How do customers approach solution procurement? An exploratory study in the mining industry

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Submitted as a work-in-progress paper for the IMP2015 conference

Track: General
Keywords: Solution procurement**,** perceived **v**alue, end customer, mining industry

Abstract

Industrial firms are increasingly seeking growth by offering solutions, but the current research has been predominantly focused on the supplier´s perspective, while customer´s perspective remains under-researched. Therefore, the objective of this study is to explore how customers approach solution procurement. More specifically, we examine how two customer types, end customers and engineering firms, procure solutions in the mining industry, and what kind of benefits and costs emerge during this process. This study adopts a qualitative research approach, and draws insights from interviews with 23 decision makers in 20 different customer organizations. The findings from this study illustrate the different approaches that customers adopt when procuring solutions, the potential drivers that influence the selection of a particular approach, as well as the typical challenges that emerge along the process. For managers, the early findings highlight the needs and expectations of different customer types during the solution procurement process. Overall, the study offers important insights for all the actors involved in solution procurement.

1 Introduction

Industrial firms are increasingly seeking new growth and differentiation in global business markets by integrating products and services into value-adding solutions, and this trend is well noted in the literature (e.g., Jacob & Ulaga, 2008; Kapletia & Probert, 2009; Ulaga & Reinartz, 2011). Focusing on the transition towards solutions, prior research has shed light on, among other things, how firms can become solutions providers (e.g., Davies et al., 2006; Helander & Möller, 2008), what kind of business models are suitable for delivering solutions (e.g., Storbacka, 2011), or how to sell solutions (e.g., Ulaga & Loveland, 2014). However, a great deal of the current research tends to look solutions predominantly from the supplier´s perspective, while customers may perceive solutions quite differently. For example, as demonstrated by Tuli et al. (2007), suppliers tend to view solutions as customized and integrated product-service combinations, whereas customers perceive solution as relational processes. Consequently, suppliers often fail to understand why or how customers purchase solutions (Epp & Price, 2011), or what kinds of benefits and costs emerge during the solution procurement process (Jaakkola & Hakanen, 2013).

A few studies have examined how customers purchase solutions, but they have usually focused on end customers only (e.g., Stremersch et al., 2001; Lindberg & Nordin, 2008; Tuli et al., 2007; Töllner et al., 2011). In reality thought, solution procurement involves usually many actors (Cova & Salle, 2008; Cantù et al., 2012), including professional agents, such as engineering firms, who may act as system integrators, and handle the evaluation and procurement of a solution on behalf of the actual end customer (c.f., Davies et al., 2007). While prior research has shed some light on the conditions when customers are likely to single-source or outsource solution procurement (Stremersch et al., 2003), it has not examined in detail how this process unfolds, or is perceived by the actors involved. Therefore, the main objective of this study is to explore how customers approach solution procurement, and what are the potential benefits and costs different actors experience during this process.

In order to address the research objectives we employed a qualitative research approach, and conducted field interviews with altogether 23 decision makers in 20 different organizations, including end customers and engineering firms, who are procuring dewatering solutions in the mining industry. The global mining industry provides a fruitful context for this study, since mining industry customers are increasingly purchasing solutions to better optimize or outsource their resource-intensive operations (Biggeman et al., 2013). The preliminary findings of this study at this work-in-progress stage illustrate the different approaches that customers adopt when procuring solutions, the potential drivers that influence the selection of a particular approach, as well as the benefits and costs that emerge during the procurement process. For managers, the findings provide early insights on the needs and expectations of different customer types during the solution procurement process, and how they should approach each customer type to produce a solution that best fits to the customer´s perceived problem.

2 Conceptual background

In this study, we draw on previous research in industrial buying as this relates to solutions purchases; first, we consider the process and structural elements. Second, we consider the role of customer perceived value.

2.1 Buying approaches of industrial customers

In general, industrial purchases involve a buying center, or a group of representative individuals acting on behalf of the firm (Johnston & Bonoma 1981; Dawes et al. 1998; Venkatesh & Kohli 1995). Most research in this area focuses on how supplier firms can influence purchase decisions. This can be challenging since buying center members differ in terms of their input to the purchase decision (Jackson et al. 1984; Johnston & Bonoma 1981). Buying centers also tend to be informal since they are assembled only when needed (Lau et al. 1999). Therefore, sales personnel must adopt a nuanced approach in their sales efforts (Lau et al. 1999).

