WHAT ACTUALLY CONSTITUTES A SOLUTION? – SCRUTINIZING THE CONCEPT OF SOLUTION THROUGH A SYSTEMATIC LITERATURE REVIEW

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Abstract

Solutions are seen as integrated combinations of products and services aiming to solve customer's problem. However, the existing solution definitions have been criticized for being too general and encompassing any kinds of offerings, which enables almost any company to call itself a solution provider. Furthermore, solution literature is lacking dimensions which would help to distinguish different types of solutions. The purpose of this paper is firstly, to develop a literature based criterion for solutions, and secondly, to develop a typology of different kinds of solutions on the basis of identified solution dimensions. The study builds on 57 systematically selected papers and the findings reveal that solutions are customized and customer need oriented integrated combinations of products and services. According to the developed typology, there are five types of solutions as solution types vary from basic integrated solutions to four-dimensional extreme solutions. The results contribute to the literature on solution characteristics and the developed solution classification will help researchers to create more detailed contributions on different types of solutions. Furthermore, the identified solution dimensions are one step towards creating measurements for solutions.

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INTRODUCTION

In the marketing literature solutions are seen as integrated combinations of products and services aiming to solve customer's problem (Tuli, Kohli and Bharadwaj, 2007; Ulaga and Reinartz, 2011). The growing literature on solution business includes various definitions for solution but lacks a unified view on what actually constitutes a solution. Most of the existing definitions for solutions emphasize the solution characteristics such as integration of products and services, customer centricity, and customization (e.g.; Hobday, 2000; Galbraith, 2002; Windahl, Berggren and Nehler, 2004). Other definitions also point out the process-oriented nature of solutions (Tuli et al., 2007; Salonen, 2011; Storbacka, 2011) and the co-creation in the solution development (Evanschitzky, Wangenheim, and Woisetschläger, 2011). However, the existing solution definitions have been criticized for being too general and encompassing any kinds of offerings, which enables almost any company to call itself a solution provider (Nordin and Kowalkowski, 2010; Sandberg and Werr, 2003).

As the existing solution definitions refer to a large number of different kinds of offerings, several studies have classified solutions in order to create more detailed contributions. Typical way to classify solutions is to make a distinction between product and process-orientated solutions and further divide solutions to groups for example depending on their ownership or the type of supplier's value proposition (Oliva and Kallenberg, 2003; Windahl and Lakemond, 2010; Ulaga and Reinartz, 2011). According to these categorizations, integrated solutions are seen as an ultimate type of product bundles (Oliva and Kallenberg, 2003), or special type of hybrid offerings (Ulaga and Reinartz, 2011). However, most of these classifications take into account only two solution dimensions and thus fail to reveal the other dimensions which differentiate solutions from each other.

In the literature of product-service systems (PSS) the most used categorization of offerings differentiates product-oriented, use oriented, and result-oriented PSS (Tukker, 2004; Tukker and Tischner, 2006). This categorization has been accused to focus too much on the characteristics of the offering. Also, the existing two-dimensional solution typologies do not provide the needed criteria for measuring the different types of solutions. The categorization of different types of solutions would help researchers to compare different kinds of solutions in their studies and derive more detailed contributions. As the extant literature is lacking measurements for different kinds of solutions, a solution typology consisting of several solution dimensions is needed.

The purpose of this paper is to clarify the meaning of a solution by analyzing the solution literature and to develop a typology of different types of solutions. More precisely, the study aims to answer the following two research questions: 1. What constitutes a solution? 2. How can different types of solutions be categorized? Thus, the paper answers the call on further research on clarifying solution literature and distinguishing different kinds of solutions (Nordin and Kowalkowski, 2010).

The study relies on a systematic literature review which is a rigorous procedure for identifying key contributions made in the literature (Tranfield, Denyer and Smart, 2003). The developed solution typology builds on 57 systematically selected papers and the findings reveal that solutions are customized and customer need oriented integrated combinations of products and services. According to the developed typology, solution types vary from basic integrated solutions to four-dimensional extreme solutions. The findings contribute to the discussion on solution characteristics (Tuli et al., 2007; Galbraith, 2002) and continue the

works of previous solution characterizations (Ulaga and Reinarts, 2011; Windahl and Lakemond, 2010; Tukker, 2004). Furthermore, the findings are one step towards the development of measurements for solution, which is needed for encouraging researchers to validate their results with quantitative studies.

The rest of the paper is organized as follows: First, the research method is explained and second, a description of review articles is presented. Third, the criteria for solution are identified and fourth, the value adding solution characteristics are introduced. Fifth, the solution typology is presented. Finally, the paper ends with conclusions, limitations and suggestions for further study avenues.

RESEARCH METHOD

The aim of this study was to scrutinize the concept of solution though analyzing solution criteria and develop a solution typology. Extant literature on solutions already includes multiple definitions for solutions and also several solution characteristics have been identified (Nordin and Kowalkowski, 2010). However, the definitions and characteristics for solutions are scattered in different fields, such as marketing, operations research and service management and all these streams provide slightly different perspective on solutions. For example, Pawar et al. (2009) categorize solution literature in three different streams, namely integrated solutions which focus on financial sustainability, product-service systems (PSS), which focus on environmental sustainability and experiental services which emphasize value co-creation in providing solutions. As the literature on solutions is scattered in many fields, a systematic literature review was conducted to synthesize contributions made in the different fields.

