

Purchasing in service networks:

The impact of high visibility on purchasing performance

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Abstract

While the service sector is growing rapidly, the purchasing of services has not yet received significant attention in theory or practice. Service purchasers face serious challenges, and existing purchasing practices for services are often non-strategic. We choose an exploratory–qualitative research approach to investigate the purchasing of IT, logistics and Maintenance, Repair, and Overhaul (MRO) services. In particular, we focus on the role of visibility and analyze how service purchasers can benefit from extensive knowledge about their service networks. We determine that visibility indeed adds significant value to service purchasing and can help service purchasers to decrease costs, mitigate risks and maintain competitiveness.

Keywords

Service purchasing, service network, supply chain visibility, supply network mapping, case study research, expert interviews

Submission category

Competitive paper

Introduction

Although growing, service sector impacts are not yet the focus of PSM research or practice

The service sector is growing in magnitude and impact and has reached global importance (Ellram & Tate, 2015). Services account for 65% of global gross domestic product (Plecher, 2019). The “servitization” trend, which describes the transition of manufacturing companies towards increasing service operations (Vandermerwe & Rada, 1988), is accelerating the growth of the service sector (Finne & Holmström, 2013). Companies can build new revenue streams

from the servitization business model (Baines et al., 2017); a prominent example is Rolls-Royce, with its Power-by-the-Hour business model, which allows customers to pay for an engine according to its working hours (Peters, 2018). Today, about 35–45% of companies' total purchasing expenses go towards services (Dhal, 2019).

While the impact of services on the international economy and the business success of companies is substantial, little but increasing research on service supply chains (Giannakis, 2011; van der Valk & van Weele, 2010) or the purchasing of business services (van der Valk & Rozemeijer, 2009; van der Valk, Wynstra, & Axelsson, 2005) has occurred to date. Current PSM literature regarding purchasing and supply chain optimization still concentrates primarily on the direct material used in production, as supply chain management has historically focused on the supply chains for manufactured goods (Ellram, Tate, & Billington, 2004). However, prior researchers have highlighted that significant differences exist between the purchasing of production material and services, which should be further investigated (Jackson, Neidell, & Lunsford, 1995; van der Valk & Rozemeijer, 2009).

Within companies, service purchasing has not received much attention, either. While the purchasing of direct materials is often already highly optimized by companies, the purchasing of indirect materials and services has not been sufficiently in focus of strategic purchasing in the past. Top management still perceives service purchasing as less complex than materials buying and therefore tends to assign new and inexperienced buyers to this area (Smeltzer & Ogden, 2002). Various studies have detected a low level of competence in service purchasing (van der Valk & Rozemeijer, 2009). In many companies, services are considered non-strategic and are purchased without the involvement of the purchasing department (van der Valk & Rozemeijer, 2009). Such non-compliant behavior of employees, by-passing established purchasing contracts and procedures, is also referred to as maverick buying (Karjalainen, Kemppainen, & van Raaij, 2008; Rothkopf & Pibernik, 2016). Our research thus aims at improving the strategic purchasing of services.

Achieving high visibility into service networks to visualize them by supply network mapping

Supply chain visibility can be defined as “the extent to which a company has information about [...] its supply chain” (Kraft, Valdés, & Zheng, 2018). This information may relate to the actors involved in the supply chain and the relationships between them. Knowledge about the service supply chain is crucial for decision-making to improve companies' efficiency (Dubois, Holma, Andersson, & Hulthén, 2011). Visibility is known to be a critical factor for process effectiveness and efficiency (Drzymalski, 2012), and supply chain visibility both positively impacts IT incident handling performance in the IT service network (Vlietland & Van Vliet, 2015) and is mandatory to track and trace the transportation performance of logistics service providers (Francis, 2008). High visibility regarding inbound supplier structure and buyer–supplier relationships is necessary for mapping and disclosing supply chain information in subsequent steps (Barratt & Barratt, 2011; Barratt & Oke, 2007; Jin, Fawcett, & Fawcett, 2013; Tse & Tan, 2012). To increase the visibility of and visualize these service networks, purchasers can use a service network mapping approach. Mapping the network traces back to the concept of supply chain mapping (Gardner & Cooper, 2003), which was later adapted to the network level by the concept of supply network mapping (Kappel, Schiele, & Buchholz, 2020).

