marketing Research," *Journal of Business Research*, 19 (2), 151-164.
- Nelson, Phillip (1974), "Advertising as Information," *Journal of Political Economy*, 82 (4), 729-754.
- (1970), "Information and Consumer Behavior," *Journal of Political Economy*, 78 (2), 311-329.
- Netemeyer, Richard G., William O. Bearden, and Subhash. Sharma (2003), *Scaling Procedures: Issues and Applications*. Thousand Oaks: Sage.
- Neu, Wayne A. and Stephen W. Brown (2005), "Forming Successful Business-to-Business Services in Goods-Dominant Firms," *Journal of Service Research*, 8 (1), 3-17.
- Ng, Irene C.L. and Sai S. Nudurupati (2010), "Outcome-Based Service Contracts in the Defence Industry - Mitigating the Challenges.," *Journal of Service Management*, 21 (5), 656 - 674.
- Nordin, Fredrik, Daniel Kindström, Christian Kowalkowski, and Jakob Rehme (2011), "The Risks of Providing Services: Differential Risk Effects of the Service-Development Strategies of Customisation, Bundling, and Range," *Journal of Service Management*, 22 (3), 390-408.
- Nordin, Fredrik and Christian Kowalkowski (2010), "Solutions Offerings: A Critical Review and Reconceptualisation," *Journal of Service Management*, 21 (4), 441-459.
- Nordin, Fredrik, Ingela Lindahl, and Staffan Brege (2013), "The Applicability of Integrated Solutions Offerings: Differential Effects of Product Complexity," *Journal of Relationship Marketing*, 12 (1), 59-78.
- Nunnally, Jum C. (1978), *Psychometric Theory*. New York: McGraw-Hill.
- Nylund, Karen L. (2007), "Latent Transition Analysis: Modeling Extensions and an Application to Peer Victimization," Dissertation, University of California, Los Angeles.
- Nylund, Karen L., Tihomir Asparouhov, and Bengt O. Muthén (2007), "Deciding on the Number of Classes in Latent Class Analysis and Growth Mixture

- Modeling: A Monte Carlo Simulation Study," *Structural Equation Modeling: A Multidisciplinary Journal*, 14 (4), 535-569.
- Nysveen, Herbjørn, Per E. Pedersen, and Helge Thorbjørnsen (2005), "Intentions to Use Mobile Services: Antecedents and Cross-Service Comparisons," *Journal of the Academy of Marketing Science*, 33 (3), 330-346.
- O'Malley, Lisa and Caroline Tynan (2000), "Relationship Marketing in Consumer Markets – Rhetoric or Reality?," *European Journal of Marketing*, 34 (7), 797-815.
- Oliva, Rogelio and Robert Kallenberg (2003), "Managing the Transition from Products to Services," *International Journal of Service Industry Management*, 14 (2), 160-172.
- Orth, Ulrich R. and Keven Malkewitz (2008), "Holistic Package Design and Consumer Brand Impressions," *Journal of Marketing*, 72 (3), 64-81.
- Page, Albert L. and Michael Siemplenski (1983), "Product Systems Marketing," *Industrial Marketing Management*, 12 (2), 89-99.
- Paiola, Marco, Nicola Saccani, Marco Perona, and Heiko Gebauer (2013), "Moving from Products to Solutions: Strategic Approaches for Developing Capabilities," *European Management Journal*, 31 (4), 390-409.
- Paliwoda, Stanley J. and Andrea J. Bonaccorsi (1993), "Systems Selling in the Aircraft Industry," *Industrial Marketing Management*, 22 (2), 155-160.
- Palmatier, Robert W., Rajiv P. Dant, and Dhruv Grewal (2007a), "A Comparative Longitudinal Analysis of Theoretical Perspectives of Interorganizational Relationship Performance," *Journal of Marketing*, 71 (4), 172-194.
- Palmatier, Robert W., Rajiv P. Dant, Dhruv Grewal, and Kenneth R. Evans (2006), "Factors Influencing the Effectiveness of Relationship Marketing: A Meta-Analysis," *Journal of Marketing*, 70 (4), 136-153.
- Palmatier, Robert W., Lisa K. Scheer, Kenneth R. Evans, and Todd J. Arnold (2008), "Achieving Relationship Marketing Effectiveness in Business-to-Business Exchanges," *Journal of the Academy of Marketing Science*, 36 (2), 174-190.
- Palmatier, Robert W., Lisa K. Scheer, Mark B. Houston, Kenneth R. Evans, and Srinath Gopalakrishna (2007b), "Use of Relationship Marketing Programs in Building Customer-Salesperson and Customer-Firm Relationships: Differential Influences on Financial Outcomes," *International Journal of Research in Marketing*, 24 (3), 210-223.
- Palmer, A. J. (1996), "Relationship Marketing: A Universal Paradigm or Management Fad?," *The Learning Organization*, 3 (3), 18-25.
- Palmer, Roger (2007), "The Transaction-Relational Continuum: Conceptually Elegant but Empirically Denied," *Journal of Business & Industrial Marketing*, 22 (7), 439-451.
- Parasuraman, A., Leonard L. Berry, and Valarie A. Zeithaml (1993), "Research Note: More on Improving Service Quality Measurement," *Journal of Retailing*, 69 (1), 140-147.
- Parasuraman, A., Valarie A. Zeithaml, and Leonard L. Berry (1985), "A Conceptual Model of Service Quality and Its Implications for Future Research," *Journal of Marketing*, 49 (4), 41-50.
- (1988), "SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality," *Journal of Retailing*, 64 (1), 12-40.