The complexity of buying centers continues to grow (Grewal et al. 2015). Two primary drivers for this trend are evident. First, the increasing sophistication of technology has had effects on the composition of industrial products and services. Buying center members require significant technical expertise to evaluate purchases competently. This is particularly the case for complex industrial solutions (Kapletia & Probert 2010; Ferreira et al. 2013). Second, there have been increases to the size and scope of buyer firms. This additional scale means that industrial purchases affect a broader set of stakeholders both within the firm and throughout the supply chain (Moon & Tikoo 2002; Brown et al. 2011; Patterson & Dawes 1999). This additional scale has also led to a need for further involvement in purchase decisions by key stakeholders.

Solutions procurement in industrial markets has some similarities with existing approaches (Töllner et al. 2011). Many firms continue to use buying centers as the vehicle for purchase decisions. In addition, solutions involve combinations of products and services (Brady et al. 2005; Barquet et al. 2013). However, solutions procurement is likely to require adaptations so as to customize the offering. At present, few studies consider the approaches that buyer firms adopt when procuring solutions. This is probably due to the complexity involved in the process. Studies in this area tend to assume few differences from non-solutions procurement approaches, only with additional resource investments due to high relative complexity, importance and risk (Patterson & Dawes 1999). Solutions procurements also involve more collaboration between buyer and supplier representatives (Storbacka et al. 2013; Storbacka et al. 2011; Tuli et al. 2007) as well as with network actors more broadly (Windahl & Lakemond 2006; Cantù et al. 2012). This suggests a need for understanding how buyer firms approach solutions procurements beyond additional resource investments and network collaborations.

2.2 Customer perceived value and industrial buying

Customer-perceived value is an important construct due to its close association with customer satisfaction and loyalty (Khalifa 2004). Traditional views suggest customer-perceived value occurs when the benefits of the purchase exceed the costs (Khalifa 2004; Sánchez-Fernández & Iniesta-Bonillo 2007; Payne & Holt 2001). These can be either tangible or intangible and, as such, gauging customer-perceived value accurately has been difficult for firms and scholars alike. In general, scholars focus on product and service attributes and compare them to financial costs. This is particularly the case in industrial market research (Callarisa Fiol et al. 2009; Ulaga & Chacour 2001; Parry et al. 2012; Lapierre 2000). More broadly, customers also evaluate solutions through their interactions with supplier representatives and network actors (Prior 2013). These can have emotional, social and functional benefits and costs.

The prevailing view in industrial procurement literature is that customers make purchase decisions in favor of those offerings that demonstrate the best value. This suggests a coordinated and cohesive approach to corporate purchase decisions. However, there is scope for different buying center members to have different requirements. Powell & Swart (2010) show how these differ depending on the role of the individual. This raises the possibility of unequal perceptions across the buyer firm. It also poses a significant challenge for solutions selling since this attempts to accommodate all customer needs (Tuli et al. 2007; Nordin & Kowalkowski 2010).

Industrial buying studies generally consider the procurement decision as separate from the consumption experience. In this, there is a tendency to consider value in discrete terms (value-in-exchange), making the specific offer the subject of customer perceived value. However, solutions procurements tend to involve multiple purchases and consumption episodes over time (Tuli et al. 2007). This suggests a difference between customer-perceived value as this relates to the specific offer and customer-perceived value as this relates to emergent resource use (i.e. value-in-use). This has led several authors to advocate a more communicative approach to value proposition development rather than a static, supplier-centric one (Ballantyne et al. 2011).

Customer-perceived value also relies on the subjective judgements of customers (Woodruff 1997). Therefore, the specific perspectives of customers are of central importance. Several studies suggest customers rely on only a limited set of information to make purchase decisions and evaluations and that these emerge in a discrete consumption context (Lemke et al. 2011; Heinonen 2004; Woodruff 1997). While some of these perceptions relate to previous experiences customers have as individuals, other perceptions relate to the social context. We suggest there is a need to understand how customer-perceived value affects procurement decisions for solutions. Since many firms use the same basic procurement approach for solutions, we ask whether this is appropriate given the complex, emergent and relational orientation of solutions.