Systematic literature review was considered as suitable methodology for this study because it is scientifically rigorous procedure for identifying key contributions made in the literature (Tranfield, Denyer and Smart, 2003) and it is widely used for analyzing existing studies because it uses a systematical procedure for selecting the reviewed articles (Thorpe, Macpherson, and Pittaway, 2005; Crossan and Apaydin, 2010). Solution literature provides good basis for literature review as the topic has aroused researchers' interest already for several years and multiple articles on solutions have been published (Nordin and Kowalkowski, 2010).

The scattering nature of solution literature has resulted in many different concepts for solution as different literature streams use varying concepts. In the marketing literature, concepts such as customer solutions (Tuli et al., 2007), integrated solutions (Brady et al., 2005) or solution offerings (Brax and Jonsson, 2009) are used to describe offerings that combine products and services in order to generate profits. The operation literature discusses the concept of product-service system (PSS) and emphasizes the lower environmental impact which can be reached by replacing product offerings with solutions (Pawar et al., 2009). While different solution literature streams have remained quite separate, it is important to study them simultaneously to reveal the true nature of solution. Therefore, this study reviews both the literature on integrated solutions and on PSS to reveal the solution characteristics.

Besides the above mentioned concepts for solutions, related concepts such as systems selling, project marketing and complex product systems (CoPS) are also discussed in the literature on solutions (e.g. Cova and Salle 2007; Matthyssens and Vandenbemt, 2010; Hobday, 2000). However, these concepts are seen to focus on different types of business logics. Solutions

business literature emphasizes continuity (Brax and Jonsson, 2009) whereas projects are limited in time (Cova and Salle, 2007). Also CoPS are short-term oriented as they are supplied as one-off items or small batches (Davies and Brady, 2000). Therefore, CoPS and projects are seen as distinct literature streams and are not used as search terms for finding relevant articles for the review. In addition to these concepts, recently a concept of hybrid offering has also been used to describe offerings that combine products and services (Ulaga and Reinartz, 2011). Hybrid offerings are categorized in four groups and according to the categorization integrated solutions are one type of hybrid offerings, namely process-orientated and output-based solutions (Ulaga and Reinartz, 2011). In the literature search this concept yielded only two articles and thus, it was not included as a search term.

LITERATURE SEARCH

The article selection followed a systematic procedure similar to Bakker (2010) which includes two phases of article search: database search and backward and forward snowballing. In the first phase, peer reviewed scholarly articles written in English were searched in four different databases: ABI/INFORM Global (Proquest), EBSCO, Elsevier (Science Direct) and Emerald. The search was conducted in January 2013, and it includes all that far published articles and articles that appeared in press in the databases. The search was limited to abstract, title and keywords (Elsevier) or abstracts only (other databases). The used search terms "integrated solution(s)", "customer solution(s)", "solution(s) offering(s)" and product-service system(s)" resulted in 708 hits after the removal of duplicates. At this point, the abstracts of articles were scanned for relevancy and 642 articles which did not focus on solution business or the characteristics of solutions were excluded. To guarantee the quality of contributions, only journals with ISI Impact Factor were included in the review and thus, 13 articles that appeared in journals which lacked an impact factor were also excluded. After reading the potential 53 articles that we had left, 11 articles were excluded as they were not relevant regarding our topic and we ended up having 42 articles from the database search.

In the second phase of the article search, potential articles were searched using backward and forward snowballing (Bakker, 2010). Scanning the reference lists of the found 42 articles resulted in nine relevant articles. Also an often cited book chapter by Sawhney (2006) was included similar to Nordin and Kowalkowski, 2001). Cited reference search in ISI Web of Knowledge added two new articles in our review. In addition to the two approaches adopted from Bakker (2010) for searching relevant articles, we also looked for potential articles in two special issues in Industrial Marketing Management (namely Vol. 36, Issue 2 and Vol. 40 Issue, 5) and from one special issue on International Journal of Operations & Production Management (Vol. 29, Issue 5) which focused on solutions. This analysis resulted in three new articles to the review. After these methods of collecting articles, we ended up having 56 articles and one book chapter in our literature review. The search strategy is depicted in the Figure 1.