- Pekkarinen, Olli, Markus Piironen, and Risto T. Salminen (2012), "Boot Business Model in Industrial Solution Business," *International Journal of Business Innovation and Research*, 6 (6), 653-673.
- Penttinen, Esko and Jonathan Palmer (2007), "Improving Firm Positioning through Enhanced Offerings and Buyer-Seller Relationships," *Industrial Marketing Management*, 36 (5), 552-564.
- Periatt, Jeffery A., Stephen A. LeMay, and Subhra Chakrabarty (2004), "The Selling Orientation-Customer Orientation (SOCO) Scale: Cross-Validation of the Revised Version," *Journal of Personal Selling & Sales Management*, 24 (1), 49-54.
- Persson, Magnus and Pär Åhlström (2006), "Managerial Issues in Modularising Complex Products," *Technovation*, 26 (11), 1201-1209.
- Peteraf, Margaret A. (1993), "The Cornerstones of Competitive Advantage: A Resource- Based View," *Strategic Management Journal*, 14 (3), 179-191.
- Peters, Linda D., Andrew D. Pressey, Markus Vanharanta, and Wesley J. Johnston (2013), "Theoretical Developments in Industrial Marketing Management: Multidisciplinary Perspectives," *Industrial Marketing Management*, 42 (3), 275-282.
- Phillips, Lynn W. (1981), "Assessing Measurement Error in Key Informant Reports: A Methodological Note on Organizational Analysis in Marketing," *Journal of Marketing Research*, 18 (4), 395-415.
- Pine II, B. Joseph (1992), *Mass Customization: The New Frontier in Business Competition*. Cambridge.
- Pine II, B. Joseph, Bart Victor, and Andrew C. Boynton (1993), "Making Mass Customization Work," *Harvard Business Review*, 71 (5), 108-118.
- Podsakoff, Philip M., Scott B. MacKenzie, Jeong-Yeon Lee, and Nathan P. Podsakoff (2003), "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," *Journal of Applied Psychology*, 88 (5), 879-903.
- Podsakoff, Philip M. and Dennis W. Organ (1986), "Self-Reports in Organizational Research: Problems and Prospects," *Journal of Management*, 12 (4), 531-544.
- Pondy, Louis R. (1980), "The Circle of Enquiry. Commentary on Gilfillan, Morrow-Muchinsky, and Bluedorn-Evered.," in *Middle Range Theory and the Study of Organizations*, Craig C. Pinder and Larry F. Moore, eds. Boston: Matinus Nijhoff Publishing.
- Popper, Karl R. (1959), *The Logic of Scientific Discovery*. London and New York: Hutchinson & Co.
- Porter, Michael E. (1985), *Competitive Advantage*. New York: Free Press.
- (1980), *Competitive Strategy*. New York: Free Press.
- Prahalad, C.K. and Gary Hamel (1990), "The Core Competency of the Corporation," *Harvard Business Review*, 68 (3), 79-91.
- Priem, Richard L. and John E. Butler (2001a), "Is the Resource-Based "View" a Useful Perspective for Strategic Management Research?," *Academy of Management Review*, 26 (1), 22-40.

- (2001b), "Tautology in the Resource-Based View and the Implications of Externally Determined Resource Value: Further Comments," *Academy of Management Review*, 26 (1), 57-66.
- Probert, David (2010), "Migrating from Products to Solutions: An Exploration of System Support in the Uk Defense Industry," *Industrial Marketing Management*, 39 (4), 582-592.
- Questback (2012), *EFS Survey Manual*. Köln: Questback AG.
- Rabiner, Lawrence R. (1989), "A Tutorial on Hidden Markov Models and Selected Applications in Speech Recognition," *Proceedings of the IEEE*, 77 (2), 257-286.
- Raddats, Chris and Christian Kowalkowski (2014), "A Reconceptualization of Manufacturers' Service Strategies," *Journal of Business-to-Business Marketing*, 21 (1), 19-34.
- Raff, Tilmann (2000), *Systemgeschäft und Integralqualitäten: Informationsökonomische Fundierung und empirische Prüfung am Beispiel der Fertigungsautomatisierung*. Wiesbaden: Springer.
- Ragin, Charles C. (1989), *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. Berkeley and Los Angeles: University of California.
- (2000), *Fuzzy-Set Social Science*. Chicago: University of Chicago Press.
- (2003), "Making Comparative Analysis Count". COMPASSS Working Paper.
- (2008), *Redesigning Social Inquiry. Fuzzy Sets and Beyond*. University of Chicago Press.
- (2004), "Turning the Tables: How Case-Oriented Research Challenges," in *Rethinking Social Inquiry: Diverse Tools, Shared Standards*, Henry E. Irady and David Collier, eds. 2nd. ed. Lanham: Rowman and Littlefield.
- Raja, Jawwad Z., Dorota Bourne, Keith Goffin, Mehmet Çakkol, and Veronica Martinez (2013), "Achieving Customer Satisfaction through Integrated Products and Services: An Exploratory Study," *Journal of Product Innovation Management*, 30 (6), 1128-1144.
- Ram, Nilam and Kevin J. Grimm (2009), "Methods and Measures: Growth Mixture Modeling: A Method for Identifying Differences in Longitudinal Change among Unobserved Groups," *International Journal of Behavioral Development*, 33 (6), 565-576.
- Rao, Akshay R. and Mark E. Bergen (1992), "Price Premium Variations as a Consequence of Buyers' Lack of Information," *Journal of Consumer Research*, 19 (3), 412-423.
- Rao, Akshay R. and Kent B. Monroe (1996), "Causes and Consequences of Price Premiums," *Journal of Business*, 69 (4), 511-535.
- Rauyruen, Papassapa and Kenneth E. Miller (2007), "Relationship Quality as a Predictor of B2B Customer Loyalty," *Journal of Business Research*, 60 (1), 21-31.
- Reichheld, Frederick F. (2003), "The One Number You Need to Grow," *Harvard Business Review*, 81 (12), 46-54.
- Reidenbach, Eric R. and Terence A. Oliva (1981), "General Living Systems Theory and Marketing: A Framework for Analysis," *Journal of Marketing*, 45 (4), 30-37.

