

EUR Research Information Portal

How is service procurement different from goods procurement? Exploring ex ante costs and ex post problems in IT procurement

Published in:

Journal of Purchasing and Supply Management

Publication status and date:

Published: 01/01/2018

DOI (link to publisher):

[10.1016/j.pursup.2017.12.001](https://doi.org/10.1016/j.pursup.2017.12.001)

Document Version

Publisher's PDF, also known as Version of record

Document License/Available under:

Article 25fa Dutch Copyright Act

Citation for the published version (APA):

Wynstra, F., Rooks, G., & Snijders, CCP. (2018). How is service procurement different from goods procurement? Exploring ex ante costs and ex post problems in IT procurement. *Journal of Purchasing and Supply Management*, 24(2), 83-94.
<https://doi.org/10.1016/j.pursup.2017.12.001>

[Link to publication on the EUR Research Information Portal](#)

Terms and Conditions of Use

Except as permitted by the applicable copyright law, you may not reproduce or make this material available to any third party without the prior written permission from the copyright holder(s). Copyright law allows the following uses of this material without prior permission:

- you may download, save and print a copy of this material for your personal use only;
- you may share the EUR portal link to this material.

In case the material is published with an open access license (e.g. a Creative Commons (CC) license), other uses may be allowed. Please check the terms and conditions of the specific license.

Take-down policy

If you believe that this material infringes your copyright and/or any other intellectual property rights, you may request its removal by contacting us at the following email address: openaccess.library@eur.nl. Please provide us with all the relevant information, including the reasons why you believe any of your rights have been infringed. In case of a legitimate complaint, we will make the material inaccessible and/or remove it from the website.



Contents lists available at ScienceDirect

Journal of Purchasing and Supply Management

journal homepage: www.elsevier.com/locate/pursup

How is service procurement different from goods procurement? Exploring ex ante costs and ex post problems in IT procurement

Finn Wynstra^{a,*}, Gerrit Rooks^b, Chris Snijders^b

^a Rotterdam School of Management, Erasmus University, The Netherlands

^b Eindhoven University of Technology, The Netherlands

ARTICLE INFO

Keywords:

Service procurement
Information technology
Transaction Cost Economics

ABSTRACT

Several studies suggest that, in practice, service procurement is more challenging than goods procurement. The underlying but largely implicit argument is that the procurement process for services involves higher buyer uncertainty and therefore requires extra efforts to mitigate this uncertainty. Drawing on Transaction Cost Economics, we use a database of information technology transactions to investigate the relationship between transaction characteristics and social embeddedness, and ex ante cost and ex post problems. We explore whether the same relationships hold across transactions that involve only goods versus transactions that also involve services. Our findings support conventional wisdom that managing the procurement process for transactions involving services is more challenging than for transactions involving goods. However, when controlling for typical transaction characteristics, there is no difference between transactions involving goods and transactions that also involve services.

1. Procurement of services: is it different?

Over the past decades, the importance of the service sector in the global economy has increased substantially, bringing its share in world GDP to 68.3% in 2014 (World Bank, 2017). In parallel, the share of business-to-business services in the total procurement expenditures of individual organisations has grown as well (Axelsson and Wynstra, 2002; Ellram et al., 2007). Many organisations, however, find it challenging to effectively organise their procurement of services (Caldwell and Howard, 2010; Ellram and Tate, 2015; Hawkins et al., 2015).

Reflecting this increasing relevance in practice, research on service offshoring, outsourcing and procurement has been growing recently (for reviews see: Nordin and Agndal, 2008; Pisani and Ricart, 2016). Within this literature, specific topics like servitisation (Benedettini et al., 2015) and performance-based contracting (Essig et al., 2016) are attracting substantial attention. However, one more traditional, yet fundamental question remains largely unanswered: Is service procurement intrinsically different from goods procurement? And if so, in what way? Various studies have found that organisational buyers *perceive* that purchasing services is more difficult than purchasing goods (Jackson et al., 1995; Smeltzer and Ogden, 2002; Stock and Zinszer, 1987; Van der Valk and Rozemeijer, 2009). The typical conclusion is that service procurement should therefore be *executed* differently than goods procurement. A special topic forum of the *Journal of Supply Chain Management* even noted this as a fundamental question in research on service supply chains: “How does the structure of

services sourcing differ from the structure that is appropriate for sourcing nonservice goods?” (Sampson and Spring, 2012). However, while research on applying existing sourcing approaches to the procurement of services has recently grown (Ellram and Tate, 2015; Immonen et al., 2016), there have been, to the best of our knowledge, no publications conducting large-scale empirical studies to compare services versus goods transactions in a systematic way.

Given these observations, the current study addresses the following questions: (1) Can the observations regarding perceived differences in procurement complexity between goods and services be validated in large scale empirical research on how procurement is executed?; (2) If there are differences between procurement of goods and services, can these be ascribed to differences in generic transaction characteristics, or are they a function of other, idiosyncratic characteristics of services?

We ground our conceptualisation in the services management literature and particularly in the characteristics that are traditionally argued to distinguish services from goods: inseparability, heterogeneity, intangibility, and perishability (Gordon et al., 1993; Lovelock, 1983). Prior studies suggest that procurement of services is more challenging than the procurement of goods because of these characteristics (Ellram et al., 2007; Fitzsimmons et al., 1998; Tate and Ellram, 2012). Transaction Cost Economics (TCE) serves as a complementary theoretical foundation. TCE has become a dominant theory in explaining contracting arrangements (Geyskens et al., 2006; Williamson, 1979). The current study contributes to this literature by comparing transaction

* Corresponding author.

E-mail address: fwynstra@rsm.nl (F. Wynstra).

<https://doi.org/10.1016/j.pursup.2017.12.001>

Received 7 July 2016; Received in revised form 3 November 2017; Accepted 11 December 2017
1478-4092/ © 2017 Elsevier Ltd. All rights reserved.

costs of services and goods procurement, while controlling for the effects of transaction characteristics and relationships between the contracting organisations.

The research questions are explored using secondary survey data on the procurement of information technology (IT) services and goods by small and medium sized enterprises (SMEs) in the Netherlands. This involves a multi-purpose dataset for testing hypotheses on how transaction characteristics, embeddedness and other variables affect ex ante and ex post governance of transactions. Previous studies have used parts of the same data, but have not investigated the differences between procurement of IT services and goods (e.g. Anderson and Dekker, 2005; Batenburg et al., 2003; Buskens and Raub, 2002; Mooi and Ghosh, 2010; Rooks and Snijders, 2001). The IT procurement transactions in the dataset involve varying combinations of service and goods acquisitions. Business-to-business transactions increasingly involve combinations of goods and services, such as the acquisition of hardware together with maintenance services – as reflected in the widely discussed trend towards ‘servitisation’ (Schmenner, 2009; Spring and Araujo, 2013).

The remainder of this paper starts by summarising earlier research on service procurement and by briefly reviewing TCE theory. The subsequent section describes data collection and measurement. Section four comprises the data analysis and results, and the final sections offer a discussion of the findings, and conclusions and recommendations.

2. Literature review

2.1. Recent research on service procurement

Although the first publications on service procurement date back to the 1960s (Wittreich, 1966), the number of studies only started to grow significantly at the beginning of the 21st century (Nordin and Agndal, 2008). Recent literature distinguishes four major topics: specification setting, segmentation, servitisation and performance-based contracting. This set of topics is not exhaustive, but it does cover a substantial part of recent studies. A review of publications in the Journal of Purchasing and Supply Management reveals that these topics cover half of the recent publications on service procurement.¹

The first topic deals with the process of specification. Various studies have emphasised that specification is one of the processes in service procurement that is particularly challenging due to the intangibility and heterogeneity of services (Ellram et al., 2008; Van der Valk and Rozemeijer, 2009). Service specification may also be perceived as challenging because a choice needs to be made between alternative specification methods: a service may be specified in terms of outcomes, outputs, processes and inputs (Axelsson and Wynstra, 2002). Other studies dealing with the specification topic focus on the dynamic character of the service specification process and identify the stabilisation and destabilisation of specifications of services as a core element of the ongoing interaction between buyers and sellers that is so typical of service exchange (Gelderman et al., 2015; Selviaridis et al., 2011).

The second major topic in service procurement research deals with segmentation. Segmentations and classifications of services have a long history in marketing and operations management research. Over the last decade, purchasing and supply management research has developed and tested classifications that aim to segment services based on

attributes that affect the most effective way of sourcing (Van der Valk and Axelsson, 2015). Many of the early studies on service procurement focus on one particular type of service (e.g. management consultancy) (Nordin and Agndal, 2008), and the development of service classifications can be seen as a response to this, to enable synthesis and further development of previous research (e.g. Ellram et al., 2007; Wynstra et al., 2006). Segmentation studies have also highlighted the phenomenon of ‘direct services’, i.e. services bought by an organisation not for its own consumption, but as parts of its offering to final customers. Nordin and Agndal (2008) noted that very little research had been conducted on direct services, but recent studies have emphasised these services in the context of so-called buyer-supplier-customer triads (Li and Choi, 2009; Van der Valk and Van Iwaarden, 2011). A service triad is different from the usual service supply chain, as the supplier does not only rely on the buyer but also on the customer for service inputs, such as information. Wynstra et al. (2015) provides a recent overview of prior studies, applicable theories and an agenda for future research on service triads.

The third topic in recent studies on service procurement relates to servitisation. Servitisation refers to the increased emphasis on service components as part of customer offerings, and to the adaptation or innovations required in terms of the organisation's capabilities and processes (Benedettini et al., 2015; Spring and Araujo, 2013). Although the phenomenon is typically addressed in terms of the implications for organisations' marketing, sales and operations processes, there are clear procurement implications as well. Obviously, from the customer point of view, it implies a shift towards procurement of services or ‘product-service systems’ (Lightfoot et al., 2013), as opposed to only buying physical goods. As such, the trend towards servitisation is one of the drivers behind the increasing share of services in buying organisations' total spend. Additionally, from the supplier's point of view, it often implies a shift towards buying more services, as many of the services that the supplier offers its customer may be beyond its traditional capabilities and expertise.

