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Differentiating Market Offerings Using Complexity and Co-Creation: Implications for Customer Decision-Making Uncertainty

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Abstract

Customer decision-making uncertainty (DMU) is a persistent phenomenon in business-to-business markets. However, there is substantial variation in the degree customers perceive DMU and hence suppliers should react to it. Based on existing industrial buying typologies, this paper proposes a new classification scheme to explain variance in customer DMU. To this end, market offering complexity and co-creation are used as defining dimensions and four ideal types of industrial market offerings are constructed. We show theoretically that DMU is especially prevalent for complex solutions. The paper closes with guidance for suppliers of industrial market offerings and an outlook for future research.

Keywords: Decision-making Uncertainty, Industrial Market Offerings, Complex Solutions, Typology

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"No one was ever fired for buying IBM."

1 Introduction

This adage shows the power of brand names for trust-building in business-to-business procurement. Put differently, especially "in the presence of rapid technological change, buyers often find it difficult or impossible to logically evaluate and compare offerings" (Aaker and Jacobson 2001, p.487). On what grounds do industrial buyers experience these difficulties? It is this research question that our paper addresses by focusing on contingent factors of customers decision-making uncertainty (henceforth DMU) in B2B procurements.

DMU has an exposed place in the social sciences (e.g., Downey and Slocum 1975), hence in business marketing (e.g., Gao, Sirgy, and Bird 2005; Bunn 1993). Coping with uncertainty is seen as "the essence of the administrative process" (Thompson 1967, p.9, 159; see also Cyert and March 1963). In economics, the uncertainty between transaction partners gained a prominent role through the paradigm of New Institutional Economics (Rindfleisch and Heide 1997).

Also from a practitioner's standpoint, management under uncertainty has become increasingly important for companies throughout the last years (e.g. The McKinsey Quarterly 2008). Especially managers involved with the procurement of industrial market offerings are increasingly faced with high uncertainty (e.g., Bello and Zhu 2006). We adhere to the definition put forth by Gao et al. which is based on Duncan (1972) and Kohli (1989): "Decision-making uncertainty in organizational buying decisions refers to the difficulty experienced by the decision maker in predicting the outcomes of a purchase decision in terms of the likely benefits and costs" (p.397).

The purpose of our paper is to classify industrial market offerings and to draw conclusions for the resulting degree of customers' DMU. This is necessary, since industrial market offerings may entail varying degrees of DMU. Analyzing the consequences of different market offerings on DMU in a nuanced light is important for practitioners and academics alike, considering the negative effects of DMU on purchase behaviors (Gao et al. 2005).

Matching specific types of industrial market offerings with different facets of DMU allows for a more realistic view on the behavioral obstacles for exchange partners. To our best knowledge, research has failed to do so. Our paper intends to (a) examine these obstacles (namely the various dimensions of DMU which may be at play), (b) classify industrial market offerings using co-creation and market-offering complexity as dimensions for a new conceptual typology, and (c) establish links between specific facets of customer DMU and industrial market offerings. Thereby, we aim to contribute to extant research in two ways. First, we offer a theoretical rationale for a further cause of DMU not analyzed so far, i.e., the degree of co-creation. Secondly, our paper advances extant classification schemes on industrial market offerings by consolidating previously analyzed factors into the overall "market-offering complexity" dimension and adding a new

factor which is gaining prominence in marketing practice and research (co-creation).

Acknowledging the implications of a given market offering for customer decision-making also yields benefits for the supplier- and customer-side. For customers, our typology enables them to realize the intricateness of their decision-making process. For suppliers of industrial market offerings, the benefits of our typology result from the following rationale: Information (or lack of it) is hypothesized to be one key variable explaining DMU. Moreover, human information processing capabilities can be seen as the second "scissor-blade" (besides the environment, i.e., incoming information) shaping decision-making, thus DMU.[1] Relationship marketing has established that the cumbersome overcoming of the information problem can be mitigated by relational means. That is to say, by establishing a bond between customer and supplier that induces trust, the burdensome screening and evaluation of available market offerings is made obsolete (see for instance Jayachandran et al. 2005 for a review). However, before deciding on what kind of relationship to build with prospects, industrial suppliers ought to know what kind of DMU their customers are facing. Answering this question will help in deciding which selling approach to apply.

The paper is structured as follows. In the next section, we review various facets of decision-making uncertainty. This is followed by a presentation of the dimensions of industrial market offerings. Subsequently, we develop a conceptual typology of industrial market offerings and link each type to specific DMU-outcomes. Finally, we give guidance to suppliers regarding what kind of DMU their customers likely face and an outlook for further research.