- Reimann, Martin, Oliver Schilke, and Jacquelyn S. Thomas (2010), "Toward an Understanding of Industry Commoditization: Its Nature and Role in Evolving Marketing Competition," *International Journal of Research in Marketing*, 27 (2), 188-197.
- Reinartz, Werner J. and Wolfgang Ulaga (2008), "How to Sell Services More Profitably," *Harvard Business Review*, 86 (5), 90-96.
- Renault, Chloé, Dalsace Frédéric, and Wolfgang Ulaga (2010), "Michelin Fleet Solutions: From Selling Tires to Selling Kilometers," *ECCH Case Study*.
- Richter, Hans Peter (2001), *Investitionsgütermarketing - Business-to-Business-Marketing von Industrieunternehmen*. München: Hanser.
- Rihoux, Benoît (2006), "Qualitative Comparative Analysis (Qca) and Related Systematic Comparative Methods," *International Sociology*, 21 (5), 679-706.
- Rihoux, Benoît and Charles Ragin (2009), *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques*. Los Angeles: Sage.
- Rindfleisch, Aric and Jan B. Heide (1997), "Transaction Cost Analysis: Past, Present, and Future Applications," *Journal of Marketing*, 61 (4), 30-54.
- Rindfleisch, Aric, Alan J. Malter, Shankar Ganesan, and Christine Moorman (2008), "Cross-Sectional Versus Longitudinal Survey Research: Concepts, Findings, and Guidelines," *Journal of Marketing Research*, 45 (3), 261-279.
- Ringle, Christian M., Sven Wende, and Alexander Will (2005), "Smartpls 2.0 M3". Hamburg. Computer program.
- Ritter, Thomas and Achim Walter (2012), "More Is Not Always Better: The Impact of Relationship Functions on Customer-Perceived Relationship Value," *Industrial Marketing Management*, 41 (1), 136-144.
- Robinson, Patrick J., Charles W. Faris, and Yoram Wind (1967), *Industrial Buying and Creative Marketing*. Boston: Allyn & Bacon.
- Roegner, Eric and Jenine Gobbi (2001), "Effective Solutions Pricing – How to Get the Best Premium from Strategic Collaborations". McKinsey Marketing & Sales Practice.
- Roegner, Eric V., Torsten Seifert, and Dennis Swinford (2001), "Putting a Price on Solutions," *McKinsey Quarterly* (3), 94-97.
- Roehrich, Jens K. and Nigel D. Caldwell (2012), "Delivering Integrated Solutions in the Public Sector: The Unbundling Paradox," *Industrial Marketing Management*, 41 (6), 995-1007.
- Rogalski, Wolfgang and Peter Hauptmanns (1993), "Technik und Arbeitsorganisation im Maschinenbau: Neue Informationstechnologien und flexible Arbeitssysteme (NIFA-Panel)," *ZA-Information / Zentralarchiv für Empirische Sozialforschung*, 33, 115-127.
- Román, Sergio and Dawn Iacobucci (2010), "Antecedents and Consequences of Adaptive Selling Confidence and Behavior: A Dyadic Analysis of Salespeople and Their Customers," *Journal of the Academy of Marketing Science*, 38 (3), 363-382.
- Rossiter, John R. (2011a), "Marketing Measurement Revolution: The C-OAR-SE Method and Why It Must Replace Psychometrics," *European Journal of Marketing*, 45 (11/12), 1561-1588.

- (2011b), *Measurement for the Social Sciences*. New York: Springer.
- Ruekert, Robert W., Orville C. Walker Jr, and Kenneth J. Roering (1985), "The Organization of Marketing Activities: A Contingency Theory of Structure and Performance," *Journal of Marketing*, 49 (1), 13-25.
- Salonen, Anna (2011), "Service Transition Strategies of Industrial Manufacturers," *Industrial Marketing Management*, 40 (5), 683-690.
- Salvador, Fabrizio, Aravind Chandrasekaran, and Tashfeen Sohail (2014), "Product Configuration, Ambidexterity and Firm Performance in the Context of Industrial Equipment Manufacturing," *Journal of Operations Management*, 32 (4), 138-153.
- Samli, A. Coskun, Laurence W. Jacobs, and James Wills (1992), "What Presale and Postsale Services Do You Need to Be Competitive," *Industrial Marketing Management*, 21 (1), 33-41.
- Sanchez-Fernandez, Raquel and M. Angeles Iniesta-Bonillo (2007), "The Concept of Perceived Value: A Systematic Review of the Research," *Marketing Theory*, 7 (4), 427-451.
- Sapolsky, Harvey M. (2003), "Inventing Systems Integration," in *The Business of Systems Integration*, Andrea Prencipe and Andrew Davies and Michael Hobday, eds. Oxford: Oxford University Press.
- Saren, Michael and Jaqueline Pels (2008), "A Comment on Paradox and Middle-Range Theory: Universality, Synthesis and Supplement," *Journal of Business & Industrial Marketing*, 23 (2), 105-107.
- Sarstedt, Marko, Jörg Henseler, and Christian M. Ringle (2011), "Multigroup Analysis in Partial Least Squares (PLS) Path Modeling: Alternative Methods and Empirical Results," *Advances in International Marketing*, 22, 195-218.
- Sawhney, Mohanbir (2006), "Going Beyond the Product, Defining, Designing, and Delivering Customer Solutions," in *The Service-Dominant Logic of Marketing: Dialog, Debate, and Directions*, Robert F. Lusch and Stephen L. Vargo, eds. Armonk: M.E. Sharpe.
- Sawhney, Mohanbir, Sridhar Balasubramanian, and Vish V. Krishnan (2004), "Creating Growth with Services," *MIT Sloan Management Review*, 45 (2), 34-43.
- Saxe, Robert and Barton A. Weitz (1982), "The SOCO Scale: A Measure of the Customer Orientation of Salespeople," *Journal of Marketing Research (JMR)*, 19 (3), 343-351.
- Schafer, Joseph L. and John W. Graham (2002), "Missing Data: Our View of the State of the Art," *Psychological Methods*, 7 (2), 147-177.
- Schilling, Melissa A. (2000), "Toward a General Modular Systems Theory and Its Application to Interfirm Product Modularity," *Academy of Management Review*, 25 (2), 312-334.
- Schmenner, Roger W. (2009), "Manufacturing, Service, and Their Integration: Some History and Theory," *International Journal of Operations & Production Management*, 29 (5), 431-443.
- Scholz, Christian (1987), *Strategisches Management. Ein Integrativer Ansatz*. Berlin: Walter de Gruyter.