3 Methodology

In order to explore how different customer types (end customers and engineering firms) in the mining industry procure solutions, we adopted an exploratory and qualitative research approach, and employed an embedded, multiple case study method (Scholz & Tietje, 2002; Yin 2003). Qualitative research approach is increasingly used in marketing and management research to study under-researched topics (c.f., Gummesson, 2000), and it is especially suitable for generating novel insights and building a new theory about a complex topic in its real-life context (Yin, 2003), such as how customers procure solutions.

In order to gain access to empirical data that would be particularly important, insightful, and contextually rich in terms of the focal phenomenon, we employed theoretical sampling (Eisenhardt & Graebner, 2007), and identified potential customers who had prior experience in solution procurement. Specifically, we focused on customers who had experience in procuring *dewatering plants* (or technologically similar offerings) either from the mining and metallurgical supplier, or from its competitors. Dewatering is a part of the value chain from ore to metal, and it is focused on separating solid and liquid materials to optimize the processes in mineral slurry dewatering, process water reuse and by-product handling in metals and chemical processing as well as in industrial water treatment. A typical dewatering plant includes a

design, delivery, implementation, and maintenance of a combination of different plant units[1], which aims to to optimize customer´s concentrate filtration operations and lower total costs (i.e. create value-in-use), and can hence be considered a solution (c.f., Storbacka, 2011; Jaakkola & Hakanen, 2013).

The identified customers include both direct *end customers* who procure and operate the dewatering plant in their own mining processes, and *engineering firms*, who act as system integrators, and procure (and thereafter implement) dewatering plant on behalf of the actual end customer (see Fig 1). Since many customers in the mining industry do not have the expertise or resources needed to evaluate and compare the potential benefits and costs of alternative solutions, they may outsource the procurement process to more experienced partners (Kumar & Kumar 2004). Hence, in reality, the customer base in the mining industry includes both customer types, which are likely to have different needs and goals for procuring mining technology solutions.

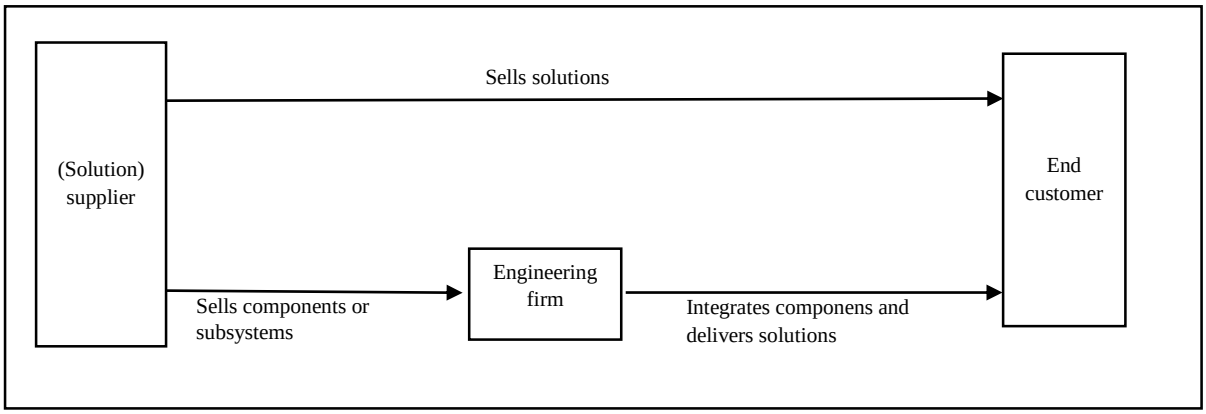

Fig 1. Solution delivery from the supplier´s perspective.

3.1 Data collection and analysis

Since customer data is often sensitive in nature, we identified potential customers who would be willing to participate in this study, and share their experiences freely. With the help of a global mining and metallurgical technology firm headquartered in Finland, we gained access to customers in South America and Australia, which represent important market areas for mining technology suppliers (c.f., Biggeman et al., 2013). More specifically, we conducted interviews with ten customers in Chile and Peru during a sales and marketing roadshow in October 2014, where the mining and metallurgical technology firm was promoting its new dewatering solutions to local customers. One of the researchers, who has several years of experience working in the mining and metallurgical technology firm, sat through the sales meetings while taking notes, and then interviewed selected decision makers in more detail after the sales meeting. The customers in Australia were interviewed at their local offices in two different cities (except for two telephone interviews) in December 2014, again by the same researcher who has experience from the mining industry.