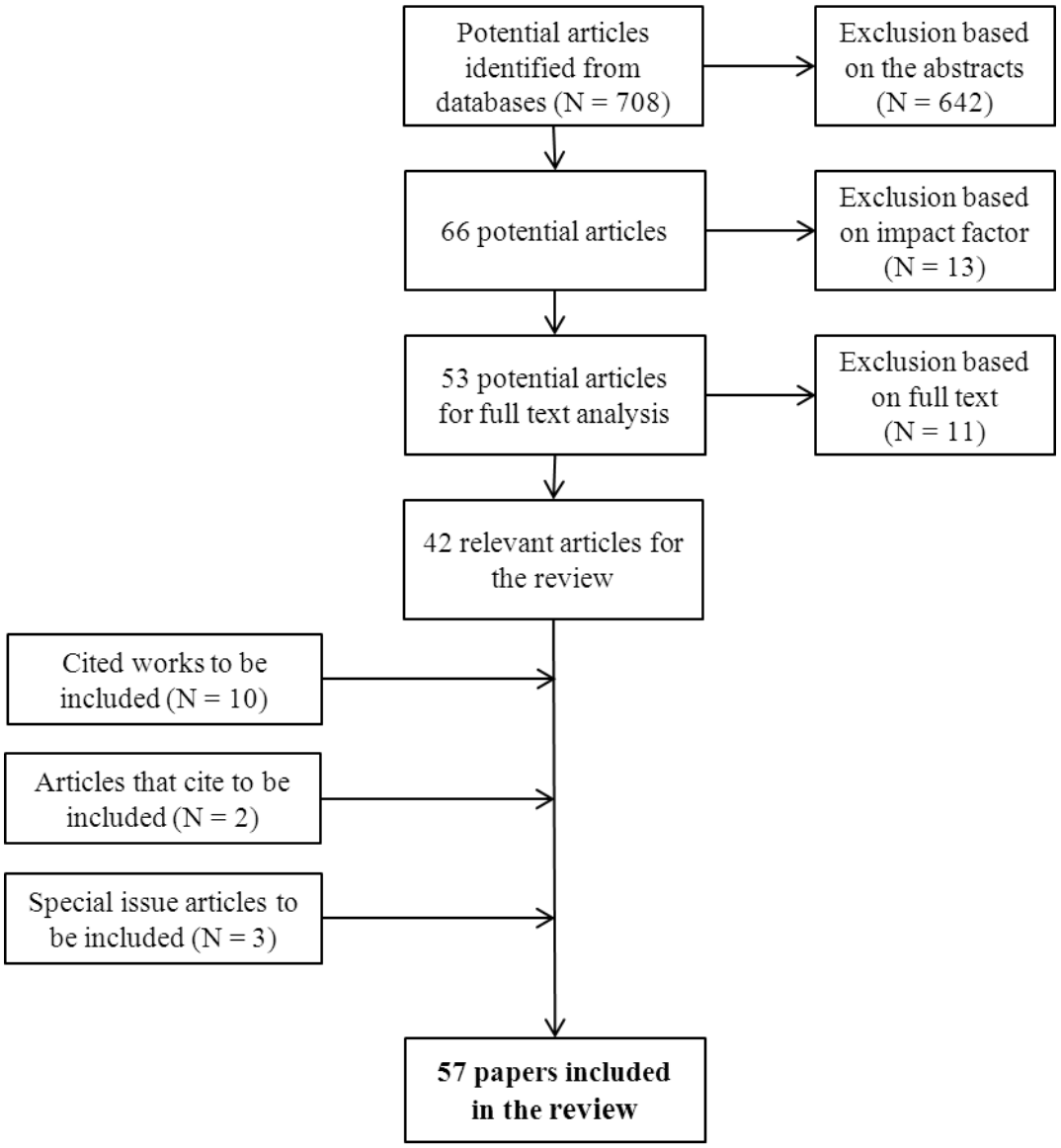

Figure 1. Literature selection process.

LITERATURE ANALYSIS

All the found 56 articles and one books chapter were analyzed with content analysis. Each study was carefully read and the main points of the article were summarized in a memo.

DESCRIPTION OF THE REVIEW ARTICLES

The identified 56 articles are published in 22 different journals (see Table 1). Altogether 106 authors have contributed to the articles and only two authors, namely Brady and Davies, have

contributed to more than two articles, which illustrates the wide interest among academics towards solutions.

Table 1. Articles by journal.

	Publication	Number of articles
1	Building Research & Information	1
2	Business Strategy and the Environment	1
3	Computers in Industry	2
4	European Management Journal	1
5	Futures	1
6	Harvard Business Review	1
7	Industrial Marketing Management	18
8	Industrial and Corporate Change	2
9	Industry and Innovation	1
10	International Journal of Advanced Manufacturing Technology	1
11	International Journal of Operations & Production Management	7
12	International Journal of Production Research	1
13	International Journal of Project Management	3
14	International Journal of Service Industry Management	1
15	Journal of Business.to-Business Marketing	1
16	Journal of Cleaner Production	4
17	Journal of Marketing	3
18	Journal of Service Management	3
19	MIT Sloan Management Review	1
20	Organizational Dynamics	1
21	Research Policy	1
22	Research Technology Management	1
		56

The found articles are published between year 1999 and 2013 but more than half of them are published 2009-2013 which guarantees that this set of articles gives an up to date impression about the solution characteristic. (See Figure 2). There may be two reasons why there are not any articles that have been published before 1999. Firstly, the used search terms have become general concepts only during last years and earlier, for example systems selling (Mattsson, 1973) was the concept that was used for describing offerings that include products and services. “Systems selling” was not adopted as search term, because the purpose of this study was to shed light on the concept of solution as the academics understand it today. Furthermore, system selling differs from solution business, because solutions are customized and customization differentiates solutions from systems selling (Davies et al., 2007).

Secondly, the lack of older studies in our sample might relate to characteristics of the databases which include more articles from the last twenty years. Thus, even if some articles published before 1999 would have used our search terms, the articles may not have been available in the used databases. Still, the increased number of published articles in recent years suggests that there is an increasing interest towards solution business.