- Schumann, Jan H., Nancy V. Wunderlich, and Florian v. Wangenheim (2012), "Technology Mediation in Service Delivery: A New Typology and an Agenda for Managers and Academics," *Technovation*, 32 (2), 133-143.
- Scott, William G. (1961), "Organization Theory: An Overview and an Appraisal," *Journal of the Academy of Management*, 4 (1), 7.
- Shankar, Venkatesh, Leonard L. Berry, and Thomas Dotzel (2009), "A Practical Guide to Combining Products and Services," *Harvard Business Review*, 87 (11), 94-99.
- Sharma, Arun (2007), "The Shift in Sales Organizations in Business-to-Business Services Markets," *Journal of Services Marketing*, 21 (5), 326-333.
- Sharma, Arun and Gopalkrishnan R. Iyer (2011), "Are Pricing Policies an Impediment to the Success of Customer Solutions?," *Industrial Marketing Management*, 40 (5), 723-729.
- Sharma, Arun, Gopalkrishnan R. Iyer, and Heiner Evanschitzky (2008), "Personal Selling of High-Technology Products: The Solution-Selling Imperative," *Journal of Relationship Marketing*, 7 (3), 287-308.
- Sharma, Deven, Chuck Lucier, and Richard Molloy (2002), "From Solutions to Symbiosis: Blending with Your Customer," *Strategy and Business*, 27 (2), 38-43.
- Sharma, Deven and Richard Molloy (1999), "The Truth About Customer Solutions," Booz Allen Hamilton Viewpoint.
- Sheth, Jagdish N. and Atul Parvatiyar (1995), "The Evolution of Relationship Marketing," *International Business Review*, 4 (4), 397-418.
- Sheth, Jagdish N. and Arun Sharma (2008), "The Impact of the Product to Service Shift in Industrial Markets and the Evolution of the Sales Organization," *Industrial Marketing Management*, 37 (3), 260-269.
- Shortell, Stephen M. and Edward J. Zajac (1990), "Perceptual and Archival Measures of Miles and Snow's Strategic Types: A Comprehensive Assessment of Reliability and Validity," *Academy of Management Journal*, 33 (4), 817-832.
- Shostack, G. Lynn (1977), "Breaking Free from Product Marketing," *Journal of Marketing*, 41 (2), 73-80.
- (1987), "Service Positioning through Structural Change," *The Journal of Marketing*, 51 (1), 34-43.
- Sichtmann, Christina (2007), "Buyer-Seller Relationships and the Economics of Information," *Journal of business market management*, 1 (1), 59-78.
- Siegle, Del (2013), "The Assumptions of Qualitative Designs," (accessed 01.10.2013), [available at <http://www.gifted.uconn.edu/siegle/research/Qualitative/qualquan.htm>].
- Simon, Herbert A. (1962), "The Architecture of Complexity," *Proceedings of the American Philosophical Society*, 106 (6), 467-482.
- Simon, Hermann and Martin Fassnacht (2008), *Preismanagement: Strategie-Analyse-Entscheidung-Umsetzung*. Wiesbaden: Springer.
- Singh, Jagdip and Deepak Sirdeshmukh (2000), "Agency and Trust Mechanisms in Consumer Satisfaction and Loyalty Judgments," *Journal of the Academy of Marketing Science*, 28 (1), 150-167.

- Singh, Jitendra V. and Charles J. Lumsden (1990), "Theory and Research in Organizational Ecology," *Annual Review of Sociology*, 16 (1), 161-195.
- Sirdeshmukh, Deepak, Jagdip Singh, and Barry Sabol (2002), "Consumer Trust, Value, and Loyalty in Relational Exchanges," *Journal of Marketing*, 66 (1), 15-37.
- Skidelsky, Robert and Edward Skidelsky (2012), *How Much Is Enough?: The Love of Money, and the Case for the Good Life*. London: Allen Lane.
- Slater, Stanley F. and John C. Narver (1998), "Customer-Led and Market-Oriented: Let's Not Confuse the Two," *Strategic Management Journal*, 19 (10), 1001.
- Snehota, Ivan and Håkan Håkansson (1995), *Developing Relationships in Business Networks*. London: Routledge.
- Snow, Charles C. and Donald C. Hambrick (1980), "Measuring Organizational Strategies: Some Theoretical and Methodological Problems," *Academy of Management Review*, 5 (4), 527-538.
- Snow, Charles C. and Lawrence G. Hrebiniak (1980), "Strategy, Distinctive Competence, and Organizational Performance," *Administrative Science Quarterly*, 25 (2), 317-336.
- Snow, Charles C., Raymond E. Miles, and Grant Miles (2006), "The Configurational Approach to Organization Design: Four Recommended Initiatives," in *Organization Design*, Richard M. Burton and Dorthe Døjbak Håkansson and Bo Eriksen and Charles C. Snow, eds. Vol. 6. New York: Springer.
- Solomon, Odile (1988), "Semiotics and Marketing New Directions in Industrial Design Applications," *International Journal of Research in Marketing*, 4 (3), 201-215.
- Soman, Dilip and John T. Gourville (2001), "Transaction Decoupling: How Price Bundling Affects the Decision to Consume," *Journal of Marketing Research*, 38 (1), 30-44.
- Speed, Richard (1993), "Maximizing the Potential of Strategic Typologies for Marketing Strategy Research," *Journal of Strategic Marketing*, 1 (3), 171.
- Spencer, Robert and Bernard Cova (2012), "Market Solutions: Breaking Free from Dyad-Centric Logic and Broadening the Scope of S-D L," *Journal of Marketing Management*, 28 (13/14), 1571-1587.
- Spiller, Pablo T. and Bennet A. Zelner (1997), "Product Complementarities, Capabilities and Governance: A Dynamic Transaction Cost Perspective," *Industrial and Corporate Change*, 6 (3), 561-594.
- Spiro, Rosann L. and Barton A. Weitz (1990), "Adaptive Selling: Conceptualization, Measurement, and Nomological Validity," *Journal of Marketing Research*, 27 (1), 61-69.
- Spiteri, Joseph M. and Paul A. Dion (2004), "Customer Value, Overall Satisfaction, End-User Loyalty, and Market Performance in Detail Intensive Industries," *Industrial Marketing Management*, 33 (8), 675-687.
- Stäblein, Thomas, Matthias Holweg, and Joe Miemczyk (2011), "Theoretical Versus Actual Product Variety: How Much Customisation Do Customers Really Demand?," *International Journal of Operations & Production Management*, 31 (3), 350-370.