2 Facets of Decision-Making Uncertainty

In the following we differentiate between facets of DMU in order to delineate later on which facets apply for which market offering and to give a more nuanced picture, what kind of market offerings are especially prone to high degrees of DMU. Choice models such as the expected utility framework (Neumann and Morgenstern 1944) emanate from complete information, in other words, riskless choice, "in which the outcomes are known with certainty" (Qualls and Puto 1989, p.180). Such a buying situation pertains to the case when an industrial buyer chooses between alternatives "for which every aspect of performance is known with certainty (e.g., guaranteed price, known quality, and reliable delivery performance)" (ibid.). This ideal assumption might best be approximated for market offerings which compete by price. Indeed, industrial market offerings competing beyond mere price considerations are perceived as being relatively

[1] Newell and Simon, 1972: "Just as a scissors cannot cut paper without two blades, a theory of thinking and problem solving cannot predict behavior unless it encompasses both an analysis of the structure of task environments and an analysis of the limits of rational adaptation to task requirements" (p. 55).

more ambiguous (as Anderson, Thomson, and Wynstra 2000 found for "value" of a market offering; p.308).[2]

Studies in behavioral decision making however are predicated on incomplete information, i.e., a lack of information about aspects of performance of alternatives, attributes, and/or their value entails uncertainty.[3] In addition, there are manifold facets of a market offering that may be tainted with uncertainty. Consequently, literature on uncertainty is replete with classifications of uncertainty that are in sum partially redundant. In finding dimensions of uncertainty we screened a variety of typologies. We aimed at building a concise classification of facets of uncertainty pertaining to the industrial procurement decision-making.

We divide extant types of DMU in three classes; (a) DMU pertaining to the specific market offering, (b) DMU related to the specific supplier of the market offering, and (c) DMU related to the customer. In the following, we consolidate findings from a review of uncertainty typologies.

2.1 Market Offering-related Decision-Making Uncertainty

We draw from conceptual work in operations management (Gerwin 1988) and business marketing (Håkansson, Johanson, and Wootz 1976) to elicit market offering-related facets of DMU. In the course of a review of relevant literature, we group technical-, financial-, social-, transaction-, and market uncertainty in this class.

Technical Uncertainty. Technical uncertainty relates to the "difficulty in determining the precision, reliability, and capacity of new processes, and whether still newer technology may soon appear to make the equipment obsolete" (Gerwin 1988, p.90). Gerwin had "Computer-aided Manufacturing Technology" in mind when reasoning about different kinds of uncertainties that may hamper its adoption process. More generally, Lehmann and O'Shaughnessy (1974) define technical uncertainty "as the chance that the product will not perform as

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[2] "Purchasing managers are more knowledgeable about using price and price changes as a basis for selecting product offerings than value and value changes. In business markets, the price of each product offering is almost always stated or understood (Heinritz et al., 1991). The same cannot be said about value. Even when the value of a product offering is known, purchasing managers likely will have far greater experience using price information than value information" (Anderson, Thomson and Wynstra, 2000, p.310).

[3] Downey and Slocum, 1975, p.570: "Reviewing the manner in which uncertainty has been employed, Duncan (1972) identified three basic definitions in the literature, all of which are explicitly or implicitly grounded in the concept of information as a counterpart of uncertainty." Uncertainty has been similarly defined by McQuiston, 1989, p.70: "Organizational buying theory states that when members of a decision-making unit are faced with uncertainty, they seek to reduce it through the gathering of more information (Sheth 1973; Webster and Wind 1972; Cyert and March 1963)." See also Dawes, Lee and Dowling, 1998; Bunn, 1993**;** Puto, Patton and King, 1985; More, 1984; Anderson, 1982; Spekman and Stern, 1979; Assmus, 1977; Sheth, 1973; Hickson, Hinings, Lee, Schneck and Pennings, 1971.

expected" (quoted from Wilson, Lilien, and Wilson 1991, p.453). In that sense, technical uncertainty has been described also as "performance risk" (e.g., Sweeney, Soutar, and Johnson 1999).

Financial Uncertainty. Financial uncertainty "includes whether return on investment should be the major criterion and whether net future returns can be accurately forecasted" (Gerwin 1988, p.90). Besides technical uncertainty, financial uncertainty is considered as the most prevalent type of uncertainty in industrial procurement decisions in general. Both types of uncertainty are decreasing the perceived value of a market offering (Sweeney et al. 1999). Whereas normally, various kinds of warranties may be applied to mitigate uncertainty-perceptions, warranties are not able to remove entirely perceived technical and financial uncertainties (Bearden and Shimp 1982).

Transaction Uncertainty. "The transaction uncertainty has to do with problems of getting the product (physically, legally, on time, etc.) from the seller to the buyer" (Håkansson et al. 1976, p.321). Transaction uncertainty may be particular problematic for industrial buying situations, where the transaction object is of strategic importance for the buyer, thus, the aspect of intactness is predominant. Generally speaking, transaction uncertainty refers to the degree of "easy-to-use procedures for doing business, processing orders accurately, and providing reliable and timely deliveries" (Anderson and Narus 2004, p.120).

Market Uncertainty. Market Uncertainty is defined as the "degree of difference between the suppliers (heterogeneity) and how these differences change over time (dynamism)" (Håkansson et al. 1976, p.321). Håkansson et al.'s rather anecdotal evidence has been supported by research of Heide and Weiss who showed that market characteristics, such as heterogeneous and rapidly changing technologies, influence positively uncertainty (Glazer 1991; Norton and Bass 1987; Teece 1986 quoted from Heide and Weiss 1995, p.30), since rapid change makes collected information time-sensitive (Bourgeois III and Eisenhardt 1988 quoted from Heide and Weiss 1995, p.30).

2.2 Supplier-related Decision-Making Uncertainty

Apart from the uncertainties induced by the characteristics of the market offering, customers may feel to varying degrees uncertainties pertaining to their counterpart in the market. Thus, the following facets of DMU stem from the interaction with industrial suppliers.