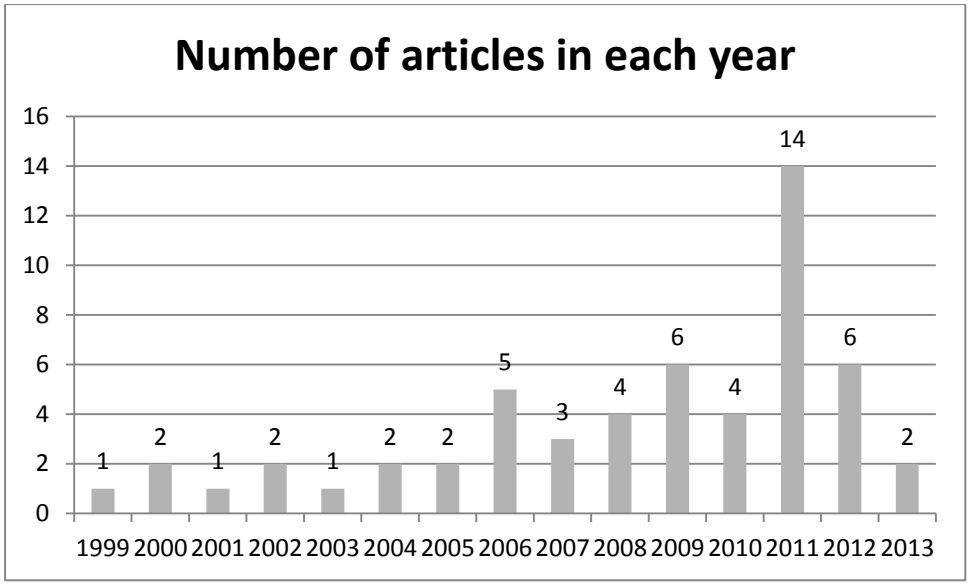

Figure 2. Published articles by year.

The academic studies on solutions are mainly qualitative by nature with few exceptions (namely Ceci and Masini, 2011; Li, 2011; Liu and Hart, 2011). As the widely cited works by Wise and Baumgartner (1999), Galbraith (2002) and Oliva and Kallenberg (2003) were published about a decade ago, there is only a little reason to argue that qualitative studies on solutions are needed to explain the emerging phenomenon. Instead, many authors, such as Johnstone, Dainty and Wilkinson (2009) justify the use of qualitative methods by arguing that solutions are difficult to me measured though quantitative measures. Therefore, it might be that the lack of measures for solutions explains the scarcity of quantitative studies on solutions. Thus, the development of solution measures would probably help to create more quantitative studies on solution business. See Attachment 1 for the review articles.

The lack of measurements for solutions is apparent in the studied articles. Majority of studies on solutions actually focus on firms that offer product bundles and state that there exist also highly integrated solutions that solve specific customer needs (Windahl and Lakemond, 2010). With a few exceptions (Sharma and Iyer 2011), authors do not discuss to what extent the studied offerings fulfill the criteria of a solution or which types of solutions their results are applicable. In fact, it appears that many of the studied companies are not actually providing integrated solutions, in which product and service components are inseparable, but rather product or service bundles. Therefore, in the next section, criteria for solutions are developed on the basis of identified solution definitions.

CRITERIA FOR SOLUTIONS

There are number of different definitions for solutions, in which the main characteristics are similar but the emphasis of the characteristics differs. Altogether 35 of the reviewed papers included a definition for a solution or a PSS. About half of the studies had developed their own definition while the other half cited the extant literature. For example, solutions can be defined as "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" (Sawhney, 2006, 369) or "unique combinations of products and services that address a customer's specific business problems" (Brady, Davies and Gann, 2005, 360). These definitions emphasize integration of products and services as well as the customer-centric nature of solutions. For example Brax and Jonsson's (2009) definition emphasizes the long-term orientation of solutions and Tuli et al. (2007) have identified the relational nature of providing solutions. Furthermore, the definitions for PSS emphasize the environmental benefits that solutions have.

Each of the found original definitions (n=15) was analyzed and the solution characteristics that they stated were identified (see Table 2). The characteristics that were identified almost in all of the definitions and appeared most commonly were selected to form the solution criteria. These solution characteristics include: integration of products and services, customization and customer orientation. The characteristics that form the solution criteria are discussed in more detail below.

Table 2. Solution definitions and characteristics.

Author(s)	Definition	Characteristics
Brady et al., 2005b, 360	"unique combinations of products and services that address a customer's specific business problems"	Unique combination, Combination of products and services, Customer need orientation, Problem solving
Brax & Jonsson 2009, 541	"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"	Bundle, Products and services, Seamless combination, Customer need orientation, Long-term orientation, Integration
Davies et al., 2007, 183	"a business model for the supply of capital goods based on the provision of products and services as integrated solutions to individual customer's needs"	Integrated products and services, Customer need orientation, Customization
Evanschitzky et al., 2011, 657	"individualized offers for complex customer problems that are interactively designed and whose components offer an integrative added value by combining products and/or services so that the value is more than the sum of the components"	Customization, Problem solving, Interactively designed, Combination of products and services, Integrative value
Johnstone et al., 2009, 522	"Integrated product and service offerings"	Integrated products and services
Kujala et al., 2010, 96	"an offering which includes a project component and after-delivery service component."	Product and service component
Li, 2011, 1207	"integrated solutions are value propositions co-created with customers, and represent a kind of service-based and customer-centric business models."	Co-creation, Customer centric
Mont, 2002, 239	"PSS should be defined as a system of products, services, supporting networks and infrastructure that is designed to be: competitive, satisfy customer needs and have a lower environmental impact than traditional business models"	System, Products, services, networks and infrastructure, Competitive, Customer need oriented, Lower environmental impact