Impacts of high visibility on cost saving performance

As purchasing volumes for services within companies are rising due to increasing outsourcing and digitalization activities, which exerts a large impact on overall business spend, analyzing and managing service spend becomes increasingly important (Ellram et al., 2004; Wang, Wallace, Shen, & Choi, 2015). Services are of a particular interest, as their net profit margin tends to be very high compared to the manufacturing industry (Kathawala & Abdou, 2003). While the net profit margin can exceed 20% for accounting services, it usually remains below 10% in the manufacturing industry (Biery, 2015; Campbell, 2018). Stradford and Tiura forecast substantially higher cost savings for service purchasing than for the purchase of manufactured goods (Stradford & Tiura, 2003). Hence, purchasers can benefit from extensive knowledge about the actors in their service network and the margins between them. As indirect spend is often overlooked, and opportunities for indirect cost reduction are endless, 10–25% savings is usually possible (Purchasing & Procurement Center, 2012). We consequently investigate the impact of high visibility into the service network on cost saving performance.

Impacts of high visibility on risk management performance

Increasing the visibility of service supply chains is a recommended strategy for mitigating the outsourcing risk regarding services (Amaral, Billington, & Tsay, 2004; Ellram et al., 2004). High visibility can help to minimize late payments to second-tier suppliers, reduce the impact of bundling services and encourage accurate billing. Furthermore, this high level of knowledge may reduce the risk that suppliers will substitute lower quality labor than what was committed and help ensure that they meet their service commitments (Amaral et al., 2004; Ellram et al., 2004). Moreover, it decreases the risk if replacing one service provider with another. This phase is a serious challenge due to the perishability of services. While safety stocks can buffer the transition between two manufacturing material suppliers, disruptions during the transition between two service providers are often unavoidable, as services cannot be stored (Allen & Chandrashekar, 2000). Hence, increasing visibility is essential, as today, the structure of service networks still remains unexplored (Baltacioglu, Ada, Kaplan, Yurt And, & Cem Kaplan, 2007).

We consequently investigate the following research question in our study:

RQ: How can high visibility into service networks improve purchasing performance?

This paper sheds a strategic light on service purchasing, while also considering the particularities of several service industries. It presents the results of in-depth case studies and interviews conducted to investigate service purchasing. We contribute to the discussion on optimizing service purchasing by analyzing the role of visibility into the service network. We determine that increased visibility can help improve purchasing performance by decreasing costs, improving risk management and maintaining competitiveness. The structure of the paper is as follows: first, we explore the specificities of service purchasing and service networks in a literature review. We subsequently explain the methodology and present the results of the three cases: IT, logistics and Maintenance, Repair, and Overhaul (MRO) service purchasing. Finally, we summarize our results and present an outlook for future research.

Theoretical background

Characteristics and challenges of service purchasing

Services have particular features and share the so-called IHIP characteristics: intangibility, unlike physical products; heterogeneity, due to variable inputs and outputs; inseparability of the production and consumption of services; and perishability, as the outputs cannot be stored and inventoried (Lovelock & Gummesson, 2004; Moeller, 2010). Hence, they differ significantly from production material and require appropriate purchasing strategies. The continuous interaction between buyer and supplier – adapted for the relevant service – is important for the success of service purchasing (Cox, Chicksand, Ireland, & Davies, 2005; van der Valk, 2008; van der Valk & Wynstra, 2014). Evidence exists that information exchange in service triads, supplier relationship-specific adaptations and the degree of formalization of the relationship directly influence performance, while cooperative norms and operational linkages lie further back in the causal ordering (Karatzas, Johnson, & Bastl, 2017). The primary challenges of service purchasing are high service diversity; a large customer base, as services such as travel booking affect all employees; decentralized purchasing, lacking formalized approaches for managing service supply chains; ad hoc management, without the involvement of purchasing professionals; and non-standardized reporting (Ellram et al., 2004; James A. Fitzsimmons, Noh, & Thies, 1998).

From service supply chains to service triads and service networks

According to Sharma and Loh, the emergence of service supply chains is an important development in the purchasing of business services (Sharma & Loh, 2009). Baltacioglu et al. propose that “the service supply chain is the network of suppliers, service providers, consumers and other supporting units that performs the functions of transaction of resources required to produce services; transformation of these resources into supporting and core services; and the delivery of these services to customers” (Baltacioglu et al., 2007). Service supply chains are triadic by nature (Choi & Wu, 2009); a triad comprises a set of three actors and the potential ties between them (M. Li & Choi, 2009; Madhavan, Gnyawali, & He, 2004). Direct contact between service providers and end customers is a characteristic unique to triads, as opposed to service supply chains (van Iwaarden & van der Valk, 2013). While services in service supply chains go through a chain of consecutive buyer–supplier relationships, services in triads bypass the purchasing organization and go directly from service provider to customer (van der Valk & van Weele, 2010). The triad is defined as the smallest unit of a business network (Bastl, Johnson, & Choi, 2013) and is a useful tool to study relationships within larger networks (Ritter, 2000). Triads provide the opportunity to study networks in a simplified form (Vural, Göçer, & Halldórsson, 2019). Prior research highlights that further empirical research on the complexity and management of triads (Peng, Lin, Martinez, & Yu, 2010) – with a particular focus on service triads (Broekhuis & Scholten, 2018; van der Valk & van Weele, 2010; van Iwaarden & van der Valk, 2013) – has been neglected, and knowledge is urgently needed. Several researchers confirm that the focal service triad, consisting of the service supplier, service provider and buying firm, is embedded in a larger network of fourth parties, such as sub-suppliers, other suppliers and customers of the purchasing firm, and other partners of the service provider (Andersson, Dubois, Holma, & Hulthén, 2014; Dubois et al., 2011).