Social Uncertainty. Social uncertainty is geared towards predicting another person's behavior (e.g., Messick, Allison, and Samuelson 1987). Social uncertainty is fostered by situations that are characterized by information asymmetry between two parties (Messick 1993, p.289). It may be mitigated by trust by "limiting the range of behavior expected from another" (Sniezek and Van Swol 2001, p.290). In other words, social uncertainty depends on the information attributes of the market offering. If a market offering is dominated by experience and credence qualities (that is, customers find out about the quality of the market offering only after they have purchased it), there is "opportunity for deception due

to the information asymmetry between the buyers and sellers" (ibid. based on Kollock 1994).[4]

Resource Uncertainty. Furthermore, business markets are characterized by high degrees of resource dependency. Thus, customers may be dependent "by those who control the resources they need" (Dwyer and Oh 1987). We follow the same logic as in the case of social uncertainty, by postulation a positive relationship between resource dependency and DMU. In this case, uncertainty stems from the resources the supplier possesses. More specifically, the customer lacks knowledge "of the resources controlled by the other party, as well as their importance and usefulness" in delivering the market offering (Sharma 1998, p.514).

Process Uncertainty. Closely related to resource uncertainty is the notion of process uncertainty which has been put forward by Sharma. It is defined as the "… uncertainty concerning the manner in which the resources of alliance partners can be combined to achieve a mission. This type of uncertainty arises because the resources of the … partners are heterogeneous" (Sharma 1998, p.514).[5]

2.3 Customer-related Decision-Making Uncertainty

Finally, DMU may stem neither from the characteristics of the market offering nor from the supplier but from the procurement manager him- or herself. This is the case when a manager experiences need uncertainty. Moreover – as kind of unifying construct – in response to all mentioned facets of DMU, managers perceive varying degrees of choice uncertainty.

Need Uncertainty. "There are often difficulties in interpreting the exact nature of the needs for materials, machines, tools, services etc., in the firm. The buyer's perceived need uncertainty is a function of these difficulties in combination with the importance of the actual need" (Håkansson et al. 1976, p.320-321). Psychological research speaks of preference uncertainty. Need uncertainty may result in selection difficulty/choice uncertainty (e.g., Anderson 2003).

Choice Uncertainty. Choice uncertainty can be defined as the "uncertainty regarding which alternative to choose" (Urbany, Dickson, and Wilkie 1989, p.208).[6] Behavioral decision-making research found that product complexity (defined by its number of attributes, number of respective values, and the

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[4] In the research context of international alliances, we found the notion of goal uncertainty. Goal uncertainty is "the uncertainty concerning the similarities and differences in the goals of the alliance partners" (Sharma, 1998, p.514). Thus, goal uncertainty is an equivalent of social uncertainty. Likewise, Erikson and Sharma speak of relationship uncertainty "… due to the bounded rationality of decision makers, interfirm cooperation is exposed to uncertainty regarding the future behavior of the counterparts, and the future outcome of the present cooperation" (Eriksson and Sharma, 2003, p.962).

[5] Sharma analyzes resource uncertainty in the context of an alliance between two parties.

[6] Psychological research oftentimes speaks of selection difficulty (e.g., Anderson, 2003).

(negative) interdependence of attributes)[7] , market complexity (number of alternative products), and decision importance among others are positively related to choice uncertainty. As such, choice uncertainty results from all previous considered facets of DMU. Although choice uncertainty is rather innate to the customer, it is triggered by outer factors, like the different facets of DMU revised.

3 Dimensions of Industrial Market Offerings

Previous classification schemes have focused on the industrial buying situation and developed a fundamental understanding of organizational purchase behavior (e.g., Hunter et al. 2004; Robinson, Faris, and Wind 1967). However, our paper stresses the influence of the characteristics of the industrial market offering on DMU as opposed to the buying situation as a whole. Extant classification schemes on industrial market offerings have focused on establishing the service-goods distinction (e.g., Grönroos 1998; Fisk, Brown, and Bittner 1993; Shostack 1977) as well as various objectively measurable characteristics (such as replacement rate or personal delivery; Boyt and Harvey 1997). These classification schemes and others (e.g., Shostack 1987; Thomas 1978) have in common that they stress explicitly or implicitly complexity as distinguishing dimension among others. Another important dimension in classifying market offerings is their degree of co-creation. This notion has been recognized for a long time in service marketing (e.g., Mersha 1990; Haywood-Farmer 1988; Bell 1981; Mills and Margulies 1980; Chase 1978; Fuchs 1968). Although some classification schemes put forth dimensions close to our understanding of market-offering complexity and co-creation (e.g., Silvestro et al. 1992; Haynes 1990; Wemmerlöv 1990; Bowen 1990; Bell 1986), none established the link to DMU. However, this body of knowledge supports our understanding that industrial market offerings ought to be classified along the dimensions of market-offering complexity and co-creation. We deem both dimensions crucial for explaining customers' DMU as the following paragraphs will show.