Nordin & Kowalkowski, 2011, 441-442	"a bundle of products, services and software which can solve customer-specific problems and relatively broad and complex offerings focused not only on technical integration but also on the total usage context"	Bundle, Products, services, and software, Problem-solving, Complexity, Integration
Sawhney, 2006, 369	"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"	Integration, Combination of products and services, Customization
Storbacka 2011, 699	"longitudinal relational processes, during which a solution provider integrates goods, service and knowledge components into unique combinations that solve strategically important customer specific problems, and is compensated on the basis of the customer's value-in-use"	Long-term orientation, Relational process, Integration, Goods, service and knowledge, Unique combination, Problem solving
Stremersch et al., 2001, 2	"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"	Bundle, Products and/or services, Problem solving
Tukker & Tischner, 2006, 1552	"PSS 'consists of a mix of tangible products and intangible services designed and combined so that they jointly are capable of fulfilling final customer needs"'	Mix, Products and services, Customer need orientated
Tuli et al., 2007, 5	"solution is 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, all of which are aimed at meeting customers' business needs"	Relational process, Customer requirements definition, Customization, Integration, Deployment, Postdeployment support, Customer need orientation
Wise & Baumgartner, 1999, 138	"products and services into a seamless offering that addresses a pressing customer need"	Products and services, Seamless offering, Customer need oriented

INTEGRATION OF PRODUCTS AND SERVICES

Integration of products and services was mentioned as a solution characteristic in many articles and definitions for solutions (Nordin and Kowalkowski, 2010; Sawhney, 2006). Integration refers to the "processes of bringing together potentially diverse products and services in ways that create value" (Epp and Price, 2011, 36). Integration can be measured on two levels. The basic level of integration means the integration rate between the components of the solution offering and the higher integration level implies to the integration between the customer's and the supplier's business systems (Brax and Jonsson, 2009).

In solution literature, the basic level of integration, which means integration of products and services, is emphasized. When the basic level integration is low, the solution resembles a bundle of products and services and customers are able to unbundle the solution components (Sharma and Iyer, 2011). When the level of integration is high, the individual components of solution cannot be separated. This means that the integration is seamless (Brax and Jonsson, 2009; Wise and Baumgartner, 1999). In the extreme case, the components are unique and designed to work together and services are thought as part of the solution early in the innovation process (Galbraith, 2002; Ulaga and Reinartz, 2011). This suggests that one way to measure the integration rate of products and services in the solution would be to find out at

which phase of the solution development process the services were thought as part of the solution.

CUSTOMIZATION

Nordin and Kowalkowski (2010, 446) argue that customization "should probably be seen as the most central characteristics of solutions". Customization is also emphasized in many solution definitions (Evanschitzky et al., 2011; Tuli et al., 2007; Sawhney, 2006). Customization refers to "designing, modifying, or selecting products to fit into a customer's environment" (Tuli et al., 2007, 7). Customization is important solution characteristic as it differentiates solutions from systems selling (Davies et al., 2007).

As customized solution will solve a customer's specific business problems (Brady et al., 2005b), it increases the supplier's costs and decreases the supplier's possibilities to build successful business through repeatable solutions. To avoid this, the supplier can provide a standard product and customized service (Aurich et al., 2006). This represents a layered view of the solution offering which consists of basic structure and customized part (Brax and Jonsson, 2009). Another approach is to achieve customization through integration. According to that approach, the supplier creates modular offerings in which products and services are mixed and integrated according to the customer's needs (Davies et al., 2006; Visintin, 2012).

Customization is difficult to be measured as the extent of needed level of customization for solutions is difficult to determine. As customization is a general characteristic for offerings in the capital goods sector (Windahl and Lakemond, 2010), it might also be difficult to differentiate solutions from other offerings based on the level of customization.

Customization can be done in many different degrees as solutions can be customized for each customers or certain customer segments (Sawhney, 2006). This suggests that the level customization can be measured through determining whether the customization is done for each customer or certain customer segments. Also it can be argued that the level of customization in modular offerings is lower than in offerings that are created from scratch to the target customer's need. Therefore, it can be argued that the higher the level of customization, the more complex is the solution.

CUSTOMER NEED ORIENTATION

Customer need orientation or customer-centric thinking goes further than customization because unlike in customization, it is not only the solution that is customer-centric but it is the entire supplying company that must adopt the customer-centric view for the business (Galbraith, 2002). The solution development process is customer need orientated as the development begins by identifying the customer need (Tuli et al., 2007).

Usually the division whether the company is customer-centric or not, is made by comparing supplier's product orientation and customer's process orientation (Kapletia and Probert, 2010; Oliva and Kallenberg, 2003). In the product orientation, services are added to the firm's existing product base offering and their aim is to improve the supplying company's product through adding services. The process-oriented services can be regarded as extreme

type of solutions in which the focus lies in improving the end customer's processes (Salonen, 2011).

In order to be able to build customer-oriented solutions, the supplier needs to understand customer's needs and perceptions (Sawhney, 2006; Cavalieri and Pezzotta, 2012). However, in some cases it is not enough to understand only the customer but the supplier should take into account also the customer's network. Therefore, Epp and Price (2011) suggest that companies developing solutions should consider also the customer's networks goals that may reflect to the customer satisfaction towards the developed solutions (Epp and Price, 2011).

VALUE ADDING SOLUTION CHARACTERISTICS

Besides the three solution dimensions that form the solution criteria, also other characteristics were identified in the solution definitions. These dimensions did not appear common enough to be part of the solution criteria but they definitely affect the solution type. The characteristics also create additional value for customer and are a source of intangible value. Therefore, the characteristics are called as value adding. These characteristics include co-creation, long-term orientation, lower environmental impact, and complexity. These characteristics are discussed below in more detail.

CO-CREATION

Solution co-creation is a relational process which consists of customer requirements definition, customization and integration, deployment and post-deployment (Tuli et al., 2007; Storbacka, 2011; Töllner et al., 2011). Several authors also pinpoint that solutions are co-created in collaboration between the supplier and the customer (Cova and Salle, 2008; Cova and Salle, 2007; Brady et al., 2005b). One of the solution definitions also argues that solutions are "interactively designed" (Evanshitzky et al., 2011, 657).