Outsourcing services to profit from specialist skills and external capacity

Business process outsourcing, which began with the outsourcing of IT services (Allen & Chandrashekar, 2000) and is now attracting many companies (Adler, 2003), is a key trend for services. Typically, the companies conclude contracts with service providers who, in return, recruit service suppliers to match the companies' demands. While older companies in particular tend to keep core manufacturing competencies in house (Cainelli, Ganau, & Iacobucci, 2019), the outsourcing of support services to specialist firms is rapidly expanding (Bhattacharya & Singh, 2018; Feng, Ren, & Zhang, 2019; García-Vega & Huergo, 2019; Holkeri, 2019). Advantages of service outsourcing include access to the best resources and capabilities (Clark, 2004; Hui & Tsang, 2004), 24-hour service lines (Ellram et al., 2004) and cost decrease effects (Ellram et al., 2004; Hui & Tsang, 2004). However, disadvantages and risks of service outsourcing also exist, such as high dependence on subcontractors for the actual service delivery (van der Valk & van Iwaarden, 2011), low service quality, less cost savings than expected (Lacity, Willcocks, & Feeny, 1996), insufficient specialist skills among suppliers and unanticipated resources being required for supplier relationship management (Adler, 2003). Hence, carefully analyzing benefits and challenges before outsourcing, as well as defining the content of the contracts with service providers (Allen & Chandrashekar, 2000) and ensuring service quality (e.g. with service level agreements) (Ellram, Tate, & Billington, 2007; Le Sueur & Dale, 1998; van Iwaarden & van der Valk, 2013), is mandatory.

Research design

Selecting IT, logistics and MRO services as relevant business cases

As the service sector is large and diverse, this study focuses on three service types: IT, logistics and MRO services. Digitalization, outsourcing, globalization and spend development have motivated the choice of these services. Table 1 presents the three selected business cases:

Service type	IT	Logistics	MRO
Methodology	Case study	Case study	Interviews
Customer industry	Railway	Pharma & healthcare	Primarily chemicals
Unit of analysis	Customer	Service provider	Producer + provider
Turnover	US\$ 49 bn.	US\$ 2 bn.	See Table 2
Business connection	B2B	B2B	B2B
Service output	Procedural	Physical	Physical
Resources	IT hard- & software, IT expert	Truck, equipment, driver, goods	Equipment, machine, maintenance staff
Outsourcing trigger	Specialist skills	Costs	Skills + capacity

Platform included	Yes	Yes	Yes
Level of customization	High	Medium	High
Service life cycle	< several months	< 1 day	< 1 week
Structure	Chain	Chain	Network
Power position	Service supplier	Service provider	Service supplier

Table 1: Overview of service case studies

We analyze a railway company, with a turnover of US\$ 49 billion, a service provider in the pharmaceutical and healthcare sector, with a turnover of US\$ 2 billion, and various producers and service providers who primarily operate in the chemical industry. All business connections are business to business. While the service output can be physically observed for logistics services, in moving goods from one location to another, and for MRO services, in repairing machines, it is procedural for IT services, since, for example, the development of software cannot be physically captured.

IT services are generally outsourced to profit from specialist skills (e.g. regarding programming). Logistics services are usually outsourced to decrease fixed costs for proprietary vehicles and to benefit from lower tariff structures. MRO services are outsourced to profit either from skills for specific services or from extra capacity. Service platforms are often used for procuring IT services (Gebregiorgis & Altmann, 2015) and increasing the efficiency of logistics services (S. Li et al., 2019) and were mentioned in the interviews for MRO services (FUTURA® Collaboration Platform).

The level of customization (Drzymalski, 2012) differs for the selected services. While IT and MRO services must be highly adapted to customer needs, the level of customization is somewhat lower for logistics services. Even though the transports depend on customer locations, transports for various customers can still be bundled to milk runs. Moreover, services can be analyzed according to their lifecycles (Kathawala & Abdou, 2003). Among the analyzed business cases, the service lifecycle of logistics services is the shortest, because short delivery times are very important in the pharmaceutical and healthcare sector. The lifecycle of MRO services is typically relatively short as well and should be completed in less than one week, depending of the complexity of the machine to be maintained or repaired. The lifecycle of IT services can be up to several months (e.g. when programming and refining a software product); it will be shorter for low value services, such as call center communications, however.