3.1 Market-offering Complexity

Different research streams have demonstrated a positive effect of complexity on DMU, such as research on organizational buying behavior (e.g., McQuiston 1989), marketing channels (e.g., Dwyer and Welsh 1985), consumer buying behavior (e.g., Heitmann, Lehmann, and Herrmann 2007; Wilson, McMurrian, and Woodside 2001; Bunn and Liu 1996), information processing (e.g., Keller and Staelin 1987; Jacoby, Speller, and Kohn 1974), and organizational research (e.g., Homburg, Workman Jr., and Krohmer 1999; Downey and Slocum 1975). Heiner (1983) posits that "in general, there is greater uncertainty as either an agent's perceptual abilities become less reliable or the environment becomes

[7] Imagine you want to buy a car; On the one hand you would like to economize (in terms of miles per gallon or purchase price), on the other hand, you prefer strong engines. Both attributes are negatively correlated.

more complex" (p.565). We follow Duncan (1972) and Pfeffer and Salancik (1978) that complexity is defined in terms of the perception of decision makers. Individuals have different perceptions and tolerance for ambiguity and uncertainty (Adorno, Frenkel-Brunswik, and Levinson 1950; Berlyne 1968).[8]

Although the analysis of the ramifications of complexity on decision making is far from being innovative, studies in business-to-business contexts are rare. As Wynstra, Axelsson, and van der Valk (2006) succinctly note: "Finally, hardly any research is published that deals with the variety of business services from the buyer's perspective, and which examines how buyers deal with this variety" (p.475).[9]

3.2 Co-creation

Our second defining element of industrial market offerings is the degree to which production processes are split between supplier and customer. This phenomenon has been treated under "co-production" (Auh et al. 2007; Ramirez 1999; Normann and Ramirez 1993), "customer participation" (Dabholkar 1990), "co-constructing" (Sawhney 2006), "co-creation" (Cova and Salle 2007; Vargo and Lusch 2004), and customer integration (e.g., Kleinaltenkamp and Jacob 2002). Interestingly, co-creation has been mainly researched in consumer markets, with slim evidence from business markets (Payne, Storbacka, and Frow 2008). This is an important point, since whereas in consumer markets co-creation is an opportunity for a firm to achieve competitive advantage (Auh et al. 2007), in industrial markets, the customer integration is oftentimes a necessity (Dhar, Menon, and Maach 2004); customers "often demand special value-adding activities from their suppliers, such as joint product development, advanced personal interaction, or consulting services" (Stock 2006, p.588).

Research on co-creation can be classified according to three research questions: (a) research focusing on the benefits of customer participation for the firm in terms of productivity (e.g., Blazevic and Lievens 2008; Payne and Frow 2005), (b) research focusing on what and when customers can be used for participation in production processes (e.g., Meuter et al. 2005), and (c) the psychological effects of participation in production processes on customers (e.g., Bendapudi and Leone 2003). According to latter authors research "has not addressed customers' potential psychological responses to participation" (p.14). Even if we would adapt research on co-creation in consumer markets, its effects on DMU or its interplay with (market-offering) complexity have not been tested so far (Hsieh, Yen, and Chin 2004). We argue that co-creation has a positive impact

[8] Hence, testing an objective state of market-offering complexity would not be conducive for our research purpose; "It is probably an epistemological misnomer to say that environments are uncertain. It is the organization that is uncertain about its' environment" (Achrol, Reve and Stern, 1983, p.59).

[9] Note, that – according to our understanding – variety is only one facet of market-offering complexity.

on customer's DMU via (a) increasing information load and (b) increasing preference uncertainty.

It can be argued that the more a customer is integrated in the production process of a market offering, the more information he or she needs to process. We follow the information load hypothesis (Jacoby et al. 1974) according to which surpassing an individual threshold of information load leads to uncertainty. In other words, customers that are integrated in the production process of a market offering are more likely to experience DMU because of higher information processing requirements than customers purchasing a ready-made industrial market offering.

Secondly, we draw from research on (1) preference construction, (2) preference insight and (3) preference expression. First of all, research on preference construction maintains that customers oftentimes do not have ex ante specified preferences but that these are highly dependent on the options presented (Anderson 2003, p.141). However, since the final market offering is co-created, theoretically, there is an infinite number of available options. Thus, preference construction can be hypothesized to be hampered. Secondly and moreover, even if customers have preferences, they may simply lack insight in their preferences (Kramer 2007). Thirdly, oftentimes managers have to operate in an environment where the formation of ex ante preferences is not possible, since they cannot translate exactly what they (on behalf of a firm) are looking for (Dhar et al. 2004), i.e., they have a problem of expressing their preferences (see Franke, Keinz, and Steger 2009 in the case of product customization). We argue that all three phenomena are more salient in buying situations with high co-creation. Thus, highly integrated customers are more prone to preference uncertainty, which increases overall DMU.

4 Classifying Industrial Market Offerings

According to Ward and Webster (1991), we explicit our research approach. We are interested in the perceived DMU of buying center members at a certain point in time. In other words, we follow a "static" orientation and the unit of analysis is the individual decision-maker within a buying center. Furthermore, we employ a conceptual typology, i.e., a deductive method of classification, as opposed to developing a taxonomy – an inductive method of classification. Fig. 1 depicts our conceptual typology of industrial market offerings. Each of the four quadrants represents a different specimen of an industrial market offering based on the customers' abstractedness of goals/needs, the degree of standardization/customization of the market offering, its information economical profile (preponderance of search-, experience-, or credence attributes), value/price considerations of the customer, and the regularity of procurement of the market offering. Concerning the cases of the typology we follow the argument of Bailey: "I would wish for the clearest and purest example of the type, with no dull or damaged features. In short, I would like to have a perfect specimen" (Bailey 1994, p.19). In that sense, the ideal type cannot be found "in its conceptual purity" in reality (ibid.). The blue bars illustrate the relevance of DMU

in the different industrial buying situations with higher bars signaling greater importance and vice versa.