Overall, we conducted 20 semi-structured field interviews with 23 key decision makers in the identified customer organizations. This is consistent with sample sizes recommended for

[1] A dewatering plant consists usually of filtration, thickening, chemical dosing, cake handling, conveying and storage unit, raw water, and water treatment plant units, and each unit contains different products and/or components.

exploratory research (McCracken, 1988, p. 17). In addition to the interview data, we employed several sources of secondary data, which can be grouped into two broad categories: notes, feedback, and documents from several meetings with the mining technology supplier, including two workshops with larger managerial audience, and observations from the sales meetings between the supplier and its customers in South America, and interactions with the local sales managers in both market areas. An overview of the sample characteristics is shown in Table 1.

Table 1. Sample characteristics

South America		***Australia***	
Title	**Customer type**	**Title**	**Customer type**
Project Supervisor*	End customer	Design Manager	Engineering firm
Chief Metallurgist*	End customer	Process Manager	Engineering firm
Chief Metal Engineer*	End customer	CEO & General Manager – Technology	Engineering firm
Senior Process Metallurgist**	End customer	Project Delivery Manager	Engineering firm
Senior Process Engineer**	End customer	Principal Process Engineer	Engineering firm
Senior Process Metallurgist**	End customer	Project Engineer	Engineering firm
Metallurgist Engineer**	End customer	Process Engineer	Engineering firm
Civil Engineer Metallurgist**	End customer	Procurement Manager	End customer
Process Engineering Manager*	Engineering firm	General Manager & Engineering Project Manager	End customer
Process Engineer & Metallurgical Engineer*	Engineering firm	Project Manager	End customer

Note: *=Peru, **=Chile.

The data analysis began with a within-case analysis of individual customers, which proceeded in two stages. First, we identified activities, decisions, and challenges related to the procurement process from the data to understand why and how individual customers purchased solutions. Second, we identified potential benefits and costs that individual customers experienced and perceived during the procurement process. After constructing an understanding and an overview of each individual customer, we moved to a cross-case analysis, where we analysed and compared emerging patterns within firms, and also contrasted them against the literature (Corbin & Strauss, 2008). As the analysis progressed, we refined our interpretations of the different procurement approaches that were emerging from the empirical data.

4 Findings: How customers purchase solutions

End customers in the mining industry typically procure dewatering solutions either directly from the supplier, or outsource the procurement process to an external engineering firm, who will acquire individual components, from different suppliers, and then integrate and install the solution on behalf of the end customer. Our empirical data describes how this procurement process proceeds, and what are the key requirements and challenges at each point of interaction between the end customer, engineering firm, and the supplier.

Our data suggests that when end customers choose whether to procure the solution directly from the supplier, or use an engineering office to procure it for them, they consider how complex the solution is, how much expertise its purchase requires, and how many suppliers are needed to develop and deliver it. If the requirements and the scope for the solution are clear, the customer has enough expertise to evaluate alternative solutions, and the solution is possible

to acquire by using minimum amount of suppliers, the customer may prefer a solution supplier, because it is usually cheaper and less time consuming.

However, both end customers and engineering firms emphasized that each solution procurement is typically very different in terms of content and delivery, and involves often components from several suppliers, which makes them difficult to evaluate, and thus creates a high risk for the customer. An engineering firm has usually more expertise to develop and evaluate alternative solutions that will solve the end customers' problems, and they take the responsibility for managing multiple suppliers to design and produce a solution that satisfies the customer, but for a higher price. As two end customers explained:

> *"The issue you've got is that on a large scope plant, you have a number of vendors, so it would be virtually impossible to manage three different vendors on a different project all doing lump sum jobs. How do you get consistency of quality, design, standards, it's just very, very difficult. It would be management nightmare… But if I engage an engineering company who's overall responsible for it, then they are responsible for the design and that brings in cohesiveness between the vendors."*