While we examine the service supply chain for the IT and logistics cases, we consider the entire service network regarding MRO services. For interaction, direct contact between service supplier and customer is needed so that the supplier gains sufficient knowledge of customer needs to determine the service offering (Broekhuis & Scholten, 2018). Once the supplier begins maintaining the customer's equipment, the customer provides inputs directly, in the form of machinery, to the service supplier. Furthermore, the customer may begin to make direct arrangements with the service supplier, for example, to maintain machinery overnight, while the maintenance was initially planned during the day. The service provider is not always

informed about these direct arrangements between service supplier and end customer (van der Valk & van Weele, 2010; Vandaele & Gemmel, 2007).

The above-described interaction for MRO services aligns with a shift of power towards the service supplier for IT and MRO services, once suppliers have begun to deliver services to customers. The customers can then discuss their individual requirements directly with the service suppliers who must customize their service offers. The service supplier and the customer bypass the service provider (van der Valk & van Weele, 2010). The performance of the service supplier directly influences customer satisfaction (J.A. Fitzsimmons & Fitzsimmons, 2006; van Iwaarden & van der Valk, 2013; Vandaele & Gemmel, 2007). In contrast, service providers are likely to maintain the power for logistics services. They define selling terms, Incoterms and carriage requirements and provide the necessary information to execute the transportation process for the haulage company (Vural et al., 2019).

Choosing an exploratory–qualitative research design to investigate service purchasing

As there has been little but increasing literature on service purchasing (van der Valk & Rozemeijer, 2009; van der Valk et al., 2005), additional empirical research is needed. In this paper, we examine specific issues, such as how buyers can profit from high visibility into their service networks. We choose an exploratory–qualitative research design to increase the current knowledge on these issues (Silver, Stevens, Loudon, & Wrenn, 2013).

For the IT and logistics business cases, we selected in-depth case studies as an appropriate methodology, as they are capable of investigating a contemporary phenomenon in depth and within a real-life context, particularly when the boundaries between the phenomenon and the context are not clearly evident (Yin, 1981). Case study research is a powerful method to enhance our current knowledge in the field of service purchasing (Halinen & Tornroos, 2005; Larsson, 1993; Stake, 2006; Wilson & Vlosky, 1997). The focus of our IT and logistics business cases is to examine why decisions were made, how they were implemented and what the results were (Schramm, 1971). Hence, the case study method helps us to build new theories (Eisenhardt, 1989) or refine existing ones (Siggelkow, 2007).

To investigate the MRO business case, we chose the semi-structured expert interview format, because we intended to uncover several participants' perspectives (Marshall & Rossman, 2006). Unlike in the two previous cases, the breadth of the responses is more important than their depth. Semi-structured interviews allow variation in the use of questions, to involve participants deeply into the study. Each interview is linked to the purpose of the study: to uncover the role of visibility for purchasing MRO services (Galletta, 2013). We conducted six interviews, exploring the following research directions:

- What does the structure of the service network look like?
- Do purchasers have visibility into their whole service network?
- How do they gather the necessary information?
- Do purchasers use mapping tools to visualize their service network?
- What are the advantages of direct vs. indirect service sourcing?
- Are purchasers aware of the service networks of their competitors?
- What is their motivation to analyze competitors' service networks?

Findings for IT service purchasing

Challenges of outsourcing IT services

In 2019, the spend on global IT services amounts to US\$ 1,031 billion worldwide. In terms of market growth, services are advancing steadily, at an annual growth rate of around 3.8%. Sub-segments of the IT services market include business process services, application services and infrastructure services, many of which are often outsourced to companies focused on service provision. In 2018, US\$ 85.6 billion was spent on outsourced services, of which the largest share was about US\$ 62 billion on IT outsourcing (Liu, 2019).

IT services are often outsourced because managers try to refocus on core competences or view IT services as a necessary cost burden to be minimized (Lacity et al., 1996). Several factors make IT outsourcing more difficult than simple make-or-buy decisions, such as the heterogeneity of IT services, requiring a selective rationale for outsourcing; the unpredictability of IT service needs, due to the high pace of IT capability evolvement; cost deviations for IT resources; the capability of companies to realize economies of scale for IT services themselves; and large switching costs associated with IT purchasing decisions (Lacity et al., 1996). For technically mature and highly integrated IT services, Lacity et al. propose pursuing a preferred contractor strategy with service providers, including shared goals, risks and rewards (Lacity et al., 1996). Service providers motivated to become the preferred contractors of certain customers must identify their niche.