The fourth topic in service procurement research relates to performance-based contracting (Guajardo et al., 2012). This topic is closely connected to the topic of servitisation, as servitised offerings are often governed through contract forms that incentivise outcomes and outputs (Linamaa et al., 2016). Despite the recent growth of studies on this topic, there are still research gaps, for example, related to the execution and monitoring of performance-based contracts (Nullmeier et al., 2016). Selviaridis and Wynstra (2015) and Essig et al. (2016) provide extensive overviews of earlier studies and remaining research gaps.

2.2. The specific characteristics of services

A large part of the literature discussed above relies, implicitly or explicitly, on the distinctive characteristics of services. The broad variety of definitions of what constitutes a service can be divided into two main streams of definitions (Edvardsson et al., 2005). One defines a service as the object of exchange, and the other defines it as a perspective on value creation. Given our focus on the governance of buyer-supplier exchange, we refer to services as an object of exchange.

The following exemplary definition captures the qualities that are typically seen to differentiate a service from a good as object of exchange: “[...] a process consisting of a series of more or less intangible activities that normally, but not necessarily always, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems.” (Grönroos, 2007: 25). This definition refers to the archetypical features of services versus goods: intangibility, heterogeneity, inseparability and perishability (IHIP) (Lovell, 1983). These features have been central arguments in many studies to suggest that management of services faces different challenges than management of goods (Vargo and Lusch, 2004).

The intangibility of services refers to the fact that no physical

¹ Searching for “service” in the title, abstract and keywords for the period 2013–2017 resulted in 28 publications, ten of which do not substantively deal with service procurement (typically, they use the word “service” just to signal sectors under study). Of the remaining 18 papers, four define service procurement as the study context but do not analyse the influence of this context. Of the final 14 papers, seven (50%) deal (at least partly) with: specification setting (Gelderman et al., 2015; Hawkins et al., 2015; Perner et al., 2014); segmentation (Van der Valk and Axelsson, 2015); servitisation (Immonen et al., 2016); and performance-based contracting (Kleemann and Essig, 2013; Meehan et al., 2017).

objects are exchanged, or rather, they are not the core of the transaction. Intangibility makes it more difficult not only to define specifications in the contract (*ex ante*), but also to verify supplier compliance *ex post* (Axelsson and Wynstra, 2002; Ellram et al., 2007). It allegedly becomes more challenging for the buyer to specify the service requirements upfront in a clear and precise manner, which is crucial to achieve desired performance through supplier selection and evaluation (Day and Barksdale, 1994; Smeltzer and Ogden, 2002; Van der Valk and Rozemeijer, 2009). Moreover, it is more difficult to identify the underlying costs of services, making it more challenging for the buyer to negotiate an equitable price with the supplier (Ellram et al., 2007; Åhlström and Nordin, 2006). Heterogeneity of services refers to variability, particularly within one and the same type of service. One driver of this heterogeneity is that business-to-business services are often (and need to be) tailored to diverse organisational needs (Jackson et al., 1995), especially in the case of production-related services (Fitzsimmons et al., 1998). This implies a need for a more extensive process to procure services, for example, with respect to market search and specification (Van der Valk and Rozemeijer, 2009). Another consequence of heterogeneity is that achieving consistent outputs is more challenging. The *ex post* costs of service delivery failures can be significant to the buyer firm. As service delivery failures can be difficult to isolate from the rest of the activities within an organisation (Åhlström and Nordin, 2006), they tend to affect the work of a large number of employees (Fitzsimmons et al., 1998). Inseparability refers to the interaction, or ‘co-production’ that takes place between provider and customer (Bettencourt et al., 2002; Wynstra et al., 2006). The inseparability of services requires careful consideration of the design and control of the underlying service encounters (Johnston, 2005; Roth and Menor, 2003). Inseparability also implies that adequate performance measurement may be difficult as performance is not only influenced by the resources and activities of the supplier, but also by those of the customer (Nullmeier et al., 2016; Slobodow et al., 2008). Perishability of services implies that (most) services cannot be stored and that demand forecasting and information exchange between customer and supplier needs to be a more frequent, iterative and adaptive process (Ellram et al., 2007).

In sum, prior literature suggests that the procurement process for services involves greater risk and higher buyer uncertainty, and that given these characteristics, customer firms need to invest more time and resources in the procurement process.

These four IHIP characteristics have recently been complemented with other approaches for distinguishing between services and goods (Wynstra et al., 2015). Sampson's Unified Service Theory (UST) is based on defining services as processes to which customers provide significant inputs (Sampson and Froehle, 2006). Another approach, the rental/access paradigm, also emphasises the roles of the respective parties in the service exchange, but focuses on the ownership of assets rather than on processes (Gadrey, 2000; Spring and Araujo, 2009). Both approaches emphasise that the characteristics of service are strongly interrelated with the exchange relationship between the respective counterparts. While UST and the rental/access paradigm provide useful conceptualisations for research on service procurement, we submit that the majority of studies on procurement of services are still grounded in the notion of the IHIP characteristics. Therefore, we base our further theorising on these characteristics.

2.3. Transaction Cost Economics: choosing optimal governance

Above, we have reasoned that the basic argument from the service procurement literature is that the IHIP characteristics lead to increased complexity and uncertainty, and thus to a more demanding procurement process. This argument is very similar to the basic premises of Transaction Cost Economics (TCE), which holds that transaction characteristics (such as uncertainty faced by the buyer) determine transaction costs and the optimal buyer-supplier governance structure. TCE

is a useful theoretical framework for our study, since it makes specific predictions about the relationship between transaction characteristics and transaction costs – which can be understood as the cost of *ex ante* and *ex post* activities to manage a transaction (Rindfleisch and Heide, 1997; Williamson, 1985; Williamson and Ghani, 2012).

TCE distinguishes three key transaction characteristics that determine transaction costs: uncertainty, transaction-specific investments and transaction frequency. Uncertainty can be understood as a lack of information. The most common approach to categorise uncertainty is to differentiate between environmental uncertainty and behavioural uncertainty. Environmental uncertainty refers to the unpredictable contingencies that surround a transaction such as volume uncertainty and technological uncertainty (Walker and Weber, 1984). A sudden change in the availability of superior technology can cause major problems in what initially seemed to be a smooth transaction (Hennart, 1988). Behavioural uncertainty refers to the difficulty to establish *ex post* whether the other party has complied with the contract. Behavioural uncertainty in service transactions may be driven particularly by inseparability. In such situations, opportunistic behaviour by the supplier is more difficult to detect and to attribute correctly (Tate and Ellram, 2012).

The second key element of TCE is transaction-specific investments (Masten et al., 1991). When firms make unilateral investments that are specific to a transaction or relation, the risk of opportunistic behaviour of the partner increases (Leiblein and Miller, 2003). In the case of IT, one can think of specific training to learn how to work with new software that is very different from other types of software. In this case, switching to an alternative supplier, whose software would also require specific training, is expensive for a buyer. The supplier can opportunistically exploit the resulting dependency of the buyer, for example, during contract renegotiations. Likewise, the buyer can behave opportunistically if the supplier has made the transaction-specific investment. One solution might be a safeguard contract, but this leads to higher *ex ante* contracting costs. Finally, a transaction that occurs very frequently implies recurring transaction costs (Williamson, 1985). When choosing between governance modes, it may then be more sensible to choose a hierarchical governance mode to economise on the costs of safeguarding the transaction (Masten et al., 1991; Anderson and Dekker, 2005).

Although we use arguments in the spirit of TCE to determine which factors are likely to influence governance, our aim is *not* to explain governance *choice* (market/hybrid/hierarchy) in the current study. Instead, we aim to study *the extent to which a contractual relation is governed in a market governance mode*. The arguments for governance mode can be readily extended to the choice of the extent of governance of a given mode, as has been put forward in detail for instance by Batenburg et al. (2003).

2.4. Social embeddedness

Many scholars have argued that transactions are embedded in social relationships or social networks (Dyer and Singh, 1998; Granovetter, 1985; Rooks et al., 2006; Uzzi, 1997) and that these relationships should be incorporated as factors explaining governance as well (Kim et al., 2009). When defining social embeddedness, a distinction is often made between dyadic embeddedness and network embeddedness. Dyadic embeddedness can be defined as the degree to which the same buyer and supplier are involved in an ongoing relation over time (Axelrod, 1984; Gulati, 1995; Lorenz, 1988). Network embeddedness can be defined as the degree to which the buyer is embedded in a network of third parties other than the focal supplier (Gulati, 1998; Powell and Smith-Doerr, 1994).

A network can be further categorised as voice network and exit network depending on its function (Helper, 1991; Hirschman, 1978). A voice network is where the buyers can share their experience in dealing with an incompetent supplier with other buyers, encouraging the

supplier to improve its performance in quality, delivery and other attributes. An exit network is where the buyer can find alternatives to replace the supplier or product if the supplier fails to meet expectations (Buskens et al., 2003; Blumberg, 2001).

Buskens and Raub (2002) discuss the learning and controlling effect of social embeddedness on ex ante costs and ex post problems. Past experiences with a certain supplier (dyadic embeddedness) as well as the information from the buyer's own network (network embeddedness) allow the buyer to learn whether the supplier is trustworthy. A trustworthy supplier saves extensive searching and contracting effort ex ante for the buyer, as the buyer tends to trust that the supplier will not commit opportunism ex post (Zaheer et al., 1998). As to the controlling effect, the buyer can choose whether to continue businesses with the focal supplier in the future (dyadic embeddedness), based on the supplier's behaviour in current transactions. In addition, the buyer can also 'gossip' with other buyers in its network about the supplier's incompetence or unreliability (voice network embeddedness), or choose to replace the supplier (exit network embeddedness). The buyer's power to sanction the supplier makes it reasonable for the supplier to behave reciprocally and maintain trustworthiness, which should decrease the buyer's ex ante costs and ex post problems. Thus, transaction costs are not only affected by transaction characteristics (asset specificity, frequency and uncertainty) but also by the dyadic and network embeddedness of the transaction.