It has been acknowledged that besides the supplier and customer, solution creation can require multiple other actors' involvement. However, studies on solution innovation in networks have emerged only recently while previous articles have focused more on a single firm's perspective (Gebauer et al, 2013). Solution network refers to "the set of actors i.e. the multiple suppliers and the customer, that are connected to each other for the purpose of integrating their resources to co-create value through solutions" (Jaakkola and Hakanen, 2013, 48). These kinds of networks do not emerge but instead they must be built (Gebauer et al., 2013). Furthermore, the solution development in networks requires certain capabilities depending on the type of the solution network (Gebauer et al., 2013).

Co-creation affects the solution type, because suppliers who innovate jointly with their lead customers tend to create more complete solutions (Li, 2011). Furthermore, it is suggested that as the complexity of the solution arises, also the number of different actors involved in the solution development arises (Galbraith, 2002). Therefore, the number of actor's involved in the solution development process could be used for measuring the solution type. The more actors are involved, the more extreme type of solution is in question.

CONTINUITY

Long-term orientation is inherent in the concept of solution (Brax and Jonsson, 2009). The long term orientation is here regarded as the continuity dimension of the solution. Continuity means that the life-cycle of the solution is extended to the pre-bid and post implementation activities (Brady et al., 2005). Continuity of solutions differentiates solutions from projects and complex products systems which are delivered as one-off items (Brax and Jonsson, 2009). The continuity of solutions helps the supplier to create smoother revenue streams because instead of single transactions the customer relationship can be based for example on continuous maintenance contract. In life-cycle solutions the emphasis is on improving the offering's life-cycle performance (Kujala et al. 2010).

HETEROGENEITY

Complexity of the offering is here understood as the heterogeneity of the offering. Heterogeneity of the offering has been operationalized to reflect the range of products and services included in the offer (Ceci and Masini, 2011). Galbraith (2002) refers to the heterogeneity of the offering using the concepts of scale and scope in which refer to the number of products and the number of different kinds of products in the offering. We argue that the heterogeneity of the offering can be used to measure the offering: the more heterogeneous the offering is the more complex solution it forms.

FUNCTIONALITY

Lower environmental impact of solutions is often emphasized in the literature on PSS (Bastl et al., 2012; Pawar et al., 2009). Here the characteristic of providing lower environmental impact is conceptualized as the functionality dimension of solution. Functionality of the solution means that the solution offers functionality instead of acquiring the product (Beuren et al., 2013). For example Mont (2002 argues that products services offer utility by replacing products with services. Therefore, the shift to providing product service systems involves a change in the traditional ownership idea in which the ownership belongs to the customer after the transaction (Pawar et al., 2009). Product-service systems offer without transferring the ownership (Roy, 2000).

SOLUTION TYPOLOGY

According to the developed solution criteria, solutions are integrated combinations of products and services which are customized, designed and provided according to the specific customer's need. These solutions are the basic types of solutions, which are here named as integrated solutions. The identified value-adding solution dimensions affect to the solution type. By combining the four identified value adding dimensions 15 different types of solutions can be created, which are one-dimensional extended solutions, two-dimensional complex solutions, three-dimensional full solutions or four dimensional extreme solutions. (See Table 3).

Table 3. Solution types.

Number of dimensions	Co-creation	Functionality	Continuity	Heterogeneity
One-dimensional *(Extended)*	X			
		X		
			X	
				X
Two-dimensional *(Complex)*	X	X		
	X		X	
	X			X
		X	X	
		X		X
			X	X
Three-dimensional *(Full)*	X	X	X	
	X	X		X
	X		X	X
		X	X	X
Four-dimensional *(Extreme)*	X	X	X	X

The identified five different types of solutions are presented in the Figure 3 and they are discussed next by each type in more detail.