- Stauss, Bernd (2005), "A Pyrrhic Victory: The Implications of an Unlimited Broadening of the Concept of Services," *Managing Service Quality*, 15 (3), 219-229.
- Steenkamp, Jan-Benedict E. M. and Hans Baumgartner (1998), "Assessing Measurement Invariance in Cross-National Consumer Research," *Journal of Consumer Research*, 25 (1), 78-107.
- Steiger, James H., Alexander Shapiro, and Michael W. Browne (1985), "On the Multivariate Asymptotic Distribution of Sequential Chi-Square Statistics," *Psychometrika*, 50 (3), 253-263.
- Stock, Ruth and Nicolas Zacharias (2011), "Patterns and Performance Outcomes of Innovation Orientation," *Journal of the Academy of Marketing Science*, 39 (6), 870-888.
- Storbacka, Kaj, Pia Polsa, and Maria Sääksjärvi (2011), "Management Practices in Solution Sales—a Multilevel and Cross-Functional Framework," *Journal of Personal Selling & Sales Management*, 31 (1), 35-54.
- Storbacka, Kaj, Charlotta Windahl, Suvi Nenonen, and Anna Salonen (2013), "Solution Business Models: Transformation Along Four Continua," *Industrial Marketing Management*, 42 (5), 705–716.
- Strambach, Simone (2001), "Innovation Processes and the Role of Knowledge-Intensive Business Services (KIBS)," *Innovation Networks*, 12, 53-68.
- Stremersch, Stefan and Gerard J. Tellis (2002), "Strategic Bundling of Products and Prices: A New Synthesis for Marketing," *Journal of Marketing*, 66 (1), 55-72.
- Stremersch, Stefan, Allen M. Weiss, Benedict G. C. Dellaert, and Ruud T. Frambach (2003), "Buying Modular Systems in Technology-Intensive Markets," *Journal of Marketing Research*, 40 (3), 335-350-350.
- Stremersch, Stefan, Stefan Wuyts, and Ruud T. Frambach (2001), "The Purchasing of Full-Service Contracts: An Exploratory Study within the Industrial Maintenance Market," *Industrial Marketing Management*, 30 (1), 1-12.
- Sturm, Flavius and Alexandra Bading (2008), "Investitionsgüterhersteller als Anbieter Industrieller Lösungen – Bestandsaufnahme des Wandels Anhand einer Umfrage," *Wirtschaftsinformatik*, 50 (3), 174-186.
- Sydow, Jörg, Georg Schreyögg, and Jochen Koch (2009), "Organizational Path Dependence: Opening the Black Box," *Academy of Management Review*, 34 (4), 689-709.
- Tabachnick, Barbara G. and Linda S. Fidell (2007), *Using Multivariate Statistics* (5. ed.). Boston: Pearson.
- Teece, David J., Amy Shuen, and Gary Pisano (1997), "Dynamic Capabilities and Strategic Management," *Strategic Management Journal*, 18 (7), 509-533.
- Tetragon (2009), "Quo Vadis Pharmaindustrie? Der Markt für Diagnostik". Tetragon Consulting, Darmstadt.
- Thibaut, John W. and Harold H. Kelley (1959), *The Social Psychology of Groups*. New York: John Wiley & Sons.
- Thomas, Oliver, Philipp Walter, and Peter Loos (2008), "Product-Service Systems: Konstruktion und Anwendung einer Entwicklungsmethodik," *Wirtschaftsinformatik*, 50 (3), 208-219.

- Thomas, Raymond W., Geoffrey N. Soutar, and Maria M. Ryan (2004), "The Selling Orientation-Customer Orientation (SOCO) Scale: A Proposed Short Form," *Journal of Personal Selling & Sales Management*, 21 (1), 63-69.
- Thompson, Craig J. (1997), "Interpreting Consumers: A Hermeneutical Framework for Deriving Marketing Insights from the Texts of Consumers' Consumption Stories," *Journal of Marketing Research*, 34 (4), 438-455.
- Toffel, Michael W (2008), "Contracting for Servicizing". Working Paper. Harvard Business School Technology & Operations Management Unit.
- Töllner, Alke, Markus Blut, and Hartmut H. Holzmüller (2011), "Customer Solutions in the Capital Goods Industry: Examining the Impact of the Buying Center," *Industrial Marketing Management*, 40 (5), 712-722.
- Tukker, Arnold (2004), "Eight Types of Product-Service System: Eight Ways to Sustainability? Experiences from Suspronet. Business Strategy and the Environment," *Business Strategy and the Environment*, 13 (4), 246-260.
- Tukker, Arnold and Ursula Tischner (2006), "Product-Services as a Research Field: Past, Present and Future. Reflections from a Decade of Research," *Journal of Cleaner Production*, 14 (17), 1552-1556.
- Tuli, Kapil R., Ajay K. Kohli, and Sundar G. Bharadwaj (2007), "Rethinking Customer Solutions: From Product Bundles to Relational Processes," *Journal of Marketing*, 71 (3), 1-17.
- Turner, Colin (2009), "Combating Commoditisation in Service Provision: Evidence from the UK Telecommunications Market," *Journal of Strategic Marketing*, 17 (6), 439-451.
- Turunen, Taija (2011), "Users as a Development Driver in Manufacturing: The Case of Reverse Servitization," in *User-Based Innovation in Services*, Jon Sundbo and Marja Toivonen, eds. Cheltenham: Edward Elgar.
- Tushman, Michael L. and Charles A. O'Reilly III (1996), "Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change," *California Management Review*, 38 (4).
- Tversky, Amos and Daniel Kahneman (1973), "Availability: A Heuristic for Judging Frequency and Probability," *Cognitive psychology*, 5 (2), 207-232.
- Uebersax, John S. (2000), "A Brief Study of Local Maximum Solutions in Latent Class Analysis " (accessed 10.10., 2013), [available at <http://www.john-uebersax.com/stat/local.htm>].
- Uhlmann, Eckart (2013), "Transregio (TR) 29: Engineering Hybrider Leistungsbündel – Dynamische Wechselwirkungen von Sach- und Dienstleistungen in der Produktion," (accessed 19.09.2013, [available at <http://www.lps.rub.de/tr29/>]).
- Uлага, Wolfgang (2003), "Capturing Value Creation in Business Relationships: A Customer Perspective," *Industrial Marketing Management*, 32 (8), 677-693.
- (2001), "Customer Value in Business Markets," *Industrial Marketing Management*, 30 (4), 315-319.
- Uлага, Wolfgang and Samir Chacour (2001), "Measuring Customer-Perceived Value in Business Markets," *Industrial Marketing Management*, 30 (6), 525-540.
- Uлага, Wolfgang and Andreas Eggert (2005), "Relationship Value in Business Markets: The Construct Its Dimensions," *Journal of Business-to-Business Marketing*, 12 (1), 73-99.