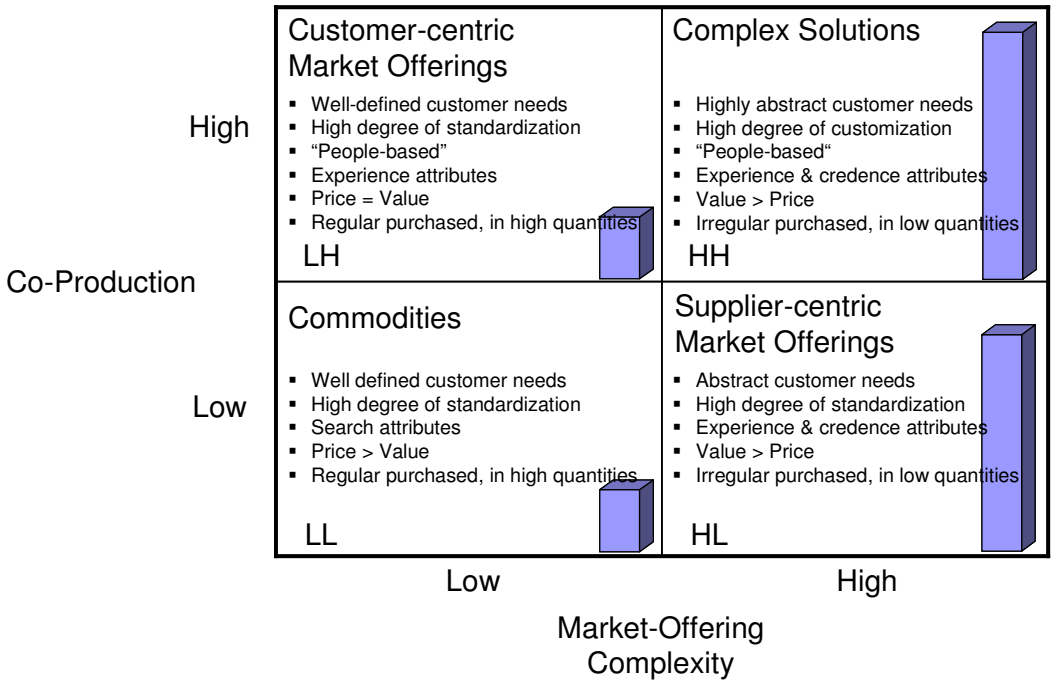

Fig. 1: A Market-offering complexity/Co-creation Typology for Industrial Market Offerings

4.1 High Market-offering Complexity/High Co-creation (HH): Complex Solutions

We labeled the fourth quadrant "complex solutions." Complex solutions are characterized by both high degrees of perceived market-offering complexity and co-creation. This kind of market offerings is gaining prominence in the industry; for instance, technology companies have shifted (e.g., IBM by acquiring PriceWaterhousCoopers) or are in the process (e.g., HP acquired EDS, Dell is about to acquire Parot Systems) of shifting from competing based on product differrentiation to competiting based on solution customization (Businessweek 2009; Srivastava, Shervani, and Fahey 1999). Dell for instance gives its salesforce incentives "to offer a broad range of solutions, instead of just hardware" (Edwards 2009, p.40).

We draw from qualitative research by Tuli, Kohli, and Bharadwaj (2007) where a solution provider states that "one of the key aspects of solutions is their complexity as compared to most products. This complexity can create problems as oftentimes, it's not clear what are the requirements, what are the goals, etc. This is especially important for solutions due to the duration of solution development and implementation" (p.9).

Thus, complex solutions arise from the high abstractedness of customer needs. Due to their abstract needs, the market offering is specified in an interactive way between supplier and customer. In other words, a clear specification broken down to specific metrics prior to the purchase of the market offering is not possible, since the customer does not know, how his or her abstract needs would translate into concrete and tangible needs. For such market offerings customer preferences are learned (Dhar et al. 2004, p.259). The market offering production process is not discernable from customer's input, nor is creation and demand fulfilment separable. When implementing a solution, an "iterative process, driven by trial and error" sets in (Thomke and Fujimoto 2000, p.130). In other words, market offerings are co-created by suppliers and customers. Silvestro (1999) states that "in professional services, the customer often actively participates in the process of defining the service specification, detailing his/her individual requirements; negotiation of the service specification thus forms part of the service process" (p.402). Typical examples are engineering project management and certain types of management consulting ('certain' because oftentimes management consulting services are well-standardized).