Case 1: Identifying value contributions through IT service supply chain mapping

The first case deals with the strategic purchasing of IT services by a railway company. The commodity IT services in this firm cover software development services, operational services, telecommunication and network services and the service operations desk, as well as IT consulting services. The cumulated spend within the IT service commodity is about US\$ 1 billion for the total contract duration. Outsourcing services to freelancers is a common practice in the IT service sector. Hence, we can conclude that the IT service supply chain consists of multiple tiers, which may lead to cost savings potential.

As the existing contracts were about to end in mid-2019, the case study investigated whether any changes in the service supply chain could improve the purchasing of IT services. Hence, the focus of this case was on generating value by supply chain mapping (Gardner & Cooper, 2003). The mapping forms a basis for identifying value contributions and enables visibility into the supply chain configuration. To enable supply chain mapping, information about the shape of the IT service supply chain was gathered using the following information sources: extraction of current IT service contracting partners from the ERP system, online research about IT service contracting partners and their relationships, internal interviews with IT service purchasers and external interviews with IT experts (founder of a freelancer platform, employee of an HR service provider).

The above-mentioned information sources contributed to achieving visibility into the service supply chain, allowing the creation of a supply chain map. Figure 1 demonstrates that the railway company defines its IT service requirements and sends them to the HR service

providers, who then compete and make offers. They use IT service platforms to find suitable IT service suppliers who can fulfill the customers' requirements.

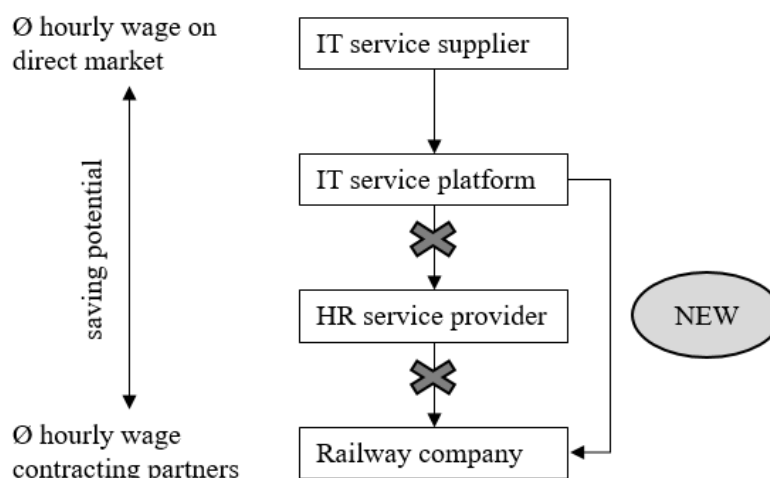


Figure 1: Direct sourcing to optimize IT service purchasing based on a supply chain map

This case study reveals that value contributions could be realized if the railway company stepped down the value chain by cooperating directly with lower tier suppliers (Wan & Wu, 2015). To determine the exact cost savings potential, the average hourly wages of the contracting partners are compared to the average hourly wages of IT freelancers, according to freelancer studies (e.g. GULP study). The result is that the railway company can make significant, double digit millions, cost savings by eliminating the margin for the HR service provider.

However, the effort involved to search for and identify all available IT service suppliers would be very high for the railway company, so it decided to utilize the open marketplace freelancemap, a platform with a database of over 50,000 IT experts (<https://www.freelancemap.com/>). As the licenses, training and effort needed to program a customized search must be expended and a risk surcharge should be calculated if working without an HR service provider, the benefits can be cut roughly in the half but are still significant (exact figures are confidential). Hence, a large cost saving potential in the railway company can be realized through visibility and mapping the supply chain of IT services.

Findings for logistics service purchasing

3PLs, 4PLs and track and trace systems boosting the growth of the logistics service market

The global logistics service market revenue accounted for US\$ 1,122.58 billion in 2018 and is expected to grow at an annual rate of 6.9% during the forecast period 2019–2027, to reach US\$ 2,029.38 billion by 2027. The emergence of third- and fourth-party logistics providers has boosted the growth of the global logistics service market. Moreover, the versatile benefits associated with the adoption of technologically driven logistics services, such as real-time tracking and monitoring, analytics, forecasting and planning are expected to provide numerous, profitable opportunities for the market players in the logistics service market during the coming

years. Substantial growth is occurring globally in the demand for logistics services to increase efficiency, meet customer delivery expectations and minimize overall operations costs. Logistics service outsourcing is common practice among large manufacturers wishing to construct a suitable supply chain and improve flexibility in global operations (Davydova, 2019).