> *We put seven request for quotations, set them out, got three back and spent all the time analyzing each of the bid… often when complex equipment are bought, some of the bids would just not comply, they are rubbish. So in terms of the value that engineering companies bring, they do a lot of the work and incorporate their own expertise as well. They have large in house databases of costs. They know roughly what to expect from a particular item, how much it would cost, and what's unreasonable… generally it is expensive, but the risk is lower."*

If the customer decides to procure the solution directly from the supplier, they usually spend a considerable time to specify the problem and its potential costs, and then send a tender of the specific requirements to a few selected suppliers whose perceived technical capabilities and solution portfolio fit the experienced problem. Since the customers approach only few suppliers with specific criteria in mind, they do not usually employ formal evaluation processes, but rely more on prior experience and internal word of mouth when they evaluate alternative solutions. The customers emphasized that at this point they have already defined their requirements and the corresponding solution, and do not expect, or often even desire, that the supplier would diagnose their needs, because it would often change the specified scope, and thus increase the costs and delay the process. However, many customers underlined that once the requested solution is implemented, they expect that the supplier will carry, or at least share some risk and responsibility of its operation. As one end customer explained:

> *How far do I need to go down to an engineering route externally to the vendor before I can come up with a decision whether you're offering me a technical solution? I basically have to do the design, let's say on a float plant, so we've got your equipment prices. We've got the steel, we've got all the detail, building materials, so we know what it is going to cost to build that part of the plant. Only then can I go to you and ask what your lump sum price is? ... But if we stop at this point, assuming that we have paid for everything that you asked for, there's no risk on you except some profit, but then you've got the opportunity to resell that, so you really got to have a look at that. No more these 30% upfront crap.*

If the customer chooses to procure the solution from an engineering office, they often expect that the engineering firm will help them to diagnose their needs and offer an optimal solution that solves their problem. However, both end customers and engineering firms explained that it was often challenging to reach a mutual understanding of the nature of the problem and the scope of the solution, especially early in the process. In particular, many of the engineering firms emphasized that customers are often unable to anticipate their broader needs, and that the changing requirements along the process may make it difficult for them to acquire the

components for an optimal solution from the network of suppliers, at least with a reasonable cost. As the engineering firms explained:

> *Our biggest risk is a customer who doesn't know what he wants. We will spend a lot of money and time delivering something that he thinks he needs and then all of a sudden, it's not really what he wants after all, I mean we start it all over again, we start frustrating everyone.*
>
> *We deal with their project team all the time, and there's agreement what's acceptable and what's not acceptable in site, but somewhere there is a client who is going to operate the system who has not much involvement in the project. So here we say that we got a good project because they think what we said we do, and the operator comes around and says: Hang on, that doesn't work, why did you do it? Because there is lack of communication and understanding what was the contract deliverable, and we got that all the time.*

Although the end customers understood that engineering firms will do a lot of work and assume majority of the risk on their behalf when seeking an optimal solution, they explained that increased competition and capital constraints have forced them to look for leaner solutions, which will solve their core problem, but come with less additional support. Similarly, the engineering firms reported that customers are increasingly focusing on the purchasing price and short-term cost savings, and usually want the "cheapest, only barely adequate and minimum technical performance". In contrast, the engineering firms considered life-cycle costs and innovative solutions that would result in long-term cost savings and improved operations, and tried usually to communicate these to the customers. However, they felt that customers were often usually very conservative, and reluctant to consider alternative offerings and new solutions despite their value potential. As the engineering firms explained:

> *"Our problem comes in trying to sell alternatives to clients sometimes. Our client base tends to be extremely conservative about new technology and new ideas, so it's sometimes very difficult for us to say, well you could do it this way but these guys have got another idea…which is cheaper, better, faster or which will give you better results. I will always present that to the client or have you guys come in and present… it's always to our benefit to get a better idea out there. We just really struggle to get customer to buy it so."*
>
> *Plenty of things have disappeared, and I think probably in the environment of where we might have selected the basic gear to have ten or fifteen percent additional capacity, these days it just has to get to hundred percent of its design load and offering no more.*
>
> *Our operation people have pushed us sometime in more expensive solutions, because they are always going to last longer. So we looked at the long life cycle thing… you know, we can give you something for 100$ but it's going to cost 1000$ overall, but if you spend 250$, it's going to cost you only 450$, so it´s always that balancing act to understand what client wants in what we give them.*