- (2006), "Value-Based Differentiation in Business Relationships: Gaining and Sustaining Key Supplier Status," *Journal of Marketing*, 70 (1), 119-136.
- Uлага, Wolfgang and James M. Loveland (2014), "Transitioning from Product to Service-Led Growth in Manufacturing Firms: Emergent Challenges in Selecting and Managing the Industrial Sales Force," *Industrial Marketing Management*, 43 (1), 113–125.
- Uлага, Wolfgang and Werner J. Reinartz (2011), "Hybrid Offerings: How Manufacturing Firms Combine Goods and Services Successfully," *Journal of Marketing*, 75 (6), 5-23
- Uлага, Wolfgang and Arun Sharma (2001), "Complex and Strategic Decision Making in Organizations: Implications for Personal Selling and Sales Management," *Industrial Marketing Management*, 30 (5), 427-440.
- Ungruhe, Markus (2011), *Bezugsobjektspezifische Investitionen im Business-to-Business-Marketing*, Dissertation FU Berlin.
- v. Wangenheim, Florian and Tomás Bayón (2007), "The Chain from Customer Satisfaction Via Word-of-Mouth Referrals to New Customer Acquisition," *Journal of the Academy of Marketing Science*, 35 (2), 233-249.
- van de Pol, Frank and Rolf Langeheine (1989), "Mixed Markov Models, Mover-Stayer Models and the Em Algorithm," presented at Multiway data analysis,
- Vandenberg, Robert J. and Charles E. Lance (2000), "A Review and Synthesis of the Measurement Invariance Literature: Suggestions, Practices, and Recommendations for Organizational Research," *Organizational Research Methods*, 3 (1), 4-70.
- Vandermerwe, Sandra and Juan Rada (1988), "Servitization of Business: Adding Value by Adding Services," *European Management Journal*, 6 (4), 314-324.
- Vargha, András, Tamás Rudas, Harold D. Delaney, and Scott E. Maxwell (1996), "Dichotomization, Partial Correlation, and Conditional Independence," *Journal of Educational and Behavioral Statistics*, 21 (3), 264-282.
- Vargo, S. L. and R. F. Lusch (2004), "Evolving to a New Dominant Logic for Marketing," *Journal of Marketing*, 68 (1), 1-17.
- Vargo, Stephen L. and Robert F. Lusch (2008a), "Service-Dominant Logic, Market Theory and Marketing Theory," presented at Otago Forum 2, Dunedin, New Zealand
- Vargo, Stephen L. and Robert F. Lusch (2008b), "From Goods to Service(S): Divergences and Convergences of Logics," *Industrial Marketing Management*, 37 (3), 254-259-259.
- (2011), "It's All B2B... And Beyond: Toward a Systems Perspective of the Market," *Industrial Marketing Management*, 40 (2), 181-187.
- (2008c), "Service-Dominant Logic: Continuing the Evolution," *Journal of the Academy of Marketing Science*, 36 (1), 1-10.
- Vargo, Stephen L., Robert F. Lusch, and Fred W. Morgan (2006), "Historical Perspectives on Service-Dominant Logic," in *The Service-Dominant Logic of Marketing: Dialog, Debate, and Directions*, Robert F. Lusch and Stephen L. Vargo, eds. Armonk: M.E. Sharpe.
- Vassinen, Antti (2012), *Configurational Explanation of Marketing Outcomes: A Fuzzy-Set Qualitative Comparative Analysis Approach*, Dissertation Aalto University.

- VDGH (2013), "Facts & Figures on the Diagnostics and Life Science Research Industry". Verband der Diagnostica-Industrie e.V.
- (2014), "IVD-Markt Deutschland 2013 - Geräte und Reagenzien Nach Produktsegmenten," (accessed June 18th, 2014), [available at http://www.vdgh.de/media/file/3903.IVD_Deutschland_2013_Produktsegmente_-_17_06_2014.pdf].
- Velamuri, Vivek K., Ann-Katrin Neyer, and Kathrin Möslein (2011), "Hybrid Value Creation: A Systematic Review of an Evolving Research Area," *Journal für Betriebswirtschaft*, 61 (1), 3-35.
- Venkatraman, Nenkat (1989), "The Concept of Fit in Strategy Research: Toward Verbal and Statistical Correspondence," *Academy of Management Review*, 14 (3), 423-444.
- Vergne, Jean-Philippe and Rodolphe Durand (2010), "The Missing Link between the Theory and Empirics of Path Dependence: Conceptual Clarification, Testability Issue, and Methodological Implications," *Journal of Management Studies*, 47 (4), 736-759.
- Vermunt, Jeroen K. (2010), "Latent Class Modeling with Covariates: Two Improved Three-Step Approaches," *Political Analysis*, 18 (4), 450-469.
- Vermunt, Jeroen K. and Jay Magidson (2002), "Latent Class Cluster Analysis," in *Applied Latent Class Analysis*, Jacques A. Hagenaars and Allan L. McCutcheon, eds. Cambridge: Cambridge University Press.
- (2005a), "Latent Gold 4.0 User's Guide". Belmont: Statistical Innovations Inc.
- (2005b), *Technical Guide for Latent Gold 4.0: Basic and Advanced*. Belmont: Statistical Innovations Inc.
- Victor, Norbert (1989), "An Alternative Approach to Configural Frequency Analysis," *Methodika*, 3, 61-73.
- Victor, Norbert and Meinhard Kieser (2003), "Configural Frequency Analysis and Association Analyses in Contingency Tables," *Computational Statistics & Data Analysis*, 44 (1-2), 419-429.
- Villena, Verónica H., Elena Revilla, and Thomas Y. Choi (2011), "The Dark Side of Buyer-Supplier Relationships: A Social Capital Perspective," *Journal of Operations Management*, 29 (6), 561-576.
- Vinchur, Andrew J., Jeffery S. Schippmann, Fred S. Switzer III, and Philip L. Roth (1998), "A Meta-Analytic Review of Predictors of Job Performance for Salespeople," *Journal of Applied Psychology*, 83 (4), 586-597.
- Visnjic Kastalli, Ivanka and Bart Van Looy (2013), "Servitization: Disentangling the Impact of Service Business Model Innovation on Manufacturing Firm Performance," *Journal of Operations Management*, 31 (4), 169-180.
- von Bertalanffy, Ludwig (1972), "The History and Status of General Systems Theory," *Academy of Management Journal*, 15 (4), 407-426.
- (1949), "Zu einer Allgemeinen Systemlehre," *Biologica Generalis*, 19 (1), 114-129.
- von Eye, Alexander (2004), "Base Models for Configural Frequency Analysis," *Psychology Science*, 46 (1), 150-170.
- (2007), "Configural Frequency Analysis," *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, 3 (4), 170-172.