Logistics triads as an underrepresented research field in the service literature

Logistics services are embedded in logistics service triads (Andersson, Dubois, Eriksson, Hulthén, & Holma, 2019). Larson and Gammelgaard define a logistics triad as “a cooperative, three-way relationship between a buyer of goods, the supplier of those goods and a logistics service provider moving and/or storing the goods between buyer and supplier” (Larson & Gammelgaard, 2001-2002). Several logistics researchers have applied a triadic approach. Gentry presents a study of the role of carriers in buyer–supplier relationships (Gentry, 1996). Carter and Ferrin investigate the effects of trilateral collaboration on transportation costs for the purchasing, supplier and carrier firms (Carter & Ferrin, 1995). Vural, Göçer and Halldórsson investigate service triads in maritime logistics (Vural et al., 2019), while Heaslip and Kovács examine service triads in humanitarian logistics (Heaslip & Kovács, 2019). However, when categorizing the existing literature on logistics services into the firm, dyad and network levels, Selviaridis and Spring find the network level (e.g. logistics triads), with only 6% of the studies, to be underrepresented (Selviaridis & Spring, 2007).

Increasing pressure for logistics service efficiency laying the basis for logistics platforms

While many intermediaries were involved in logistics service supply chains in the past, today’s customers expect to source all service components, such as customs clearance, documentation, insurance, freight forwarding and warehousing, directly from one service provider (Lai, Cheng, & Yeung, 2004; Özsomer, Mitri, & Tamer Cavusgil, 1993; Panayides, 2006; Van den Berg & De Langen, 2015, 2017; Vural et al., 2019). The requirements for logistics services, including low costs, high reliability and an added value in transport, are increasing (Vural et al., 2019). The efficiency of logistics services is subject to rising pressure (Lin, Pekkarinen, & Ma, 2015). Improving the efficiency of the logistics service supply chain cannot be based on assumptions. Relationships between the buyers and suppliers of goods develop over time, with various consequences for the requirements on logistics services. For logistics service providers, these changes may entail opportunities, if they actively interact with their buyers and suppliers (Andersson et al., 2014). The competitiveness of logistics service providers depends on their ability to collaborate with and create value for their end customers (Panayides & So, 2005). Prior research suggests a focus on the description and analysis of resources, activities and various roles that actors in the service supply chains may adopt in relation to other parties (Dubois et al., 2011). Researchers see a demand for study of the improvement of the delivery and control of the service process (Ellram et al., 2004).

Logistics platforms have evolved to increase the efficiency of logistics services by matching the resources of drivers with shippers (S. Li et al., 2019). Due to new IT possibilities, such as cloud computing (Xiaokun, Lei, & Hanyan, 2019) and blockchain and IoT technologies (Rožman, Vrabič, Corn, Požrl, & Diaci, 2019), logistics platforms have been gaining increasing prominence (Varella & Buss Gonçalves, 2013). These platforms can help to overcome the

problem of information asymmetry to improve the allocation of scarce resources and the efficiency of cost accounting (Xu, Niu, & Cai, 2020).

Case 2: Overcoming visibility barriers to improve risk management in logistics service delivery

Preventing risks is very important in logistics services. The risk management of logistics service providers is an essential part of the sustainability performance of focal companies, as logistics services touch the entire supply chain, from raw material suppliers to end customers (Multaharju, Lintukangas, Hallikas, & Kähkönen, 2017). Business Case 2 refers to a healthcare logistics service provider that focuses on contract logistics for healthcare customers such as hospitals and pharmacies. Services that are conducted for these customers include warehousing, value added services and transport. In the healthcare sector, process security and low defect rates are mandatory. Fulfilling quality requirements, such as not interrupting cold chains, is just as important as short delivery times and high flexibility. Permanent inventory control and continuous batch tracking are crucial for the delivery of pharmaceutical products.

For Case 2, an operations manager has analyzed the visibility of the logistics service supply chain and depicted it in Figure 2. Normally, the logistics provider hires a haulage company to organize the transport. This company often passes on the transport to a carrier, because it does not have its own trucks or because of capacity bottlenecks. Such bottlenecks can be avoided by providing capacity forecasts. Capacity management is thus on the future research agenda for service triads (Wynstra, Spring, & Schoenherr, 2015). In the case of outsourcing the transport to a carrier, a visibility barrier for the logistics provider would exist that may endanger risk management, as shown in Figure 2.