In sum, we build our conceptualisation on three strands of literature. Research on service management and service procurement has raised a number of transaction characteristics that are specific to services. This naturally links to TCE, which studies the effects of transaction characteristics on governance and transaction problems. Research on relational governance and specifically social embeddedness is leveraged by including the effects of embeddedness on transaction governance and problems. This basic conceptual framework underlies our empirical analysis of the differences between transactions involving goods and transactions involving services (Fig. 1).

3. Data collection and measurement

3.1. Data collection

We investigate the differences between transactions involving services and transactions involving goods by using survey data on the purchase of IT services and goods by Dutch small and medium sized enterprises (SMEs) with 5–200 employees. Two samples of IT transactions have been collected in 1995. The aim was to collect a multi-purpose dataset, resulting in a broad range of publications to test hypotheses on how transaction characteristics, embeddedness and other

variables affect ex ante and ex post governance of transactions. Rooks and Snijders (2001) analyse consistencies in the extent to which conflict resolution escalates. Buskens et al. (2003) show that supplier search is influenced by the social embeddedness of business partners. Batenburg et al. (2003) consider how a history and the expected future with the same supplier affect the contents of the contract. Vanneste and Puranam (2010) likewise investigate how prior experiences influence contractual learning.

The sampling frame for the 1995 survey was a business-to-business database of Dutch SMEs, comprising information about the characteristics of these SMEs with respect to automation. The database is known to be far more up-to-date and reliable than the more often used database of the Chamber of Industry and Commerce. At the time of data collection, about 80% of all Dutch SMEs with more than five employees were included in the database. The database was considered to be representative for the Dutch population of SMEs (see Batenburg, 1997a).

Key informants of buying firms were first briefly interviewed via a structured Computer Assisted Telephone Interview (CATI). During the interview, cooperation was requested from an employee responsible for IT. Most of the key informants were IT managers. The CATI was then used to randomly select a particular IT transaction the firm had made in the recent past, in order to define in advance which transaction the main questionnaire would focus on. Usually, the respondents were involved and often responsible for the purchase. Following this procedure, a main sample of 547 IT transactions was obtained.

Subsequently, the dataset was extended with an additional sample. This second sample was collected to obtain more observations on innovative and complex IT transactions. Transactions were sampled from SMEs in sectors that typically use such goods and services. Using judgements of IT market researchers and figures from Statistics Netherlands, five such sectors were identified (food industry, metal industry, transport equipment, wholesale trade, and road transport). Another 241 questionnaires were collected in this way.

Non-response analysis was feasible through relatively extensive information on the buyer firms that did not agree to participate in the survey. This analysis showed that the response group is not biased on crucial firm characteristics such as size, industry or region. We also know from a question in the CATI questionnaire that firms in our sample do not differ from the non-response group in their general satisfaction with IT suppliers (for details see Batenburg, 1997b).

In all, data were obtained from 788 IT buying firms. About 25% (179 out of 788) of the respondents were willing to complete a second questionnaire regarding the purchase of a different IT product, in most cases from a different supplier. The 1995 dataset comprises 967 transactions, of which 179 are second transactions by the same buyer. A member of the research team visited informants to personally deliver the questionnaire and to help the respondent to complete the questionnaire. Table 1 provides some basic descriptives for our dataset.

The total response rate equalled 59% (for details see Batenburg, 1997b), which is a high response rate in surveys among organisations (see Kalleberg et al., 1996), also compared to surveys on buyer-supplier relationships and supply chain management conducted in the same period (Melnyk et al., 2012).

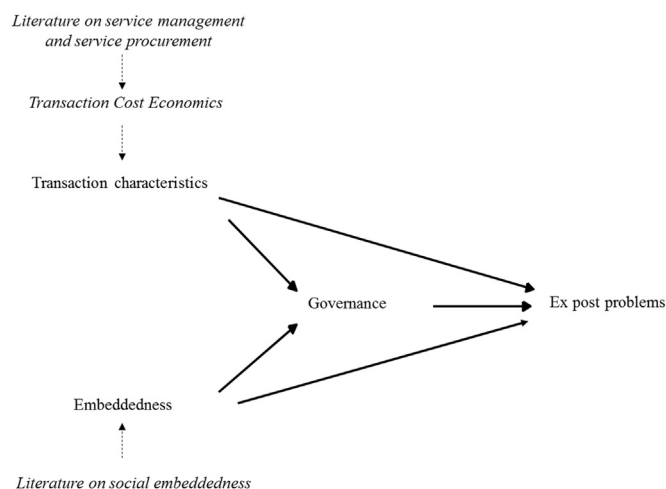


Fig. 1. Basic Conceptual Framework and Relation to Theory.

Table 1
Summary Statistics on MAT 95.

Period	1978–1995
Cases	967
Buyer firm < = SME	95%
Median size of buyer firm (FTE)	35
Seller firm < 50 (FTE)	66%
Median transaction volume ^a	17,000 EUR
Mean transaction volume ^a	43,000 EUR

^a In 1995, the Dutch guilder was still the official currency in The Netherlands. For ease of exposition, the amounts have been recalculated to Euros and rounded to the nearest multiple of 1000.

The External Management of Automation (MAT) database (in Dutch, ‘automation’ is an umbrella term that covers all forms of IT that support business processes) was created some 20 years ago. In the meantime, information technology has further developed. For example, technologies, such as cloud computing, did not exist when the MAT survey was carried out. Although this implies that some characteristics of IT transactions may have changed, our variables and theory relate to concepts that are still applicable today (Mooi and Gilliland, 2013). We therefore claim that the data are still suitable to test whether the relationship between transaction characteristics and management of transactions are similar between goods and services. As an interesting aside, note that approximately 70% of current IT transactions do not deliver on their promises (Laudon and Laudon, 2016), which is very close to the number of transactions reporting problems in our data (74%). Other researchers seem to agree that the dataset is still suitable, as demonstrated by several recent studies that have likewise used the dataset. Dekker and Van den Abbeele (2010) use it to analyse the effects of partner search and prior exchange experiences on the management of and experience with transactions. Mooi and Ghosh (2010) use it to consider the performance implications of contract specificity. Vanneste and Puranam (2010) consider the learning effect that goes with repeated interaction, and Mooi and Gilliland (2013) analyse the performance impact of misaligned enforcement mechanisms. Furthermore, based on an extended version of the dataset, Snijders and Tazelaar (2005) show that the evidence that the underlying mechanisms have changed over time is not strong.

There are also strong positive reasons for using the MAT data for the current study. First, it is one of the few transaction-based datasets that has been collected in a truly rigorous way, including response rates that would in all likelihood be difficult to find nowadays (close to 60% for a 20+ page survey is rare, see Batenburg, 1997a). Throughout all the studies using the MAT dataset, the data collection effort is praised for its careful execution and high response rates. Second, the dataset is very rich in the sense that many properties of the transaction are measured. Finally, and most importantly, it is the only dataset that we are aware of that enables a direct comparison between transactions involving goods and transactions involving services.

3.2. Distinguishing service from good transactions

The questionnaire contained a list of eighteen specific IT goods and services, such as “industry-specific software”, “workstations” and “training”. Informants were asked to indicate which of these goods (hardware, software) and services were involved in the transaction. Informants could select multiple answers. Three dummy variables were created based on the goods and service components involved in a transaction: *Hardware*, *Software* and *Services*. Whether a transaction involves hardware, software and/or services is represented by the respective dummy variable. Thus, a transaction would score positively on at least one of the three dummy variables, possibly on up to three. Table 2 provides an overview of the division of our 967 transactions.

Our sample consists of transactions that are combinations of services and goods. There are no transactions in our sample that only involve services. Our sample is not unrepresentative in this respect; many business-to-business transactions involve some combination of services and goods (Sampson, 2001). Therefore, it would be useful to know the relative importance of the service component within each transaction. Unfortunately, the data does not allow us to measure the relative importance of the hardware, software and service component in each transaction, as reflected, for example, by their respective share in the total acquisition price. Buying organisations may actually not know these shares, as IT providers may not separately charge for the components. We can, however, identify *how many* of the components were goods and how many were services, and use this as a proxy for the relative importance of the service component in the transaction.

Table 2
Sample of Transactions.

	Hardware	Software	Service	No. of cases
Hardware only	✓			112
Software only		✓		126
Hardware+ Software without services	✓	✓		140
Service-involved purchases	✓		✓	589
	✓	✓	✓	
Total				967

3.3. Measurements

As explained above, we defined three dummy variables - *Hardware*, *Software* and *Services* - that each indicate whether or not a transaction involves this type of IT product. In the subsequent analysis, we first use these dummy variables to split our sample into two groups: transactions that, among others, involve service components versus transactions that do not involve service components (‘no-service transactions’). We then compare the ex ante and ex post transaction costs, transaction characteristics and embeddedness characteristics for these two groups.

Secondly, we use the dummy variables as independent variables in regression analyses, next to transaction and embeddedness characteristics, to explain ex ante and ex post transaction costs. Note that the dummy variables are not perfectly collinear, since a transaction can involve services, hardware and software simultaneously: the presence of one characteristic does not preclude the presence of another. In a robustness check of these regression analyses, we operationalise the service nature of a transaction in an alternative way. As explained earlier, our data can identify *how many* of the components were goods and how many were services. Our instrument lists 18 possible components of the transaction, for example, whether training was involved or tailor-made software was delivered. Informants indicated whether each of these components was part of the transaction. Six components referred to services: design, training, instruction, consultation, documentation and support. By counting the number of constituents components, and which of these are services for each transaction, we construct a ratio variable: *Proportion of Services*.