When the engineering firm has constructed a mutual understanding of the customer´s requirements and expectations, it will send tenders to a selected group of suppliers to acquire the components that are needed to develop the required solution. The engineering firms explained that this is usually the most critical part of the process, as it includes several rounds of negotiations with many different suppliers, testing and piloting potential solutions, and tends to last very long, often 20 to 30 weeks. The engineering firms employ formal evaluation processes and complex technical and cost matrixes to evaluate alternative offerings and make sure that they fulfill the end customers' requirements. Several engineering firms emphasized, that to speed up the process, they use preselected suppliers for specific components, and try to keep new ideas at this stage at a minimum. As two engineering firms explained.

Probably like to hear about that before it happens. Generally because we have already decided on what we think we are going to do. So if you come up with a totally different solution which might use, steam dewatering or something with steam, and we haven't put that in there, then that's going to render the works. But certainly, we are not averse to new ideas, but I like to hear about the innovation side before we get to the tender stage…Once you're in the tendering period, I don't think we generally even see people at that stage, so the time to influence the selection is pre-tender.

The biggest challenge with suppliers is to get a commercial agreement quickly, you know, left right and center, there's lawyers and battling on for weeks, and that's always a hard bit to do. So one way to go around that is to have pre-agreements, where we go contractor A, hey this is what we are going to send you.

Several of the engineering firms mentioned that once the solution is installed and functional at the customers' site, there is usually a "grey area" where their work is done according to the contract, but where many customers expect assistance and support, sometimes as long as the solution is operational. In these cases, the engineering firms tend to offer their own operational services to customers, and purchase only spare parts from the suppliers, unless the required service is within technical guarantees, highly complex and outside the engineering firm´s own expertise, or limited to a specific process area. Many engineering firms felt that while outsourcing maintenance services to suppliers might free their resources, it also increases the risk that the supplier would take over their customer share in the future, or incorrectly operate the part of the process that is not their expertise. In some instances, the engineering firms might even deliberately stop purchasing components from a supplier who shows signs of competitive behavior. Figure 2 summarizes the emerging findings regarding the procument process for solutions in the mining industry.