Therefore, complex solutions are not standardized, but unique with a high degree of customization. Thus, complex solutions are "people-based" as opposed to "equipment-based" (Thomas 1978). This means for operations, that suppliers need to invest in the expertise of their workforce. On this note, a major account of Hewlett Packard's service unit describes the choice of Aviva to pick HP over IBM for a $1 billion, 10-year outsourcing contract in Britain: "…what you're buying is tremendous expertise" (The New York Times 2009, p.B4). Consequently, it becomes very difficult for customers to inspect the market offering prior to purchase, i.e., complex solutions are dominated by experience and credence attributes. Finally, in industrial buying situations a clear-cut transfer of the market offering from the supplier to the customer is oftentimes hardly discernable.

DMU Implications for Complex Solutions

We argue that customers of complex solutions will experience high degrees of DMU, since customers will experience both market offering-related and supplier-related uncertainties. Due to the market offering's high complexity, procurement managers are more likely to perceive high degrees of technical uncertainty (Achrol and Stern 1988; Dwyer and Welsh 1985). Simply because the market offering possesses so many attributes and respective values, it becomes more likely that a decision-maker is not knowledgeable across all attributes. Technical uncertainty is difficult to cope with when management lacks technical expertise to understand the market offering and the consequences of its purchase for the company. Tatikonda and Montoya-Weiss (2001) clarify that technical uncertainty is influenced by "product and process novelty" (p.155). In buying situations of high technical- and need uncertainty, customers will rely on known suppliers, or – if it is a new buy – on known brands in the market (Mudambi, Doyle, and Wong 1997). In the case of technical uncertainty, customers will value especially "attributes like delivery stability, adaptability, degree of service etc." (Bengtsson

and Servais 2005, p.708). Likewise, the more complex the market offering is, the more difficult the financial impact of a purchase on company performance is to estimate.

Also, transaction uncertainty is particularly prevalent for complex solutions, since they are co-produced between supplier and customer. In fact, for complex solutions, oftentimes there is no physical transfer of the market offering taking place. Imagine the “production” of an outsourcing project. Whereas certain areas of a given department of the customer company may be outsourced, other may stay within the company. Likewise, the “transfer” of a consultancy project from supplier (the management consultancy) to customer is mainly intangible and does not take place at a certain point in time but throughout a period of time. In other words, the transferability of complex solutions is not clear-cut and may evoke (transaction) uncertainty.

Due to their high degree of co-creation, complex solutions are hardly pre-specified. That means that at the outset of the cooperation between customer and supplier, the specifications of the final market offering have to be made jointly. Oftentimes, this joint-specification develops throughout the co-creation process. It follows, that there is theoretically an abundance of possible market offering attributes and respective values. Moreover, it is likely that the more attributes a market offering possesses the more negative correlations between some attributes may emerge. It has been empirically demonstrated that these three criteria increase choice and need uncertainty (e.g., Dhar 1997). On this note, Dhar et al. (2004) state: “… our experience suggests that customer solution preferences are steeped in uncertainty and ambiguity rather than pure product functionality and benefits” (p.260).

Given the dominance of experience and credence attributes over search attributes for complex solutions, industrial customers are also prone to social uncertainty. As Sniezek and Van Swol (2001) have established, social uncertainty stems from information asymmetry. Consistent with our argument made for technical and financial uncertainty, it is likely that procurement managers of complex solutions (especially when the purchase is a first buy) have an informational disadvantage compared with the supplier. It follows that for complex solutions, customers will either try to catch up their informational disadvantage by extensive information search or rely on relational strategies to mitigate risks of supplier opportunism.

For the successful co-creation of the market offering resources need to be pooled. Consequently, another facet of DMU is concerned with the availability and usefulness of the supplier’s resources. Since complex solutions are “people-based”, resource uncertainty applies especially (but not exclusively) to the supplier’s human resources. Whereas resource uncertainties geared towards tangible resources are relatively easily to evaluate for the customer, the cognitive resources of the supplier’s workforce are much more difficult to assess. Industrial suppliers of complex solutions might counter resource uncertainty by referring to signals. However, being able to examine the quality of the supplier’s resources does not answer the question of how well the pooled resources of customer and supplier will work together. Especially for complex solutions, achieving customer

value depends on how smoothly the resources of both parties interact, for instance their workforce, different information technologies, etc. Thus, for complex solutions process uncertainty may also be an issue as the supplier's resources are rich in experience and credence attributes.

From this argumentation follows that customers of complex solutions focus on the value aspect of the market offering instead of price considerations. Put differently, solutions are especially demanded in markets where the cost of failure is high. In those markets, by trend customers will prefer service and quality over price considerations (e.g., Baker 2009, p.58). Considering the variety of facets of DMU that are at play, we may conclude, that in-suppliers and companies with a strong reputation will dominate markets for complex solutions (see Bengtsson and Servais 2005; Heide and Weiss 1995, p.31 for a similar rationale).

4.2 Low Market-offering Complexity/Low Co-creation (LL): Commodities

The LL quadrant denotes market offerings of low perceived complexity and low co-creation. Market offerings are typically purchased in large quantities and regularly. This means that even if the market offering may possess characteristics for being objectively complex, because of the gained experience of procurement management, they are no longer perceived as being complex. This point highlights the subjective character of complexity of a market offering. In other words, complexity is in the eye of the beholder: the same market offering might be perceived differently complex for different customers. For instance, the purchase object "consultancy project" is commonly considered to be complex. However, for the procurement managers of big corporations, consultancy projects are bought several times a year. So even if the consultancy project is considered at the first buy as complex, due to recurring purchases it may slip from the HH to the LL quadrant.