The measurement of the other constructs in this study is based on various studies that have used part of the same data (Anderson and Dekker, 2005; Batenburg et al., 2003; Mooi and Ghosh, 2010; Rooks et al., 2006). Details on the reliability of the measures used in our study can be found in Table 3. The items for each construct are listed in the Appendix A.

To measure ex ante cost, we defined four constructs: *Search Cost*, *Tender Specificity*, *Contract Cost* and *Contract Specificity*. *Search Cost* refers to buyer searching effort. *Tender Specificity* refers to the degree to which the offered tenders by the suppliers are specified in detail. *Contract Cost* refers to buyer efforts in contracting. *Contract Specificity* refers to the degree to which contract terms are specified in detail. These constructs measure the buyer's transaction costs in three consecutive phases in the procurement process (cf. Van Weele, 2015): specification, selection, and contracting. By breaking down transaction costs in this way, we can assess in which phases ex ante transaction costs differ between service and goods transactions (for example, it has been argued that one should specifically consider the specification phase, see Van der Valk and Rozemeijer, 2009). The variable *Ex Post Problems* measures the occurrence of problems during and after the focal transaction (Rooks et al., 2006), with eleven items, each referring to one possible typical ex post problem that is often associated with IT transactions (Riesewijk and Warmerdam, 1988). In 74% of the transactions, at least one problem occurred at least to a certain degree.

To assess transaction characteristics that typically affect the extent to which a transaction is governed, we defined seven constructs: *Purchase Volume*, *Complexity*, *Switching Cost*, *Buyer Uncertainty*, *Dyadic Embeddedness*,

Table 3
Measurement details^a.

	No. of Items	Item Scales	Variable Construction	M (SD)	CA
Search Cost	1	No. days	Log	1.94 (1.24)	NA
Tender Specificity	4	5 pt	Average	3.25 (0.78)	0.66
Contract Cost	1	No. days	Log	1.02 (0.79)	NA
Contract Specificity	3	5 pt	Average	1.26 (1.41)	0.82
Ex Post Problems	11	5 pt	Average	1.67 (0.73)	0.90
Purchase Volume	1	Amount ranges (in HFL) ^b	Mid-range value (in 100,000 EUR)	0.95 (1.31)	NA
Complexity	2	Composite ^c	Product	8.22 (4.43)	0.75
Switching Cost	4	5 pt	Average	0.00 1.00	0.76
Buyer Uncertainty	4	5 pt	Factor score	0.00 1.00	0.83
Past Relation	4	5 pt	Average	0.00 (0.96)	0.97
Future Relation	1	5 pt	NA	2.79 (1.38)	NA
Dyadic Embeddedness	NA	NA	Product of Past Relation and Future Relation	0.59 (3.20)	NA
Voice Network	1	No. firms		1.35 (1.96)	NA
Exit Network	2	5 pt	Average	2.67 (0.97)	0.72
Size Buyer	1	No. employees	Log	3.66 (1.04)	NA
Size Supplier	1	5 pt	NA	3.32 (1.43)	NA

^a M = Mean; SD = Standard deviation; CA = Cronbach's Alpha.

^b Answers are measured in 5 categories of amount ranges: up to HFL 25,000; HFL25,000 - HFL50,000; HFL50,000 - HFL100,000; HFL100,000 - HFL200,000, and over HFL200,000. Answers were scored with a value, referring to the midpoint of the categories (in 100,000 HFL). In 1995, the Dutch Guilder (HFL) was still the official currency; all monetary amounts reported in the paper are in Euro. Note that inflation since 1995 (in total around 45%) implies that the projects at the time were more substantial than they seem now.

^c Complexity was measured based on the kinds of goods and services that were purchased. It was calculated as a combination of the number of goods or services involved and the complexity of the separate items (where, for instance, standard hardware is typically not complex and tailor-made software is).

Voice Network and *Exit Network*. *Purchase Volume* measures the financial amount of the focal transaction. We used we two items to measure transaction complexity (*Complexity*), following the approach as in [Anderson and Dekker \(2005\)](#), which also uses this dataset. The first item is based on a classification of the aforementioned 18 types of goods and services, in five groups of increasing complexity. If a transaction involves more than one good/service type, the score of the highest complexity ranking is noted. The second item measures the number of goods and services within the transaction. A high complexity score implies more sophisticated goods/services purchased and more types of goods/services bought in one transaction ([Choi and Krause, 2006](#)). Transaction-specific investment is measured by the *Switching Cost* in case of product failure. *Buyer Uncertainty* measures a buyer's uncertainty regarding the behaviour of the supplier, resulting from information asymmetry. *Dyadic Embeddedness* refers to both the past and the expected future transactions between the buyer and supplier. *Past Relation* measures the extent to which buyer and supplier have dealt with each other in the past; *Future Relation* measures the buyer's anticipated future relation with the supplier. Past and future expectations are *necessary* and *jointly sufficient* (cf. [MacKenzie et al., 2011](#)) for dyadic embeddedness. Therefore, we define *Dyadic Embeddedness* as the product of *Past Relation* and *Future Relation*. Network embeddedness can be separated into voice network and exit network. *Voice Network* measures to what extent the buyer has access to

Table 4
Correlations between Study Variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Search C.	0.10																	
2. Tend. Sp.	0.61	0.12																
3. Contr. C.	0.12	0.11	0.14															
4. Contr. Sp.	0.22	-0.04	0.21	-0.07														
5. Ex P.Pr.	0.49	0.15	0.45	0.14	0.21													
6. Purch. V.	0.32	0.12	0.27	0.08	0.26	0.34												
7. Compl.	0.41	0.17	0.34	0.08	0.27	0.36	0.34											
8. Switch C.	0.30	-0.05	0.27	-0.04	0.40	0.25	0.28	0.35										
9. Buy. Unc.	-0.19	0.05	-0.09	0.02	-0.14	0.00	-0.04	-0.11	-0.21									
10. Past Rel.	-0.14	0.05	-0.08	0.03	0.01	-0.01	0.08	0.01	-0.06	0.43								
11. Fut. Rel.	-0.19	0.04	-0.10	-0.01	-0.14	0.02	0.05	-0.13	-0.13	0.92	0.33							
12. Dyad. E.	0.11	0.15	0.11	0.01	0.17	0.17	0.11	0.12	0.02	0.15	0.12	0.16						
13. Voice N.	-0.15	-0.14	-0.18	0.01	-0.23	0.02	0.06	-0.23	-0.26	0.05	-0.08	0.03	-0.14					
14. Exit N.	0.19	0.08	0.22	0.10	0.05	0.33	-0.02	0.06	-0.02	0.09	0.01	0.11	0.10	-0.04				
15. Size B.	0.25	0.09	0.20	0.16	0.03	0.36	0.16	0.21	0.09	0.16	0.08	0.18	0.16	-0.11	0.27			
16. Size S.	0.01	0.10	-0.01	0.09	-0.04	0.15	0.36	0.00	-0.02	0.15	0.08	0.11	0.02	0.16	-0.05	0.07		
17. Hardw.	0.16	0.03	0.10	-0.03	0.20	0.07	0.40	0.20	0.18	0.15	0.05	-0.10	0.10	-0.18	-0.02	0.03	0.20	
18. Softw.	0.28	0.10	0.23	0.09	0.19	0.22	0.76	0.30	0.23	-0.09	0.05	-0.04	0.09	-0.15	-0.02	0.14	0.22	0.31
19. Serv.																		

* : p < 0.05.
** : p < 0.01.
*** : p < 0.001.

other similar buyers who can provide relevant information about the suppliers. *Exit Network* measures the ease for the buyer to switch supplier or product. Finally, we include two organisational control variables in our analyses, *Size Buyer* and *Size Supplier*. The correlations between our study variables are shown in Table 4.

3.4. Statistical analysis

To test our hypotheses, we make use of ordinary least squares regression analysis. Since heteroscedasticity is the norm rather than the exception in organisational research, we obtained heteroskedasticity robust standard errors (White, 1980). We used various residual diagnostic plots to determine the adequacy of the various models that were tested. Cook's distance was calculated for every regression model to determine whether some observations were too influential in the calculation of parameter estimates. We did not find highly influential observations. Since correlations between the study variables are relatively low, multicollinearity is not an issue. As 179 observations refer to second transactions by the same buyer, we checked whether this clustering (and the resulting dependence of residuals) affected our statistical results by obtaining cluster robust standard errors. Our results did not change substantially.

4. Data analysis and findings

Using the *Hardware*, *Software* and *Services* dummy variables, we first split our sample into two groups: transactions that (among others) involve service components versus transactions that do not involve service components. In a second step, we use the dummy variables and subsequently *Proportion of Services* as independent variables in regression analyses, in addition to transaction and embeddedness characteristics, to explain ex ante and ex post transaction costs.

For the two groups, Table 5 shows the mean scores for the ex ante and ex post transaction costs, transaction characteristics and embeddedness characteristics. The findings demonstrate that ex ante management is different for transactions that involve services compared to transactions that do not. Buying firms spend more time and effort searching for transaction partners, and the tenders offered by suppliers are more specific. Buying firms also spend more time crafting contracts. However, contracts are not more specific for transactions involving services. Ex post problems also occur more frequently for transactions involving services.

In addition, the transactions in our sample that involve services indeed differ from no-service transactions in several respects. Transactions involving services have a higher financial volume, they are more complex and are characterised by higher buyer uncertainty. Switching to an alternative supplier is more expensive for transactions involving services compared to no-service transactions. Interestingly, we found no significant difference in dyadic embeddedness between services and no-service transactions, while network embeddedness clearly differs. Transactions involving services are more embedded in a voice network of common third parties. However, transactions involving services are less embedded in an exit network of alternative partners than no-service transactions.