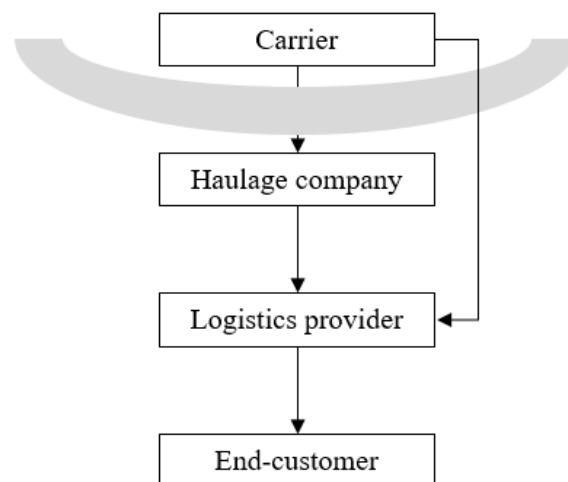


Figure 2: Logistics service supply chain with visibility barrier

Another possible scenario for the logistics provider is booking the transport directly at the carrier (e.g. via a logistics platform). The carrier's truck transports the goods to the warehouse of the service provider or picks them up there. Therefore, the service provider can see the name of the subcontractor of the haulage company and overcome the visibility barrier. Furthermore, an information flow occurs between the service provider and the carrier, because the carrier can ask the service provider for possible arrival times. However, this direct sourcing of logistics services at the carrier requires a certain level of expertise and knowledge by the employees of the logistics provider, because they must take over some activities that the haulage company

has previously done. In addition, direct sourcing does not necessarily guarantee cost savings. Besides, some haulage companies prohibit their customers from doing business with their subcontractors through the use of contractual arrangements. Furthermore, the volumes are often too small to attract carriers for direct business, and complexity would increase exponentially.

Both direct sourcing at the carrier, via logistics platform, and indirect sourcing, via haulage company, have advantages and disadvantages for logistics service providers. Therefore, they may decide case by case whether to involve a haulage company, depending on the relevant objectives and capacity. The two alternative scenarios demonstrate that the number of actors involved in a logistics service supply chain may often change. Hence, supply chain mapping (Gardner & Cooper, 2003) in the context of logistics services is a continuous process requiring market analyses and permanent updates.

Findings for MRO service purchasing

Lack of specialized skills and capacity motivating companies to outsource MRO services

The European MRO distribution market size was valued at US\$ 184.69 billion in 2018 and is anticipated to expand at an annual growth rate of 2.5% during the forecast period. The MRO outsourcing services sector has increased significantly, as a majority of companies have sought to cut costs on inventory and specialized workforces. Large multinational distributors are focusing on meeting various customer needs, in an attempt to provide quality services at affordable prices. Pressure on the manufactures to reduce costs while maintaining product quality has substantially increased the attractiveness of outsourcing MRO services and lowered the barriers for standalone distributors in the region. Machine consumables was the most distributed product category in the market. The high priority of manufacturing companies to get damaged parts replaced and repaired as soon as possible to reduce production loss has remained a key factor responsible for segment penetration. This is further supported by the stringent government norms for regular check-ups and the maintenance of industrial equipment to avoid fatal hazards. The preventive and scheduled segment is projected to be the dominant maintenance type by the end of the forecast period. Equipment breakdown causes the loss of time and money, so to increase profitability along with focusing on improving returns on investment, companies cannot afford to face any breakdown circumstances (Grand View Research, 2019).

Digitalization speeding up the growth of the MRO service market

The digital MRO market is projected to grow from US\$ 1.0 billion in 2019 to US\$ 4.7 billion by 2030, at an annual growth rate of 14.6% over this time. The increasing digitalization of MRO services, to enhance efficiency and reduce machine downtime, is the key factor that is expected to fuel the growth of the digital MRO market. The artificial intelligence segment is projected to grow at the highest annual rate from 2019 to 2030. The growth of this segment can be attributed to increasing demand for predictive maintenance, part failure analysis and troubleshooting (Research and Markets, 2019). The evolution of e-commerce platforms in the recent past has helped market players to achieve higher efficiency and offered them easier access to target

markets. Distribution via e-commerce platforms is expected to bring significant penetration and growth for the market players to almost every end use industry (Grand View Research, 2019).

Purchasing of MRO services in various industries

Prior research has addressed the purchasing of MRO services in various industries. Peng investigated a supply network in the Taiwan military service maintenance industry from the focal company perspective. He states that firms should realize their structural positions in a supply network to secure a central position, which will improve their bargaining power and flexibility in reacting to environmental changes (Peng et al., 2010). Further authors have examined MRO services in the aerospace industry (Rodrigues Vieira & Lavorato Loures, 2016) (e.g. focusing on contracting aero-engine MRO service providers) (Wibowo, Tjahjono, & Tomiyama, 2017). In the aviation industry, MRO services are normally provided during product usage. Airplanes generally have a lifespan of over 30 years, so high profitability can be gained from maintaining and repairing them over the anticipated lifespan (Uhlmann, Bilz, & Baumgarten, 2013; Zhu, Gao, Li, & Tang, 2012). The global aircraft MRO market size, of around US\$ 82 billion in 2019, is expected to grow at an annual rate of 3.4% between 2019 and 2024. In the next five years, the market will accelerate slightly, at an annual growth rate of 3.7%, as the new generation aircraft reach the stage when life-limited parts need replacement and the number of other scheduled maintenance events rises. With this growth in the commercial aviation industry, the supporting MRO market is also expected to grow. Total MRO spend is expected to rise to US\$ 116 billion by 2029. Aside from the growth in the fleet, the increase will be driven by more expensive maintenance visits and technological enhancements (Cooper, Reagan, Porter, & Precourt, 2019). E-procurement and platforms, such as Skywise by Airbus, may positively impact purchasing MRO services in the aviation industry (Basak, 2016; Foroughi, 2008; Haile & Altmann, 2016; Herterich, Uebernickel, & Brenner, 2015; Jalil, Abu Bakar, Khir, & Fauzi, 2017; Michaelides, Ho, Boughton, & Kehoe, 2010; Yu, Mishra, Gopal, Slaughter, & Mukhopadhyay, 2015).