Further examples for this kind of market offerings are raw materials, items such as maintenance parts, and office suppliers, but also services such as postal services. For this kind of market offerings, the production process is highly specified and routinized. The interaction between both parties is rather short in time and probably characterized by arm's length transaction-style relationships. It is for this reason that the supplier is able to provide the market offering to a relatively large number of customers. The amount of information transmitted between both parties is relatively limited. Customers have well-defined, concrete requirements and needs, thus choice uncertainty is low. Moreover, transparency is easily achieved, since the market offerings are standardized with few differentiations along only a few criteria. Having said that, commodities are typically dominated by search attributes. Due to its eased evaluation, market offerings are easier to compare. This will foster competition on price. Thus, customer dependency on the supplier is limited. It follows, that markets for commodities are price-driven and companies need to establish economies of scale. Different industrial e-business concepts are demonstrating the overriding importance of price considerations, such as Covisint in the automotive industry,

MetalSite.com in the metal industry, and Contractors eSource in the construction business.

DMU Implications for Commodities

Since commodities are low in complexity, there are no high information-gathering and information-processing requirements on the procurement manager. Therefore, their technical aspects can be rather easily assessed. Also, their financial impact on the company is more predictable. Transactions can be expected to follow a standardized pattern. Moreover, commodities are dominated by search attributes. Consequently, there exists information symmetry and hence little space for deception or opportunism on the supplier-side. However, social-, resource-, and process uncertainty may still be an issue, if the customer is committing him- or herself through long-term order-contracts to a supplier. In that case, the customer could fall prey to the suppliers will. However, this risk is not a function of market-offering complexity or co-creation and thus not within the scope of our framework.

Another intriguing thread of thought results from the similarity of all market offerings, i.e., the customer's consideration set. Research shows that when alternatives are not discriminating and no alternative is dominating among the consideration set, selection difficulty (choice uncertainty in our parlance) does result (Dhar 1997). To sum up, DMU for commodities is relatively low, since the market offering is easy to evaluate and to specify.

4.3 High Market-offering Complexity/Low Co-creation (HL): Supplier-centric Market Offerings

The HL quadrant denotes market offerings that are high in perceived complexity and low in co-creation. Examples are purchases of IT-hardware or software. Although the market offering itself is of high complexity, it is relatively standardized.[10] For instance, the market for anti-virus software constitutes very complex perceived market offerings. However, generally no customer will have an opportunity to co-produce the software. Instead, companies may offer different versions of software, among which customers can decide. Considering the dominance of the supplier in the production process, we label this kind of marketing offering "supplier-centric." Those market offerings are of high importance to the purchasing company. Due to the market offering's importance

[10] Depending on the state of the product life cycle, standards for the IT-market offering may have been established. Thus, the situation of the IT-market offering on the product life cycle decides over its perceived market-offering complexity. Is the IT-market offering at an early stage, no market standards exist. The customer will experience the raw market-offering complexity of the IT-market offering and has to decide for him- or herself which standard to adapt. However, once a standard has been introduced and manifested itself in the market, the decision-making process becomes much more guided and the IT-market offering losses some of its perceived market-offering complexity.

for the buying organization, a lot of information is exchanged between both parties. They are purchased in low quantities and irregularly. Customer's requirements and needs are rather ill-defined. Due to the market offerings complexity, procurement managers will face similar problems as described for complex solutions in assessing the market offering prior to purchase. Thus, experience and credence attributes dominate.

DMU Implications for Supplier-centric Market Offerings

Reviewing our bipartite classification of facets of DMU, it becomes apparent that supplier-centric market offerings are rich in uncertainties stemming from the market offering and less susceptible to uncertainties stemming from the supplier. Since there is virtually no co-creation, i.e., no interaction between both parties throughout the production process, doubts about the customers resources and processes do not concern prospective customers. Still, due to the market offerings high perceived complexity, information asymmetries prevail, making the procurement manager susceptible to social uncertainties. Speaking of the market offerings complexities entails questions of technical, financial, and transaction uncertainties. In addition, the comparison between market offering alternatives is hampered due to the potential lack of alignability of the assortment (e.g., Gourville and Soman 2005). Both factors may lead to increased customer market uncertainty. Furthermore, due to the variety of choice (emanating from the various and sometimes conflicting product attributes, and the consequential nature of the choice), paired with abstract requirements and needs of the customer, need and choice uncertainty may be at play. Although the production process of the market offering is not closely linked to the customer, due to its high importance to the customer and the involved high risk of the purchase, customers are interested in developing a relationship to the supplier. Moreover, customer value has a relatively more important role than for commodities.

4.4 Low Market-offering Complexity/High Co-creation (LH): Customer-centric Market Offerings

The LH quadrant is characterized by a relatively low degree of perceived market-offering complexity and a high degree of co-creation of the market offering. Examples are "high contact services" (Chase 1978) like divers customer services (e.g., taxi, eat as you go, call center services, software and systems training and support), hospitality and tourism. For those services, the customer is constantly involved in the production process, i.e., a high degree of co-creation is taking place. For this reason we label this kind of market offering "customer-centric." On the other hand, perceived complexity of the market offering is limited. Customers have well-defined requirements and needs. Due to easy to make comparisons and evaluations of the market offering delivery, price will play an important role for the purchase decision. Likewise, the supplier is able to deliver the service to a large amount of customers. Consequently, market offerings are delivered in a standardized way, although they are "people-based." It is normally impossible to

examine the market offering prior to consumption. Customer-centric market offerings are instead dominated by experience attributes.