While buying firms thus spend more time on searching and contracting when services are involved, this does not mean that ex ante management is intrinsically more challenging for transactions involving services. The extra amount of ex ante management and ex post problems may be attributable to the fact that transactions involving services are, on average, also more uncertain and/or complex, as demonstrated by the data. Therefore, we apply a multiple regression analysis that takes these transaction and embeddedness characteristics into account, for each of the five constructs measuring transaction costs: *Search Cost*, *Tender Specificity*, *Contract Cost*, *Contract Specificity*, and *Ex Post Problems*. The results of the five regression analyses are presented in Table 6. In these analyses, the coefficient of the variable *Services* measures the additional effect of whether a transaction involves services or not, controlling for all transaction, embeddedness, and organisational characteristics described earlier (including the dummy variables *Hardware* and *Software*).

Table 5
Comparing Service and No-service Transactions (Means, Standard Deviations, Difference of Means and T-values).

	Services	No-services	Test of difference
Search Cost	2.23 (1.21)	1.50 (1.15)	0.73*** (8.93)
Tender Specificity	3.31 (0.77)	3.14 (0.80)	0.16** (2.85)
Contract Cost	1.28 (0.81)	0.89 (0.72)	0.38*** (6.84)
Contract Specificity	3.11 (0.97)	3.29 (1.14)	-0.18** (2.59)
Ex Post Problems	1.79 (0.74)	1.50 (0.68)	0.29*** (6.05)
Purchase Volume	1.15 (1.20)	0.63 (0.93)	0.52*** (7.12)
Complexity	10.95 (3.17)	4.02 (2.28)	6.93*** (36.97)
Switching Cost	0.23 (0.93)	-0.37 (0.98)	0.60*** (9.56)
Buyer Uncertainty	0.18 (0.96)	-0.32 (0.99)	0.51*** (7.83)
Past Relation	-0.03 (0.98)	0.05 (0.92)	0.08 (1.39)
Future Relation	2.85 (1.42)	2.70 (1.31)	0.15 (1.60)
Dyadic Embeddedness	0.49 (3.36)	0.75 (2.93)	0.26 (1.23)
Voice Network	1.49 (1.95)	1.14 (1.96)	0.35** (2.71)
Exit Network	2.55 (0.93)	2.86 (1.00)	0.31*** (4.78)
Size Buyer	3.65 (1.03)	3.69 (3.69)	0.04 (0.63)
Size Supplier	3.48 (1.43)	3.08 (1.08)	0.40*** (4.26)

As one example for the size of the difference: transactions with services included have an average purchase price (Purchase Volume) of 1.15 versus 0.63 for no-services, which is roughly equivalent to a difference of 80k versus 40k EUR. Note that it is not obvious for all variables how large the difference is substantively, as several of our measures are based on factor scores (which is also the reason why some of the reported means are negative).

*: $p < 0.05$.

** : $p < 0.01$.

*** : $p < 0.001$.

As can be seen in the table, in most regressions, the effect of *Services* is now no longer significant. That is, after controlling for transaction and embeddedness characteristics, a transaction that involves services is no different in terms of ex ante management in most dimensions. Buyers do not spend more time on contracting, and contracts and tenders are not more specific than for no-service transactions. The sole exception is a remaining significant effect of *Services* on *Search Cost* (although only about one-third of the original effect size remains: 0.25 compared to 0.73). This suggests that buyers do invest more time and effort in finding suppliers for their transactions involving services, partly because of factors that cannot be explained by the other variables present in our models. Finally, we find no evidence that transactions involving services are more problematic ex post. The effect of *Services* on *Ex Post Problems* is not significant.

Our analyses so far rely on the operationalisation of *Services* as a dummy variable that measures whether or not a transaction involves services. As a robustness check, we also considered the relative importance of the service components in the transaction. Using the *Proportion of Services* variable, we reran the regression analyses and the results are presented in Table 7. In these analyses, the coefficient of the variable *Proportion of Services* measures the additional effect of the extent to which a transaction involves services components, controlling for all transaction, embeddedness and organisational characteristics described earlier. Similar to the effects of the *Services* dummy variable, the effect of *Proportion of Services* is not significant in most regressions. A transaction that involves a higher proportion of services is in most respects not different in terms of ex

Table 6
Regression Analysis for Different Forms of Ex Ante and Ex Post Transaction Costs – Services.

	Search Cost	Tender Specificity	Contract Cost	Contract Specificity	Ex Post Problems
Services	0.25 [*] (0.11)	0.00 (0.09)	0.10 (0.07)	0.17 (0.11)	−0.05 (0.07)
Purchase Volume	0.33 ^{***} (0.04)	0.04 (0.03)	0.20 ^{***} (0.03)	0.05 (0.04)	0.05 [*] (0.03)
Complexity	0.02 (0.02)	0.01 (0.01)	0.02 [*] (0.01)	−0.00 (0.01)	0.02 [*] (0.01)
Switching Cost	0.22 ^{***} (0.04)	0.12 ^{***} (0.03)	0.12 ^{***} (0.03)	0.07 (0.04)	0.05 [*] (0.03)
Buyer Uncertainty	0.09 [*] (0.04)	−0.12 ^{***} (0.03)	0.07 ^{**} (0.03)	−0.08 ^{**} (0.03)	0.20 ^{***} (0.03)
Past Relation	0.08 (0.09)	0.06 (0.09)	0.08 (0.08)	−0.03 (0.11)	0.03 (0.06)
Future Relation	−0.10 ^{**} (0.03)	0.00 (0.03)	−0.04 (0.02)	−0.01 (0.03)	0.02 (0.02)
Dyadic Embeddedness	−0.07 [*] (0.03)	−0.02 (0.02)	−0.03 (0.02)	−0.00 (0.03)	−0.02 (0.02)
Voice Network	0.02 (0.02)	0.04 [*] (0.02)	0.00 (0.01)	0.01 (0.02)	−0.02 (0.01)
Exit Network	0.03 (0.04)	−0.09 [*] (0.04)	−0.03 (0.03)	0.02 (0.04)	−0.07 ^{**} (0.02)
Size Buyer	0.10 (0.04)	0.04 (0.03)	0.09 ^{***} (0.03)	0.05 (0.04)	0.04 (0.02)
Size Supplier	0.07 [*] (0.03)	0.00 (0.02)	0.02 (0.02)	0.09 ^{**} (0.03)	−0.03 (0.02)
Hardware	−0.19 (0.10)	0.11 (0.09)	−0.18 [*] (0.07)	0.12 (0.11)	−0.09 (0.07)
Software	−0.01 (0.10)	−0.04 (0.09)	−0.11 (0.07)	−0.15 (0.11)	0.13 [*] (0.06)
Constant	1.07 ^{***} (0.23)	3.08 ^{***} (0.23)	0.72 ^{***} (0.16)	−3.80 ^{***} (0.25)	1.57 ^{***} (0.14)
No. of observations	875	668	805	876	917
R²	0.36	0.09	0.30	0.06	0.22

* p < 0.05.

** p < 0.01.

*** p < 0.001.

ante management. Buyers do not spend more time on searching and contracting, or on contracts and tenders if a transaction involves relatively many service components. The sole exception is a significant effect of *Proportion of Services* on *Ex Post Problems*. Interestingly, this is a negative effect, indicating that if a transaction involves more services components, fewer problems will occur during contract execution.

5. Discussion

Our first analysis shows that transactions that involve services are indeed different in some respects than transactions that do not involve services. Search costs and contracting costs are higher, and service transactions lead to more problems ex post. While previous studies mainly measured *perceptions* of buyers and *perceived* differences between goods and service procurement, our analysis demonstrates that transactions involving services are indeed *executed* differently. However, our findings also show that these differences can be explained by the transaction characteristics affecting ex ante and ex post transaction costs, according to TCE theory, and in terms of social embeddedness. Compared to transactions that do not involve services, transactions involving services are, on average, more expensive and more complex, are characterised by higher buyer uncertainty and switching costs, and are subject to limited opportunities to replace a service or entire supplier if the transaction fails to meet expectations ('exit network'). After controlling for these transaction and embeddedness characteristics, the difference in transaction costs between transactions that involve services and those that do not, in fact, largely disappears.

The sole exception in our data concerns search costs. Transactions that involve services tend to have higher search costs even after controlling for acquisition price, switching costs, uncertainty and embeddedness. For the other ex ante and ex post transaction costs we considered – the specificity of tenders, contract costs and contract specificity, and ex post problems – we

find that transactions involving services are not different from any other transaction, after controlling for transaction and embeddedness characteristics. When we operationalise the service content of transactions as *Proportion of Services* instead of as *Services*, we only find a difference in ex post problems, which actually decrease when the service components are more important.

There is no evident explanation why search costs would be higher for transactions involving services, even beyond the effects of higher transaction uncertainty and complexity. Possibly, buyers spent more time comparing potential suppliers and offerings, not because the comparisons were more difficult, but in order to satisfy internal customers. As many services, compared to goods, typically have a broader range of internal customers, the IT managers involved may have investigated more options at the explicit request of various internal customers or to pre-empt any criticisms that insufficient market research had been done. This possible explanation should be validated in further research; our current dataset cannot be used to verify such effects. Note, however, that the increased search costs for services per se were not found when we measured service content as a proportion; the effect is not robust, at least not in this dataset.

The effect on ex post problems is not robust either; it is only found when we measure service content as a proportion. In addition, the direction of the effect is counterintuitive; controlling for all other transaction and embeddedness characteristics, transactions involving services suffer from fewer problems than no-service transactions. Perhaps the measurement items seem somewhat biased towards problems in goods transactions (see the [Appendix A](#)), but then it is strange that we only found a differential effect for one of the two operationalisations of transaction service content.

6. Conclusions and recommendations

The findings from our study of a large set of IT procurement transactions

Table 7
Regression Analysis for Different Forms of Ex Ante and Ex Post Transaction Costs –Proportion of Services.