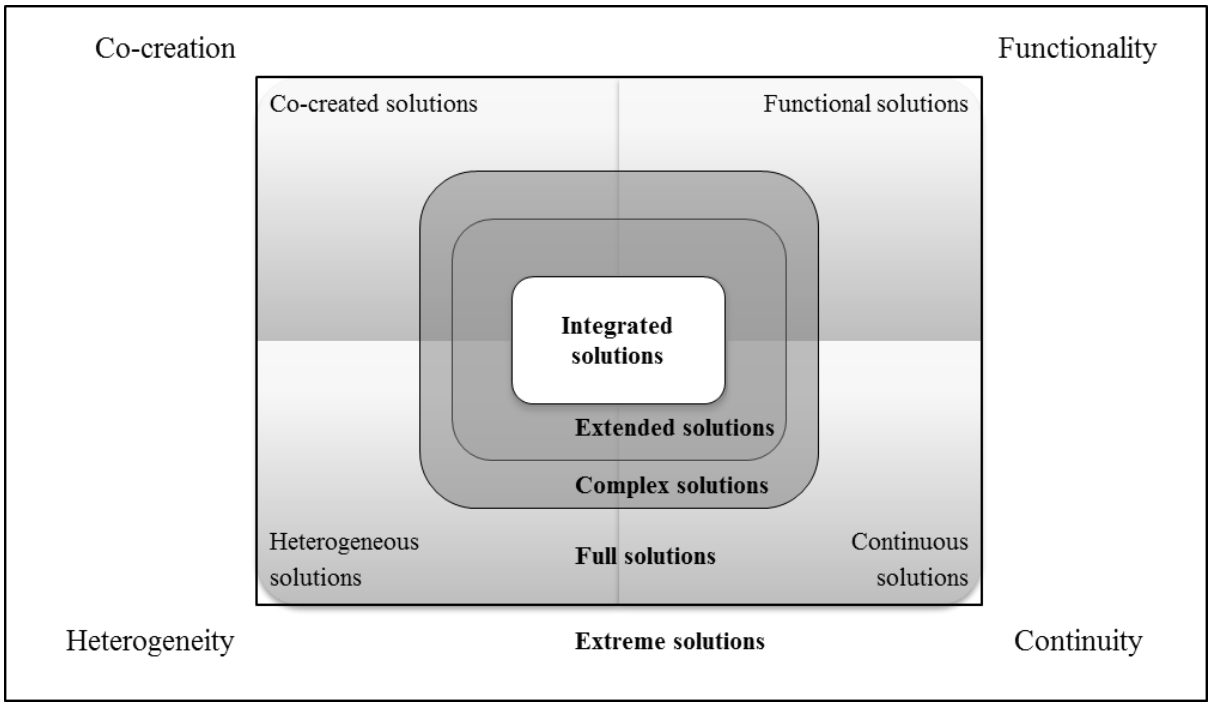

Figure 3. Different types of solutions and their characteristics.

INTEGRATED SOLUTIONS

Solutions that belong to the category of integrated solutions fulfill the solution criteria of being integrated combinations of products and services, customized and customer need oriented but they do not have any of the value adding characteristics. Integrated solutions are vastly studied in the solution literature (e.g. Brady et al., 2005a and 2005b; Wise and Baumgartner 1999) and they are the basic type of solutions. Examples of integrated solutions include simple projects and product-service systems which consist of integrated and customized products and services and are delivered as one off items.

EXTENDED SOLUTIONS

Extended solutions can also be called as one-dimensional solutions as these solutions have one value adding dimension. Solutions belonging to this group include Co-created solutions, Functional solutions, Continuous solutions and Heterogeneous solutions depending on the type of the value adding dimension that the solution has. One-dimensional co-created solutions combine resources from multiple actors but they are still relatively simple as they do not have any other value adding dimension. Typically the one-dimensional co-created solutions are developed in collaboration with customer. One-dimensional functional solutions include solutions which improves the customer's process. These kinds of solutions are often named as process solutions or process-oriented solutions (Ulaga and Reinartz, 2011; Tukker, 2004). An example of one-dimensional functional solution could be a solution which includes an education service during the solution implementation. One-dimensional continuous solutions are often life-cycle solutions which include a contract of a long term solution. For example solution including maintenance contract can be regarded as one-dimensional continuous solution. One-dimensional heterogeneous solutions include multiple different kinds of services and products and an example of this type of solution could be a project delivery.

COMPLEX SOLUTIONS

Complex solutions are two dimensional solutions which have at least two of the identified value adding characteristics. One example of complex solution could be the Rolls Royce's Power by the Hour-concept in which the supplier provides long term functionality in the form of aircraft flight hours. Other complex solutions include Co-created functional solutions, Co-created continuous solutions, Co-created heterogeneous solutions, Functional continuous solutions, Functional heterogeneous solutions and Continuous heterogeneous solutions.

FULL SOLUTIONS

Full solutions have three of the four identified value adding solutions characteristics. As full solutions are missing only one value adding dimension, they resemble extreme solutions. Full solutions can for example be complex products and systems which are delivered as one off items or projects which are lacking continuous dimension, which are examples of Co-created functional heterogeneous solutions. Other three-dimensional solutions include Co-created functional continuous solutions, Co-created continuous heterogeneous solutions and Functional continuous heterogeneous solutions.

EXTREME SOLUTIONS

Extreme solutions are four-dimensional solutions which have all the identified four value-adding characteristics. These solutions are co-created, functional, continuous and heterogeneous. A typical example is this type of solution is outsourcing in which the supplier provides performance and takes care of certain customer's activity. As these kind of outsourcing contracts are complex, they are often made for a long period of time, they encompass different kinds of product and service components, which may be even difficult to be unbundled and they are often co-created as customer's knowledge about its process is needed during the solution development.

CONCLUSIONS

As the definitions on solution offerings remain quite general and more studies on different kinds of solutions is needed (Nordin and Kowalkowski, 2010), a literature review of solution offerings was conducted to find out what constitutes a solution and how can solutions be categorized. The findings built on 57 studies published between the years 1999-2013.

The findings contribute to the literature on solution business and especially to the discussion on solution characteristics (Nordin and Kowalkowski, 2010; Tuli et al., 2007; Sawhney, 2006) by identifying criteria for solutions. According to the findings, integration, customization and customer need orientation lie at the heart of solution concept. Accordingly, only offerings that that consist of integrated products and services, are at least at some level customized and developed in a customer need oriented way should be labeled as solutions. The other identified solution dimensions; co-creation, functionality, continuity and heterogeneity, can add the solution's value but are not necessities for solution offerings. However, these value adding characteristics will help us to identify different types of solutions.

Furthermore, the study contributes to the literature on classifying solutions (Ulaga and Reinartz, 2011; Windahl and Lakemond, 2010; Oliva and Kallenberg, 2003). The developed solution typology is created on the base of identified value-adding solution characteristics and it classifies solutions in four groups on the basis of the number of value adding dimensions that the solution has. Thus, solutions can be integrated solutions, one-dimensional extended solutions, two-dimensional complex solutions, three-dimensional full solutions or four-dimensional extreme solutions.