DMU Implications of Customer-centric Market Offerings

Since customer-centric market offerings are low in customer perceived complexity, technical-, financial-, and transaction uncertainty are also relatively low. Likewise, social uncertainty is only of concern to inexperienced customers. Since customer-centric market offerings are purchased on a regular basis, information asymmetry would not hold for long and is thus in this case relatively unimportant. The same holds for process- and resource uncertainty. Since the customer is able to gain rapidly experience, she will also be able to quickly evaluate the supplier. Imagine a company uses the service of a caterer for its cafeteria. The quality of the caterer will become relatively quickly apparent to the customer. Upon contract renewal, the customer is flexible to opt for an alternative caterer. Yet, we adapt the same thread of thought as for commodities; Due to the similarity of all market offerings (because of their standardization) in a customer's consideration set, need and choice uncertainty may be an issue. Consequently, relationships for suppliers of those market offerings are evaluated constantly. Due to its low perceived complexity, the dominance of experience attributes, as well as regular purchases, price considerations are equally important as value considerations.

5 Conclusion

Fig. 2 illustrates the varying degrees of uncertainty across different phases of the procurement process, i.e., need recognition, determination of characteristics needed, product specification, supplier search, supplier selection, set-up procedures, and formal performance review of the supplier. We draw from the buygrid model of Robinson et al. (1967; see also Anderson and Narus 2004, p.123-124). However, we did not incorporate "proposal solicitation" since on a theoretical note this level does not seem to contribute to varying degrees of DMU. On a conceptual level and in line with our argumentation, the ideal type purchase of a complex solution shows high degrees of uncertainties across more phases of the procurement process as compared to the remaining three ideal type buying situations. The lowest level is exhibited by commodity-like market-offerings.

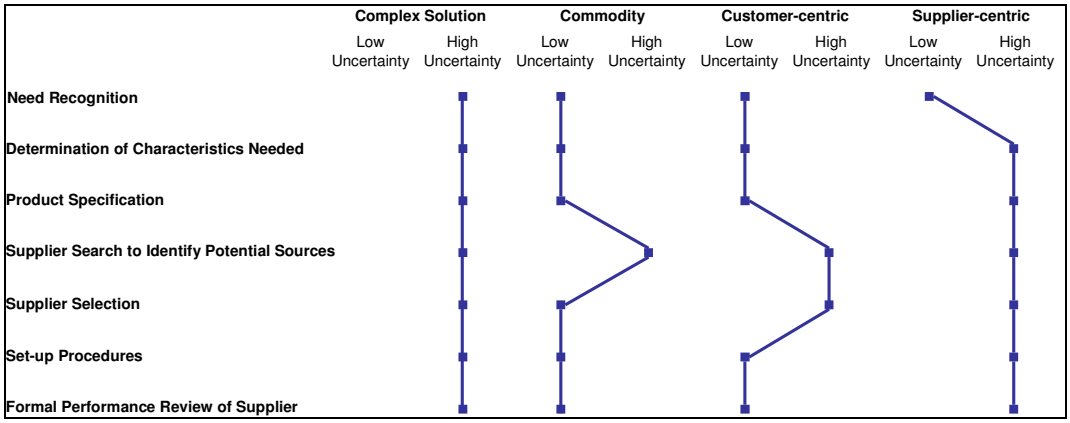

Fig. 2: Customer Decision-making Uncertainty Across Buying Phases

Uncertainty has been discussed for decades as one of the shaping forces of consumer decision-making and buying behavior. The aim of this paper was to show, that for industrial buying behavior, this premise calls for a differentiated view, depending on the characteristics of the market offering. To this end, the authors have demonstrated theoretically how market-offering complexity and co-creation interact to influence the degree of decision-making uncertainty experienced by industrial buyers. Likewise, managers may draw from our typology that for certain market offerings, DMU-reducing strategies are more beneficial than for others. More specifically, the sale of complex solutions calls for DMU-reducing strategies, whereas in the opponent case, for the sale of commodities, DMU-reducing strategies are not similarly necessary. Indeed, suppliers may use this framework as guideline to optimize their resource allocation in terms of relationship marketing.

Research has shown that especially for high-risk buying situations (which are similar to high DMU buying situations), advice of salespeople is more appreciated than for low-risk market offerings (Sweeney et al. 1999, p.84). More specifically, “in industrial buying situations, Henthorne, LaTour, and Williams (1993) found that external salespeople were one of the most important informal, personal sources of information” (quoted from ibid.). Consequently, one may hypothesize that rather personal, DMU-reducing contact (i.e., expensive resources) ought to be directed towards customers of complex solution than towards customers of commodities, where rather impersonal contact should be maintained to economize on resources (Reinartz, Thomas, and Kumar 2005). Future research should aim to validate empirically the proposed contingency framework and find ways to mitigate customer DMU.

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