	Search Cost	Tender Specificity	Contract Cost	Contract Specificity	Ex Post Problems
Proportion of Services	0.21 (0.20)	0.04 (0.16)	0.16 (0.15)	0.20 (0.19)	–0.24 [*] (0.13)
Purchase Volume	0.33 ^{**} (0.04)	0.05 (0.03)	0.19 ^{***} (0.03)	0.04 (0.04)	0.04 (0.03)
Complexity	0.03 (0.01)	0.01 (0.01)	0.02 [†] (0.01)	–0.00 (0.01)	0.03 ^{**} (0.01)
Switching Cost	0.22 ^{***} (0.04)	0.12 ^{***} (0.03)	0.11 ^{***} (0.03)	0.07 (0.04)	0.05 [†] (0.03)
Buyer Uncertainty	0.09 [†] (0.04)	–0.12 ^{***} (0.03)	0.08 ^{**} (0.03)	–0.08 [†] (0.04)	0.20 ^{***} (0.03)
Past Relation	0.07 (0.09)	0.05 (0.09)	0.08 (0.08)	–0.02 (0.11)	0.03 (0.06)
Future Relation	–0.09 ^{**} (0.03)	0.00 (0.03)	–0.04 (0.02)	–0.01 (0.03)	0.02 (0.02)
Dyadic Embeddedness	–0.07 [†] (0.03)	–0.02 (0.03)	–0.03 (0.02)	–0.00 (0.03)	–0.02 (0.02)
Voice Network	0.02 (0.02)	0.04 [†] (0.02)	0.01 (0.01)	0.01 (0.02)	–0.02 (0.01)
Exit Network	0.03 (0.04)	–0.08 [†] (0.03)	–0.03 (0.03)	0.02 (0.04)	–0.07 ^{**} (0.02)
Size Buyer	0.10 ^{**} (0.04)	0.04 (0.03)	0.09 ^{***} (0.03)	0.05 (0.04)	0.04 (0.02)
Size Supplier	0.07 [†] (0.03)	0.00 (0.02)	0.02 (0.02)	0.09 ^{**} (0.03)	–0.03 (0.02)
Hardware	–0.19 (0.11)	0.11 (0.10)	–0.14 [†] (0.08)	0.19 (0.12)	–0.13 [†] (0.07)
Software	–0.01 (0.10)	–0.06 (0.09)	–0.08 (0.07)	–0.09 (0.11)	0.10 (0.06)
Constant	1.03 ^{***} (0.23)	3.10 ^{***} (0.20)	0.76 ^{**} (0.16)	–3.91 ^{***} (0.26)	1.61 ^{***} (0.15)
No. of observations	871	667	802	872	913
R²	0.36	0.09	0.29	0.05	0.22

* p < 0.05.

** p < 0.01.

*** p < 0.001.

provide a possible explanation of the hitherto mainly anecdotal evidence that managing the procurement process for services is different from managing transactions that do not involve services. Our study largely confirms prior studies suggesting that service procurement is more difficult and more expensive than goods procurement (Ellram et al., 2007, 2008; Fitzsimmons et al., 1998; Van der Valk and Rozemeijer, 2009). However, these differences can be explained in terms of well-established transaction and social embeddedness characteristics. What makes a service transaction (or more precisely: transactions involving service components or a higher number of service components) more expensive in terms of ex ante and ex post transaction costs, compared to goods transactions (or more precisely: transactions not involving service components, or a lower number of service components) are the same factors that make one goods transaction more expensive than the other.

For research, our findings suggest that the well-established IHIP characteristics may indeed explain some of the differences between procurement of goods and procurement of services, although admittedly our data does not allow us to directly measure these characteristics, but only through proxies such as buyer uncertainty. Further research could adopt more direct measurements of the IHIP characteristics to assess their impact on the various forms of ex ante transaction cost and ex post problems.

For management practice, our study suggests that, on average, service procurement indeed requires more time and resources than goods procurement, especially in terms of comparing and selecting offerings and suppliers, drawing up contracts and resolving problems related to delivery and usage; at least in the area of IT. Buying firms would be advised to allocate more resources to IT service procurement up front, to prevent any unforeseen bottlenecks. Further research, as discussed below, would be necessary to verify whether this implication also holds for other procurement domains than IT services and goods. At the same time, we have shown

that these differences in transaction costs between transactions involving services and those without or with less service, are almost fully due to differences in volume, complexity, switching costs, buyer uncertainty and the network embeddedness of the transaction. Thus, to plan their service transaction efforts, buying organisations can apply the same factors as they do for goods transactions. The findings that service transactions exhibit higher search efforts and lower ex post problems than no-service transactions, even after controlling for transaction and embeddedness characteristics, are not robust for our two measures of service content. Therefore, we cannot give any managerial recommendations regarding these aspects.

As this is, to the best of our knowledge, the first large scale empirical study to investigate the differences between goods and services in the actual execution of procurement activities, further studies are needed. In developing such further research, the following limits and limitations of the current study may be addressed. First, our findings are context-specific and further research could be conducted in other populations. Our dataset of IT procurement transactions by SMEs in the Netherlands allows us to compare transactions involving only goods and transactions involving (among others) services within a particular, technical domain of procurement transactions. This reduces the chance that some unmeasured variable affects our findings. At the same time, it also implies a limitation as it restricts the scope of our study to this particular population of procurement transactions. Subsequent studies could replicate our study by investigating other technical procurement domains such as transportation and logistics, which for individual buying organisations could also span transactions of goods (e.g. trucks) and services (e.g. road transportation). Future studies could also replicate this study beyond the Netherlands. Prior studies have argued that some (business) cultural characteristics, such as striving for consensus (Anderson and Wynstra, 2010) and uncertainty avoidance (Pemer et al., 2014), may affect procurement decision-making. It is not immediately clear, however, whether and how these characteristics would impact the

differences that our study finds between transactions that involve services and those that do not. Replications beyond the current SME setting would also be helpful. Snijders and Tazelaar (2005) compares the MAT 1995 data with a partial replication of the MAT study in 2003 that contains information about purchasing transactions of larger firms as well. Their analysis found that although large firms are more bureaucratic and deal with more complex transactions, the management of transactions is very similar, suggesting that our results may be generalisable to larger firms as well.

Second, as noted earlier, our dataset does not encompass transactions that only include services. In our view, however, this does not constitute an important shortcoming. In practice, even though transactions involving only services exist (e.g. management consultancy), the majority of business-to-business transactions – also outside of IT – combine both goods and services (Axelsson and Wynstra, 2002; Spring and Araujo, 2013). So, differences between ‘pure’ goods procurement transactions and ‘pure’ service procurement transactions are difficult but, by the same token, are also less relevant to investigate than differences in the degree of service content in a procurement transaction. Our *Proportion of Services* ratio variable partly captures this degree of service content, but further research should preferably (also) measure the financial importance of the service components within the overall transaction, although this may be practically difficult depending on suppliers’ billing procedures. Future research could still study pure service procurement transactions, as this would inform us about the generalisability of the current findings to that particular population of transactions.

Finally, we see potential for complementary studies that further disentangle different types of services, based on service characteristics such as the

extent of customer contact and the degree of customisation (Van der Valk and Axelsson, 2015). One such characteristic is how the service is actually applied or used by the buying organisation (Wynstra et al., 2006). Whether a buying organisation uses a service for internal purposes, or buys the service to be processed and delivered to external clients makes a difference for the most effective way to interact with the suppliers involved (Van der Valk and Wynstra, 2012). Applied to IT, procuring ERP system implementation services versus outsourcing a ‘customer facing’ IT service such as online banking services faces different governance challenges, for example, in terms of monitoring performance. Another perspective for complementary studies that further disentangle various kinds of services could be to compare different service patterns. Following the works of Hill (1977) and Gadrey (2000), Araujo and Spring (2006) define different service patterns or rationales, two of which are particularly applicable to business-to-business services: (1) a change in the condition of a unit or a person, or of a good belonging to some economic unit, as a result of the activity of some other economic unit; (2) the provision of maintained technical capacity for customers to use. The first pattern can be observed in IT services such as client contact centres, while the second pattern applies to services like data centres. Each of these two types of services may pose particular procurement challenges, such as a greater dependence on the quality and availability of customer inputs in the first type of services (Chase, 1978; Nullmeier et al., 2016; Sampson, 2001).

Thus, further research on service procurement would benefit not only from a comparison between transactions encompassing different combinations of goods and services based on the traditional IHIP characteristics, but also from a closer examination of different forms of services.

Appendix A

See Appendix Table A1

Table A1
Construct Measures.