As any study, also this study has some limitations. To begin with, authors have used several different concepts for finding articles related to solutions but some articles that use different terminology may have been missed in the literature search due to the limited number of search terms. Also some recent or forthcoming articles that are not yet cited or do not exist in databases may be missing. However, the number of articles is adequate compared to other literature reviews in this research area (e.g Nordin and Kowalkovski, 2010) which suggests that no major articles are missing from the review. Also as the study relied on several different methods in collecting the review articles it is likely that most of the relevant articles were included in the review.

It must be noted that the results are lacking an empirical validation and thus, the generalization of these findings should be made with caution. For further studies we suggest the validation of the solution criteria through empirical studies. The validation should include both supplier and customer side data as the customer's view of solution differs from the supplier's view (Tuli et al., 2007). The further analysis should be conducted on a solution level as solution suppliers might employ number of different solution-specific business models each having different types of solution offerings (Kujala et al., 2010). Also the solution typology needs to be validated empirically within different industries. We believe that this paper is the first step of developing measurements for solution offerings and it will stimulate more detailed contributions on different types of solutions.

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**article included in the review*

Attachment 1. Review articles.

	Author(s)	Year	Publication	Type
1	Wise & Baumgartner	1999	Harvard Business Review	Managerial
2	Davies & Brady	2000	Research Policy	Qualitative
3	Roy	2000	Futures	Conceptual
4	Stremersch et al.	2001	Industrial Marketing Management	Mixed
5	Galbraith	2002	Organizational Dynamics	Conceptual
6	Mont	2002	Journal of Cleaner Production	Conceptual
7	Oliva & Kallenberg	2003	International Journal of Service Industry Management	Qualitative
8	Davies	2004	Industrial and Corporate Change	Qualitative
9	Tukker	2004	Business Strategy and the Environment	Managerial
10	Brady et al.	2005	International Journal of Project Management	Qualitative
11	Brady et al.	2005	Building Research & Information	Qualitative
12	Aurich et al.	2006	Journal of Cleaner Production	Qualitative
13	Davies et al.	2006	MIT Sloan Management Review	Qualitative
14	Sawhney	2006		Conceptual
15	Tukker & Tischner	2006	Journal of Cleaner Production	Conceptual
16	Windahl & Lakemond	2006	Industrial Marketing Management	Qualitative
17	Cova & Salle	2007	Industrial Marketing Management	Qualitative
18	Davies et al.	2007	Industrial Marketing Management	Qualitative
19	Tuli et al.	2007	Journal of Marketing	Qualitative
20	Ceci & Prencipe	2008	Industry and Innovation	Qualitative
21	Cova & Salle	2008	Industrial Marketing Management	Conceptual
22	Helander & Moller	2008	Journal of Business.to-Business Marketing	Qualitative
23	Matthyssens & Vandenbempt	2008	Industrial Marketing Management	Qualitative
24	Baines et al.	2009	International Journal of Operations & Production Management	Qualitative
25	Brax & Jonsson	2009	International Journal of Operations & Production Management	Qualitative
26	Johnstone et al.	2009	International Journal of Operations & Production Management	Qualitative
27	Pawar et al.	2009	International Journal of Operations & Production Management	Qualitative
28	Shelton	2009	Research Technology Management	Managerial
29	Spring & Araujo	2009	International Journal of Operations & Production Management	Conceptual
30	Kujala et al.	2010	International Journal of Project Management	Qualitative
31	Matthyssens & Vandenbempt	2010	Journal of Service Management	Qualitative
32	Nordin & Kowalkowski	2010	Journal of Service Management	Conceptual
33	Windahl & Lakemond	2010	Industrial Marketing Management	Qualitative
34	Ceci & Masini	2011	Industrial and Corporate Change	Quantitative
35	Datta & Roy	2011	International Journal of Operations & Production Management	Qualitative
36	Epp & Price	2011	Journal of Marketing	Qualitative
37	Evanschitzky et al.	2011	Industrial Marketing Management	Conceptual
38	Kujala et al.	2011	International Journal of Project Management	Qualitative
39	Li	2011	Industrial Marketing Management	Quantitative
40	Liu & Hart	2011	Industrial Marketing Management	Quantitative
41	Meier et al.	2011	International Journal of Advanced Manufacturing Technology	Conceptual
42	Salonen	2011	Industrial Marketing Management	Qualitative
43	Sharma & Iyer	2011	Industrial Marketing Management	Qualitative
44	Storbacka	2011	Industrial Marketing Management	Qualitative

45	Töllner et al.	2011	Industrial Marketing Management	Qualitative
46	Ulaga & Reinartz	2011	Journal of Marketing	Qualitative
47	Wang et al.	2011	International Journal of Production Research	Conceptual
48	Bastl et al.	2012	International Journal of Operations & Production Management	Qualitative
49	Cavalieri & Pezzotta	2012	Computers in Industry	Conceptual
50	Hakanen & Jaakkola	2012	Journal of Service Management	Qualitative
51	Kapletia & Probert	2012	Industrial Marketing Management	Qualitative
52	Roehrich & Caldwell	2012	Industrial Marketing Management	Qualitative
53	Visintin	2012	Computers in Industry	Qualitative
54	Gebauer et al.	2013	Industrial Marketing Management	Qualitative
55	Jaakkola & Hakanen	2013	Industrial Marketing Management	Qualitative
56	Beuren et al.	*	Journal of Cleaner Production	Conceptual
57	Paiola et al.	*	European Management Journal	Qualitative

* in press