- (2000), "Configural Frequency Analysis - a Program for 32 Bit Windows Operating Systems. Manual for Program Version 2000".
- (2002), *Configural Frequency Analysis Methods, Models, and Applications*. Mahwah: Lawrence Erlbaum Associates.
- (2001), "Configural Frequency Analysis--Version 2000. A Program for 32 Bit Windows Operating Systems," *Methods of Psychological Research Online*, 6 (2), 129-139.
- (2006), "Variablen- und personenorientierte Forschung," in *Veränderungsmessung und Längsschnittstudien in der empirischen Erziehungswissenschaft*, Angela Ittel and Hans Merckens, eds. Wiesbaden: VS Verlag für Sozialwissenschaften.
- von Eye, Alexander and G. Anne Bogat (2006), "Person-Oriented and Variable-Oriented Research: Concepts, Results, and Development," *Merrill-Palmer Quarterly*, 52 (3), 390-420.
- von Eye, Alexander and Patrick Mair (2007), "A Functional Approach to Configural Frequency Analysis," *Austrian Journal of Statistics*, 37 (2), 161-173.
- von Eye, Alexander, Patrick Mair, and Eun-Young Mun (2010), *Advances in Configural Frequency Analysis*. New York: Guilford Press.
- von Eye, Alexander and Eun-Young Mun (2012), "Interindividual Differences in Intraindividual Change in Categorical Variables," *Psychological Test and Assessment Modeling*, 54 (2), 151-167.
- (2013), *Log-Linear Modeling: Concepts, Interpretation, and Application*. Hoboken: Wiley.
- von Eye, Alexander, Eun Young Mun, and G. Anne Bogat (2008), "Temporal Patterns of Variable Relationships in Person-Oriented Research: Longitudinal Models of Configural Frequency Analysis," *Developmental Psychology*, 44 (2), 437-445.
- von Eye, Alexander and Eduardo Gutiérrez Peña (2004), "Configural Frequency Analysis: The Search for Extreme Cells," *Journal of Applied Statistics*, 31 (8), 981-997.
- von Eye, Alexander, Michael J. Rovine, and Christiane Spiel (1995), "Concepts of Nonindependence in Configural Frequency Analysis," *Journal of Mathematical Sociology*, 20 (1), 41-54.
- Vorhies, Douglas W. and Neil A. Morgan (2003), "A Configuration Theory Assessment of Marketing Organization Fit with Business Strategy and its Relationship with Marketing Performance," *Journal of Marketing*, 67 (1), 100-115.
- Wagner, William B (1987), "Customer Service in Industrial Marketing: Hedge against Competition," *European Journal of Marketing*, 21 (7), 7-17.
- Walker, Charles T. and Adrian J. Smith (1995), *Privatized Infrastructure: The Build Operate Transfer Approach*. London: Thomas Telford.
- Wang, Mo and Todd E. Bodner (2007), "Growth Mixture Modeling: Identifying and Predicting Unobserved Subpopulations with Longitudinal Data," *Organizational Research Methods*, 10 (4), 635-656.
- Wang, Mo and Paul J. Hanges (2011), "Latent Class Procedures: Applications to Organizational Research," *Organizational Research Methods*, 14 (1), 24-31.

- Wang, Xia, Luping Sun, and Hean Tat Keh (2013), "Consumer Responses to Variety in Product Bundles: The Moderating Role of Evaluation Mode," *International Journal of Research in Marketing*, 30 (4), 335-342.
- Webster Jr., Frederick E. and Yoram Wind (1972), "A General Model for Understanding Organizational Buying Behavior," *Journal of Marketing*, 36 (2), 12-19.
- Weiber, Rolf (2004), "Informationsökonomische Fundierung des Industriegütermarketing," in *Handbuch Industriegütermarketing*, Klaus Backhaus and Markus Voeth, eds. Wiesbaden: Gabler.
- Weiber, Rolf and Georg Beinlich (1994), "Die Bedeutung der Geschäftsbeziehung im Systemgeschäft," *Marktforschung & Management*, 38 (3), 120-127.
- Weick, Karl E. (1995), "What Theory Is Not, Theorizing Is," *Administrative Science Quarterly*, 40 (3), 385-390.
- Weitz, Barton A. and Kevin D. Bradford (1999), "Personal Selling and Sales Management: A Relationship Marketing Perspective," *Journal of the Academy of Marketing Science*, 27 (2), 241-254.
- Weitz, Barton A. and Sandy D. Jap (1995), "Relationship Marketing and Distribution Channels," *Journal of the Academy of Marketing Science*, 23 (4), 305-320.
- Wernerfelt, Birger (1984), "A Resource-Based View of the Firm," *Strategic Management Journal*, 5 (2), 171-180.
- Wertheimer, Max (1924), "Über Gestalttheorie," presented at KANT-Gesellschaft, Berlin. Reprint in: *Gestalt Theory*, 7 (2) 1985, 99-120.
- Widmier, Scott (2002), "The Effects of Incentives and Personality on Salesperson's Customer Orientation," *Industrial Marketing Management*, 31 (7), 609-615.
- Williams, Michael R. and Jill S. Attaway (1996), "Exploring Salespersons' Customer Orientation as a Mediator of Organizational Culture's Influence on Buyer-Seller Relationships," *Journal of Personal Selling & Sales Management*, 16 (4), 33-52.
- Williamson, Oliver E. (1981), "The Economics of Organization: The Transaction Cost Approach," *American Journal of Sociology*, 87 (3), 548-577.
- (1975), *Markets and Hierarchies*. New York: Free Press.
- (1998), "Transaction Cost Economics: How It Works; Where It Is Headed," *De Economist*, 146 (1), 23-58.
- Williamson, Oliver E. and Tarek Ghani (2012), "Transaction Cost Economics and its Uses in Marketing," *Journal of the Academy of Marketing Science*, 40 (1), 74-85.
- Wilson, Lynn O., Allen M. Weiss, and George John (1990), "Unbundling of Industrial Systems," *Journal of Marketing Research*, 27 (2), 123-138.
- Windahl, Charlotta, Pierre Andersson, Christian Berggren, and Camilla Nehler (2004), "Manufacturing Firms and Integrated Solutions: Characteristics and Implications," *European Journal of Innovation Management*, 7 (3), 218-228.
- Windahl, Charlotta and Nicolette Lakemond (2006), "Developing Integrated Solutions: The Importance of Relationships within the Network," *Industrial Marketing Management*, 35 (7), 806-818.
- Wise, Richard and Peter Baumgartner (1999), "Go Downstream: The New Profit Imperative in Manufacturing," *Harvard Business Review*, 77 (5), 133-141.