Construct	Items (factor loadings between brackets where applicable)
Search Cost	How much time did you and your colleagues spend on comparing and selecting the product and potential suppliers?
Tender Specificity	How specific were the tenders regarding: 1) Adaptation to situation in buyer's firm (0.58); 2) Technical specifications (0.78); 3) Cost specification (0.73); 4) Terms of delivery (0.73). (five-point scales, ranging from “Not specific” to “Very specific”).
Contract Cost	How much time did you and your colleagues spend on drawing up the agreement and on negotiations with the supplier?
Contract Specificity	How specific were the terms in the contract regarding: 1) Technical specifications of the product (0.71); 2) Financial and legal considerations (0.73); 3) Overall contractual features (0.88). (Five-point scales, ranging from “Not specific” to “Very specific”).
Ex Post Problems	These are possible problems associated with purchasing such products and with service. To what degree did you experience each of these problems?: 1) Delivery delay (0.57); 2) Price /budget overrun (0.64); 3) Product incomplete (0.76); 4) Product too slow / limited (0.69); 5) Deviation from agreed specifications (0.74); 6) Incompatibility with other IT products (0.53); 7) Installation too quick / careless (0.70); 8) Insufficient support (0.73); 9) Service too slow / too late (0.77); 10) Updates too slow / too late (0.84); 11) Documentation incomplete / unclear (0.75). (Five-point scales, ranging from “Problem did not occur at all”, to “Problem occurred to a very high degree”).
Purchase Volume Complexity	How much was paid to the supplier, excluding later supplements? Which of the following products/services were delivered by the supplier? (18 products/services grouped in five categories of increasing complexity, ranging from standard products / services, to mainly tailored products / services.) Item 1: highest complexity for the combined selected products / services; Item 2: number of products/services selected.
Switching Cost	Assume that the product had failed to function and had to be replaced, what would have been the damage in terms of time and money: 1) Spent on procuring a new product (0.80); 2) Spent on training personnel (0.81); 3) Spent on data entry (0.78); 4) Wasted in idle production (0.69)? (Five-point scales, ranging from “Very small amount” to “Very large amount”).
Buyer Uncertainty	1) Was it easy or difficult for you and your employees to judge the quality of the product upon delivery? (0.74); 2) Was it easy/difficult for your firm to compare tenders? (0.79); 3) Was it easy/difficult for your firm to compare the product with other products? (0.86); 4) Was it easy/difficult for your firm to compare price-quality ratio of the products offered by potential suppliers? (0.84). (Five-point scales, ranging from “Very easy” to “Very difficult”).
Past Relation	1) How long had your firm done business with the supplier before the purchase of this product? (0.94); 2) How frequently had your firm done business with the supplier before the purchase of this product? (0.97); 3) How extensively had your firm done business with the supplier before the purchase of this product? (0.96); 4) How satisfied was your firm with the business with the supplier before the purchase of this product? (0.95). (Five-point scales, ranging from “No business” to “Very regular and/or extensive business”).
Future Relation	To what extent did you expect, before the purchase of this product, that your firm would continue doing business with this supplier? (Five-point scale, ranging from “No business” to “Very regular and/or extensive business”).
Dyadic Embeddedness	(Product of Past Relation and Future Relation)
Voice Network	Consider the other firms you know that were customers of the supplier at that time of transaction. How many of such other firms do you know? (number)
Exit Network	Consider the circumstances at the time of the transaction. How large was 1) The number of potential suppliers for this product (0.89); 2) The number of alternatives for this product? (0.89). (Five-point scales, anchored by “1-Very small” and “5-Very large”).
Size Buyer	Number of buyer employees (open question)
Size Supplier	Number of supplier employees (1 = Fewer than 5; 2 = 5–9; 3 = 10–19; 4 = 20–49; 5 = 50 or more).

References

- Åhlström, P., Nordin, F., 2006. Problems of establishing service supply relationships: evidence from a high-tech manufacturing company. *J. Purch. Supply Manag.* 12 (2), 75–89.
- Anderson, J.C., Wynstra, F., 2010. Purchasing higher-value, higher-price offerings in business markets. *J. Bus.-to-Bus. Mark.* 17 (1), 29–61.
- Anderson, S.W., Dekker, H.C., 2005. Management control for market transactions: the relation between transaction characteristics, incomplete contract design, and subsequent performance. *Manag. Sci.* 51 (12), 1734–1752.
- Araujo, L., Spring, M., 2006. Services, products, and the institutional structure of production. *Ind. Mark. Manag.* 35 (7), 797–805.
- Axelrod, R., 1984. *The Evolution of Cooperation*. Wiley, New York.
- Axelsson, B., Wynstra, F., 2002. *Buying business services*. Wiley, West Sussex.
- Batenburg, R., 1997a. *The External Management of Automation 1995: Codebook of MAT95 (ISCORE Paper 58)*. Utrecht University.
- Batenburg, R., 1997b. *The External Management of Automation 1995 (MAT95): field-work, Response, and Non-Response (ISCORE Paper 59)*. Utrecht University.
- Batenburg, R.S., Raub, W., Snijders, C., 2003. Contacts and contracts: dyadic embeddedness and the contractual behavior of firms. *Res. Sociol. Organ.* 20 (1), 135–188.
- Benedettini, O., Neely, A., Swink, M., 2015. Why do servitized firms fail? A risk-based explanation. *Int. J. Oper. Prod. Manag.* 35 (6), 946–979.
- Bettencourt, L.A., Ostrom, A.L., Brown, S.W., Roundtree, R.I., 2002. Client Co-Production in Knowledge-Intensive Business Services. *Calif. Manag. Rev.* 44 (4), 100–128.
- Blumberg, B., 2001. Efficient partner search: embedded firms seeking co-operative partners. *J. Math. Sociol.* 25, 329–354.
- Buskens, V., Raub, W., 2002. Embedded trust: control and learning. In: *Thye, S.R., Lawler, E.J. (Eds.), Group Cohesion, Trust and Solidarity, Advances in Group Processes* 19. pp. 167–202.
- Buskens, V., Batenburg, R.S., Weesie, J., 2003. Embedded partner selection in relations between firms. *Res. Sociol. Organ.* 20, 107–133.
- Caldwell, N., Howard, M. (Eds.), 2010. *Procuring Complex Performance: Studies of Innovation in Product-Service Management*. Routledge, Oxford.
- Chase, R.B., 1978. Where does the customer fit in a service operation? *Harv. Bus. Rev.* 56 (6), 137–142.
- Choi, T.Y., Krause, D.R., 2006. The supply base and its complexity: implications for transaction costs, risks, responsiveness, and innovation. *J. Oper. Manag.* 24 (5), 637–652.
- Day, E., Barksdale, H.C., 1994. Organizational purchasing of professional services: the process of selecting providers. *J. Bus. Ind. Mark.* 9 (3), 44–51.
- Dekker, H.C., Van den Abbeele, A., 2010. Organizational learning and interfirm control: the effects of partner search and prior exchange experiences. *Organ. Sci.* 21 (6), 1233–1250.
- Dyer, J.H., Singh, H., 1998. The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Acad. Manag. Rev.* 23 (4), 660–679.
- Edvardsson, B., Gustafsson, A., Roos, I., 2005. Service portraits in service research: a critical review. *Int. J. Serv. Ind. Manag.* 16 (1), 107–121.
- Ellram, L., Tate, W.L., 2015. Redefining supply management's contribution in services sourcing. *J. Purch. Supply Manag.* 21 (1), 64–78.
- Ellram, L.M., Tate, W.L., Billington, C., 2007. Services Supply Management: the next frontier for improved organizational performance. *Calif. Manag. Rev.* 49 (4), 44–66.
- Ellram, L.M., Tate, W.L., Billington, C., 2008. Offshore outsourcing of professional services: a transaction cost economics perspective. *J. Oper. Manag.* 26 (2), 148–163.
- Essig, M., Glas, A.H., Selviaridis, K., Roehrich, J.K., 2016. Performance-based contracting in business markets. *Ind. Mark. Manag.* 59, 5–11.
- Fitzsimmons, J.A., Noh, J., Thies, E., 1998. Purchasing business services. *J. Bus. Ind. Mark.* 13 (4/5), 370–380.
- Gadrey, J., 2000. The characterization of goods and services: an alternative approach. *Rev. Income Wealth* 46 (3), 369–387.
- Gelderman, C.J., Semeijn, J.J., De Bruijn, A., 2015. Dynamics of service definitions—An explorative case study of the purchasing process of professional ICT-services. *J. Purch. Supply Manag.* 21 (3), 220–227.
- Geyskens, I., Steenkamp, J.B.E.M., Kumar, N., 2006. Make, buy, or ally: a transaction cost theory meta-analysis. *Acad. Manag. J.* 49 (3), 519–543.
- Gordon, G.L., Calantone, R.J., Di Benedetto, C.A., 1993. Business-to-business service marketing: how does it differ from business-to-business product marketing? *J. Bus. Ind. Mark.* 8 (1), 45–57.
- Granovetter, M., 1985. Economic action and social structure: the problem of embeddedness. *Am. J. Sociol.* 91 (3), 481–510.
- Grönroos, C., 2007. *Service Management and Marketing: Customer Management in Service Competition*, 3rd ed. Wiley, Chichester.
- Guajardo, J.A., Cohen, M.A., Kim, S.-H., Nettesine, S., 2012. Impact of performance-based contracting on product reliability: an empirical analysis. *Manag. Sci.* 58 (5), 961–979.
- Gulati, R., 1995. Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Acad. Manag. J.* 38 (1), 85–112.
- Gulati, R., 1998. Alliances and networks. *Strateg. Manag. J.* 19 (4), 293–317.
- Hawkins, T.G., Gravier, M.J., Berkowitz, D., Muir, W.A., 2015. Improving services supply management in the defense sector: how the procurement process affects B2B service quality. *J. Purch. Supply Manag.* 21 (92), 81–94.
- Helper, S., 1991. An exit-voice analysis of supplier relations. In: *Coughlin, R.M. (Ed.), Morality, Rationality, and Efficiency: New Perspectives on Socio-economics*. Routledge, New York, pp. 355–372.
- Hennart, J.-F., 1988. A transaction costs theory of equity joint ventures. *Strateg. Manag. J.* 9 (4), 361–374.
- Hill, T.P., 1977. On goods and services. *Rev. Income Wealth* 23 (4), 315–338.
- Hirschman, A.O., 1978. Exit, voice, and the state. *World Polit.* 31 (1), 90–107.
- Immonen, M., Hallikas, J., Pynnönen, M., 2016. Antecedents of system purchasing in B2B services. *J. Purch. Supply Manag.* 22 (3), 205–213.
- Jackson, R.W., Neidell, L.A., Lunsford, D.A., 1995. An empirical investigation of the differences in goods and services as perceived by organizational buyers. *Ind. Mark. Manag.* 24 (2), 99–108.
- Johnston, R., 2005. Service operations management: from the roots up. *Int. J. Oper. Prod. Manag.* 25 (12), 1298–1308.
- Kalleberg, A.L., Knoke, D., Spaeth, J.L., 1996. *Organizations in America*. Sage, Thousand Oaks CA.
- Kim, S.K., Stump, R.L., Oh, C., 2009. Driving forces of coordination costs in distributor—supplier relationships: toward a middle-range theory. *J. Acad. Mark. Sci.* 37 (4), 384–399.
- Kleemann, F.C., Essig, M., 2013. A providers' perspective on supplier relationships in performance-based contracting. *J. Purch. Supply Manag.* 19 (3), 185–198.
- Laudon, K.C., Laudon, J.P., 2016. *Essentials of Management Information Systems*, 12th edition. Pearson College Division, Upper Saddle River NJ.
- Leiblein, M.J., Miller, D.J., 2003. An empirical example of transaction- and firm influences on the vertical boundaries of firms. *Strateg. Manag. J.* 24, 839–859.
- Li, M., Choi, T., 2009. Triads in services outsourcing: bridge, bridge decay and bridge transfer. *J. Supply Chain Manag.* 45 (3), 27–39.
- Lightfoot, H., Baines, T., Smart, P., 2013. The servitization of manufacturing: a systematic literature review of interdependent trends. *Int. J. Oper. Prod. Manag.* 33 (11–12), 1408–1434.
- Liinamaa, J., Viljanen, M., Hurmerinta, A., Ivanova-Gongne, M., Luotola, H., Gustafsson, M., 2016. Performance-based and functional contracting in value-based solution selling. *Ind. Mark. Manag.* 59, 37–49.
- Lorenz, E.H., 1988. Neither friends nor strangers: informal networks of subcontracting. In: *Gambetta, D. (Ed.), French Industry in Trust: Making and Breaking Cooperative Relations*. Blackwell, Oxford, pp. 94–107.
- Lovelock, C.H., 1983. Classifying services to gain strategic marketing insights. *J. Mark.* 47 (3), 9–20.
- MacKenzie, S.B., Podsakoff, P.M., Podsakoff, N.P., 2011. Construct measurement and validation procedures in MIS and behavioral research: integrating new and existing techniques. *MIS Q.* 35 (2), 293–334.
- Masten, S.E., Meehan, J.W., Snyder, E.A., 1991. The costs of organization. *J. Law, Econ. Organ.* 7, 1–25.
- Meehan, J., Menzies, L., Michaelides, R., 2017. The long shadow of public policy; Barriers to a value-based approach in healthcare procurement. *J. Purch. Supply Manag.* 23 (4), 229–241.
- Melnyk, S.A., Page, T.J., Wu, S.J., Burns, L.A., 2012. Would you mind completing this survey: Assessing the state of survey research in supply chain management. *J. Purch. Supply Manag.* 18 (1), 35–45.
- Mooi, E.A., Ghosh, M., 2010. Contract specificity and its performance implications. *J. Mark.* 74 (2), 105–120.
- Mooi, E.A., Gilliland, D.I., 2013. How contracts and enforcement explain transaction outcomes. *Int. J. Res. Mark.* 30 (4), 395–405.
- Nordin, F., Agndal, H., 2008. Business service sourcing: a literature review and agenda for future research. *Int. J. Integr. Supply Manag.* 4 (3/4), 378–405.
- Nullmeier, F., Wynstra, J.Y.F., Van Raaij, E.M., 2016. Outcome attributability in performance-based contracting: roles and activities of the buying organization. *Ind. Mark. Manag.* 59, 25–36.
- Pemer, F., Sieweke, J., Werr, A., Birkner, S., Mohe, M., 2014. The cultural embeddedness of professional service purchasing – a comparative study of German and Swedish companies. *J. Purch. Supply Manag.* 20 (4), 273–285.
- Pisani, N., Ricart, J.E., 2016. Offshoring of services: a review of the literature and organizing framework. *Manag. Int. Rev.* 56 (3), 385–424.
- Powell, W.W., Smith-Doerr, L., 1994. Networks and economic life. In: *Smelser, N., Swedberg, R. (Eds.), The Handbook of Economic Sociology*. Princeton University Press, Princeton, N.J., pp. 368–402.
- Riesewijk, B., Warmerdam, J., 1988. *Het Slagen en Falen van Automatiseringsprojecten*. Instituut voor Toegepaste Sociale Wetenschappen (“The success and failure of IT projects.”), Nijmegen.
- Rindfleisch, A., Heide, J.B., 1997. Transaction cost analysis: past, present, and future applications. *J. Mark.* 61 (4), 30–54.
- Rooks, G., Snijders, C., 2001. The purchase of information technology products by Dutch SMEs: problem resolution. *J. Supply Chain Manag.* 37 (3), 34–42.
- Rooks, G., Raub, W., Tazelaar, F., 2006. Ex post problems in buyer–supplier transactions: effects of transaction characteristics, social embeddedness, and contractual governance. *J. Manag. Gov.* 10 (3), 239–276.
- Roth, A.V., Menor, L.J., 2003. Insights into service operations management: a research agenda. *Prod. Oper. Manag.* 12 (2), 145–163.
- Sampon, S.E., Froehle, C., 2006. Foundations and implications of a proposed unified services theory. *Prod. Oper. Manag.* 15, 329–343.
- Sampon, S.E., 2001. *Understanding Service Businesses: Applying Principles of the Unified Services Theory*, 2nd ed. Brigham Young University.
- Sampon, S.E., Spring, M., 2012. Service supply chains: introducing the special topic forum. *J. Supply Chain Manag.* 48 (4), 3–7.
- Schmenner, R.W., 2009. Manufacturing, service, and their integration: some history and theory. *Int. J. Oper. Prod. Manag.* 29 (5), 431–443.
- Selviaridis, K., Wynstra, F., 2015. Performance-based contracting: a literature review and future research directions. *Int. J. Prod. Res.* 53 (12), 3505–3540.
- Selviaridis, K., Agndal, H., Axelsson, B., 2011. Business services ‘in the making’: (de) Stabilisation of service definitions during the sourcing process. *J. Purch. Supply Manag.* 17 (2), 73–86.
- Slobodow, B., Abdullah, O., Babuschak, W.C., 2008. When supplier partnerships aren't