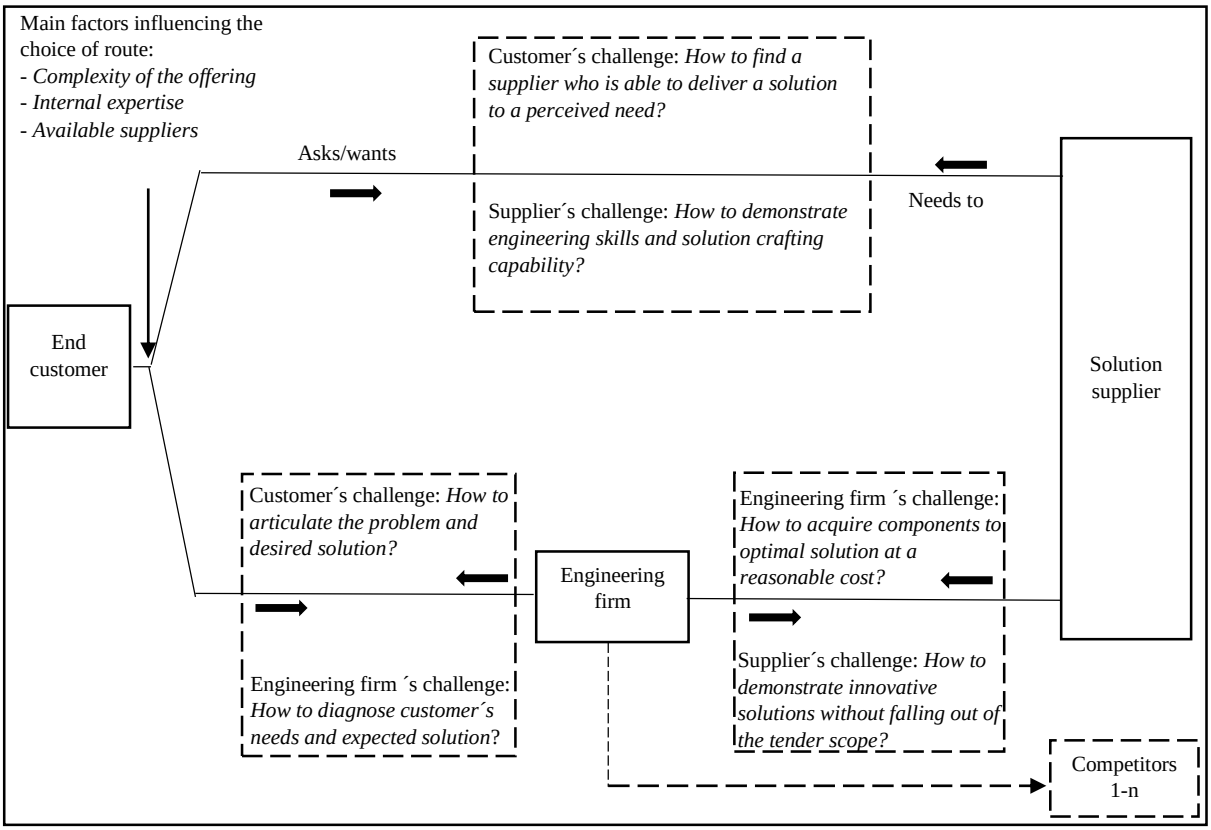

Fig 2. Procurement process for solutions from the customer´s perspective.

5 Discussion and preliminary contributions

Our findings first illustrate the procurement approach that customer firms adopt in the mining industry. In general terms, these include sole sourcing, self-assembly and agent-based procurement. By identifying each of these approaches, our study addresses the customer perspective in solutions procurement research. Previous studies focus on how a supplier can offer solutions, primarily as a systems integrator or as a single suppliers (Davies et al. 2007; Brady et al. 2005).While research into the customer perspective of solutions suggests it is necessary to customize offerings (Tuli et al. 2007; Epp & Price 2011; Roehrich & Caldwell 2012), there is currently little research into how customers enact solutions procurement. Therefore, our study makes an initial contribution in understanding the approaches that customer firms take in solutions procurement, particularly in the early stages of this process.

Our study also explores the determinants of customer procurement approach. Our findings suggest that customers primarily consider the relative complexity of the solution. The degree of complexity relates to the nature and clarity of the customer need, the necessary diversity of potential suppliers, as well as the quantity of time and resources necessary. These observations are all forms of costs. While previous studies of customer perceived value in business markets focus on time and resource costs (Hansen et al. 2008; O'Cass & Ngo 2012), few studies consider the types of intangible costs that emerge. Our study complements earlier research in this area (Prior 2013; Keränen & Jalkala 2013) by identifying a basis for customer perceived costs as they relate to solutions procurement.

From a managerial perspective, the preliminary findings provide insights on the needs and expectations of different customer types during the solution procurement process, as well as typical bottlenecks and challenges that emerge along the process. For firms who wish to position themselves as solutions providers, the early findings underscore the importance of developing deep social ties into the customer organizations. If the interaction is limited to sales communication during competitive tender, the suppliers´ only option is usually to deliver product-service bundles to pre-specified needs. In order to gain access to customers' latent needs, and propose optimal solutions to problems perceived – that often have a higher differentiating power – the supplier needs to invest in a relationship that extends over individual sales-cycles.

For customer firms and organizations who are procuring solutions, the early findings highlight the key role of costs related to information search as well as perceived risk and uncertainty. To counter these costs, customers could take pro-active steps before the need for tender arises. For example, customers could invite selected suppliers to conduct a baseline assessment and suggest solutions that would improve customer´s operations; or showcase and pilot innovative solutions that need field-testing and further development. And in return for the access to its operations, the customer would not only gain information about available solutions and potential suppliers, but could also request price reductions and exclusive rights to developed solutions.

However, at this stage, this study provides only initial observations into solutions procurement from the customer´s perspective, and much more research is needed. Potential avenues for further research include inquiries into how customers in cross-cultural settings evaluate and perceive value from solutions, how solutions are co-developed with different customer types, and what are potential risk management strategies for both suppliers and buyers of solutions.

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