- Wold, Herman (1982), "Soft Modelling: The Basic Design and Some Extensions," in *Systems under Indirect Observation: Part I*, Karl G. Jöreskog and Herman Wold, eds. Amsterdam: North-Holland.
- Woodall, Tony (2003), "Conceptualising 'Value for the Customer': An Attributional, Structural and Dispositional Analysis," *Academy of Marketing Science Review*, 12 (1), 1-42.
- Woodside, Arch G. (2010), "Bridging the Chasm between Survey and Case Study Research: Research Methods for Achieving Generalization, Accuracy, and Complexity," *Industrial Marketing Management*, 39 (1), 64-75.
- (2003), "Middle-Range Theory Construction of the Dynamics of Organizational Marketing-Buying Behavior," *Journal of Business & Industrial Marketing*, 18 (4/5), 309-335.
- Woodside, Arch G. and Roger Baxter (2013), "Achieving Accuracy, Generalization-to-Contexts, and Complexity in Theories of Business-to-Business Decision Processes," *Industrial Marketing Management*, 42 (3), 382-393.
- Wright, Malcolm and Deborah Russell (2012), "Some Philosophical Problems for Service-Dominant Logic in Marketing," *Australasian Marketing Journal (AMJ)*, 20 (3), 218-223.
- Wunderlich, Nancy V. (2010), *Acceptance of Remote Services: Perception, Adoption, and Continued Usage in Organizational Settings*: Springer DE.
- Wunderlich, Nancy V., Florian v. Wangenheim, and Mary Jo Bitner (2013), "High Tech and High Touch a Framework for Understanding User Attitudes and Behaviors Related to Smart Interactive Services," *Journal of Service Research*, 16 (1), 3-20.
- Würth (2013), "Würth Logistics - Portrait," (accessed October, 25th, 2013), [available at <http://www.e.wurthlogistics.com/platform/apps/content/index.asp?MenuID=800&ID=1928&Menu=11&Item=5>].
- Wuyts, Stefan, Stefan Stremersch, Christophe Van den Bulte, and Philip Hans Franses (2004), "Vertical Marketing Systems for Complex Products: A Triadic Perspective," *Journal of Marketing Research*, 41 (4), 479-487.
- Xin, Yan, Kah-Hin Chai, Ville Ojanen, and Aarnout Brombacher (2013), "The Moderating Effects of Service Solution Characteristics on Competitive Advantage of KIBS," *The Service Industries Journal*, 33 (15-16), 1633-1658.
- Yang, Zhilin and Robin T. Peterson (2004), "Customer Perceived Value, Satisfaction, and Loyalty: The Role of Switching Costs," *Psychology & Marketing*, 21 (10), 799-822.
- Yin, Robert K. (2003), *Case Study Research: Design and Methods*. Thousand Oaks: Sage.
- Zacharias, Nicolas, Erdwin Nijssen, and Ruth Stock (2012), "How to Combine Product Development and Customer Relationship Activities: A Typology of Successful Marketing Strategies". Presented at the EMAC conference, Lisbon.
- Zahra, Shaker A. and John A. Pearce II (1990), "Research Evidence on the Miles-Snow Typology," *Journal of Management*, 16 (4), 751-768.
- Zeithaml, Valarie A., Mary Jo Bitner, and Dwayne D. Gremler (1996), *Services Marketing*. Boston: McGraw-Hill.

- Zeithaml, Valarie A., P. Rajan Varadarajan, and Carl P. Zeithaml (1988), "The Contingency Approach: Its Foundations and Relevance to Theory Building and Research in Marketing," *European Journal of Marketing*, 22 (7), 37-64.
- Zimmer, Marcus (2013a), "Proactivity and Reactivity in Solution Selling - a Configurational Approach Using Fuzzy Sets," presented at the Winter AMA Educators Conference, Las Vegas
- (2013b), "Selling Solutions More Effectively – a Configurational Approach," presented at the Frontiers in Service Conference, Taipei
- Zimmer, Marcus, Anne Scherer, and Florian v. Wangenheim (2009), "Kundenintegration und Konfiguration in der Marktforschungsbranche. Data-Information-Knowledge," in *Management Internationaler Dienstleistungen Mit 3K*, Dirk Holtbrügge and Hartmut H. Holzmüller and Florian v. Wangenheim, eds. Wiesbaden: Gabler.
- Zimmer, Marcus, Christoph Scholze, and Florian v. Wangenheim (2010), "Kundenbindungsmanagement von B2B-Lösungen," in *Marketing von Solutions*, David M. Woisetschläger and Manuel Michaelis and Heiner Evanschitzky and Alexander Eiting and Christoph Backhaus, eds. Wiesbaden: Springer.
- Zimmer, Marcus and Wolfgang Ulaga (2010), "Perceived Risk of Business Solutions," presented at the Frontiers in Service Conference, Karlstad.