- MIT Sloan Manag. Rev. 49 (2), 77–83.
- Smeltzer, L.R., Ogden, J.A., 2002. Purchasing professionals' perceived differences between purchasing materials and purchasing services. *J. Supply Chain Manag.* 38 (1), 54–70.
- Snijders, C., Tazelaar, F., 2005. Five counterintuitive findings in IT-purchasing. *J. Purch. Supply Manag.* 11 (2), 83–96.
- Spring, M., Araujo, L., 2009. Service, services and products: re-thinking operations strategy. *Int. J. Oper. Prod. Manag.* 29, 444–467.
- Spring, M., Araujo, L., 2013. Beyond the service factory: service innovation in manufacturing supply networks. *Ind. Mark. Manag.* 42 (1), 59–70.
- Stock, J.R., Zinszer, P.H., 1987. The industrial purchase decision for professional services. *J. Bus. Res.* 15 (1), 1–16.
- Tate, W.L., Ellram, L.M., 2012. Service supply management structure in offshore outsourcing. *J. Supply Chain Manag.* 48 (4), 8–29.
- Uzzi, B., 1997. Social structure and competition in interfirm networks: the paradox of embeddedness. *Adm. Sci. Q.* 42 (1), 35–67.
- Van der Valk, W., Axelsson, B., 2015. Towards a managerially useful approach to classifying services. *J. Purch. Supply Manag.* 21 (2), 113–124.
- Van der Valk, W., Rozemeijer, F., 2009. Buying business services: towards a structured service purchasing process. *J. Serv. Mark.* 23 (1), 3–10.
- Van der Valk, W., Van Iwaarden, J., 2011. Monitoring in service triads consisting of buyers, subcontractors and end customers. *J. Purch. Supply Manag.* 17 (3), 198–206.
- Van der Valk, W., Wynstra, F., 2012. Buyer–supplier interaction in business-to-business services: a typology test using case research. *J. Purch. Supply Manag.* 18 (3), 137–147.
- Van Weele, A.J., 2015. *Purchasing and Supply Chain Management*, 6th ed. Cengage Learning, Hampshire UK.
- Vanneste, B.S., Puranam, P., 2010. Repeated interactions and contractual detail: identifying the learning effect. *Organ. Sci.* 21 (1), 186–201.
- Vargo, S.L., Lusch, R.F., 2004. The four service marketing myths remnants of a goods-based, manufacturing model. *J. Serv. Res.* 6 (4), 324–335.
- Walker, G., Weber, D., 1984. A transaction cost approach to make or buy decisions. *Adm. Sci. Q.* 29 (3), 373–391.
- White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48 (4), 817–838.
- Williamson, O.E., 1979. Transaction-Cost Economics: the Governance of Contractual Relations. *J. Law Econ.* 22 (2), 233–261.
- Williamson, O.E., 1985. *The Economic Institutions of Capitalism*. Free Press, New York, NY.
- Williamson, O.E., Ghani, T., 2012. Transaction cost economics and its uses in marketing. *J. Acad. Mark. Sci.* 40 (1), 74–85.
- Wittreich, W.J., 1966. How to buy/sell professional services. *Harv. Bus. Rev.* 44 (2), 127–136.
- World Bank, 2017. *World Development Indicators. World Databank*. <<http://databank.worldbank.org/data/reports.aspx?source=2&type=metadata&series=NVS.SRV.TETC.ZS>> (Accessed 17 January 2017).
- Wynstra, F., Axelsson, B., Van der Valk, W., 2006. An application-based classification to understand buyer-supplier interaction in business services. *Int. J. Serv. Ind. Manag.* 17 (5), 474–496.
- Wynstra, F., Spring, M., Schoenherr, T., 2015. Service triads: a research agenda for buyer-supplier-customer triads in business services. *J. Oper. Manag.* 35 (1), 1–20.
- Zaheer, A., Mcevily, B., Perrone, V., 1998. The strategic value of buyer-supplier relationships. *Int. J. Purch. Mater. Manag.* 2, 20–26.