Case 3: High visibility into the MRO service network facilitating competitive purchasing

Table 2 provides an overview of the six interviews conducted to investigate MRO service purchasing in the chemical, consumer good and automotive component industries. As the intentions of service providers and producers may diverge, we decided to interview both groups.

Firm type	Producer	Producer	Producer	Producer	Service provider	Service provider
Industry	Chemicals	Consumer goods	Chemicals	Automotive components	Chemicals, pharma, biotech	Chemicals, engineering, military...
Turnover	\$70 bn.	\$22 bn.	\$3 bn.	\$130 m.	\$1 bn.	\$110 m.
MRO spend	n/a	n/a	n/a	\$3 m.	\$100 m.	50% of contracts
Function	Team leader indirect procurement	Team member MRO Europe	Procurement specialist	Category manager indirect spend	Head of MRO & IT purchasing	Head of strategic purchasing

Expertise	>20 yr. purchasing	5 yr. in function, 25 yr. purchasing	4 yr. purchasing	15 yr. indirect purchasing	1 yr. at firm, >10 yr. MRO	15 yr. strat. purchasing, 40 yr. purchasing
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Table 2: Overview of MRO interview partners

According to the interview partners, visibility into the service network is generally high, because service purchasers select the service suppliers themselves. However, service supplier data must be continuously updated. High visibility into the network structure can provide information about market power and development, offers and trends and serve as an early alert warning system. Visibility is important for service providers to detect whether service suppliers also collaborate with their own customers directly and hence might evolve into direct competitors of the service providers. The possibility of volume bundling is another advantage of high visibility. It is possible to bundle volumes if the same supplier can offer several services: Is the electrician a locksmith, too? Can he work at different plants within the same company? Innovative purchasing practices can lead to savings of up to 30% for MRO services (Mulani, 2008). Moreover, high visibility into the service network is critical to enable the local sourcing of MRO services: service suppliers should be selected according to the locations of their customers, as travel costs are a primary cost driver of MRO service expenses, representing about 50% of costs. This differentiates MRO service purchasing from the purchasing of production materials, which focuses on global sourcing to lower manufacturing costs. While global sourcing might make sense for some low value functions such as call center services (Elia, Caniato, Luzzini, & Piscitello, 2014), this is not the case for MRO services. Furthermore, the interview partners stated that visibility can depend on the individual service. The chemical producer, for instance, allows its MRO service provider that he may involve only one single sub-supplier after contracting. He does not however track the identity of this sub-supplier, so full visibility is lacking.

Visibility is less critical for MRO services, as they can be sourced on a polypolistic market: many MRO service suppliers aim at gaining business, leading to high price competition. Hence, a Plan B or the option of double sourcing for critical services in terms of risk management will always exist. Nevertheless, professional risk management is necessary, because the costs and duration of services cannot be entirely calculated from the outset. Moreover, adequate financial monitoring and the surveillance of adhering to work laws and codes of conduct is essential when purchasing MRO services. Risk management is on the future research agenda for service triads (Sengupta, Niranjana, & Krishnamoorthy, 2018; Wynstra et al., 2015). According to the interview partners, a dedicated mapping of the supply chains is not necessary for MRO services, although the purchasing process must be documented in detail, including all relevant insurance and certificates.

Each competitor has its own portfolio of service suppliers. The purchasers may not actively ask for competitors' suppliers, due to cartel law. However, due to high expertise and know-how, purchasers usually know the primary suppliers used by competitors, particularly regarding specific machines. Without actively disclosing service supplier names, producers can see which companies use which service suppliers (e.g. by the branding on the suppliers' business vehicles

entering competitors' production sites). Furthermore, service suppliers sometimes mention other customers, because they want to bundle their customers geographically (chemical firms are often located next to each other in the same chemistry park). Even though they may know that they share a service supplier with a competitor, as illustrated in Figure 3, they do not know competitors' prices. Moreover, visibility would be helpful regarding reaction times: if two producers use the same machine, and they break down at the same time, it may be questioned who will get the electrician first and whether the supplier treats one competitor preferentially.

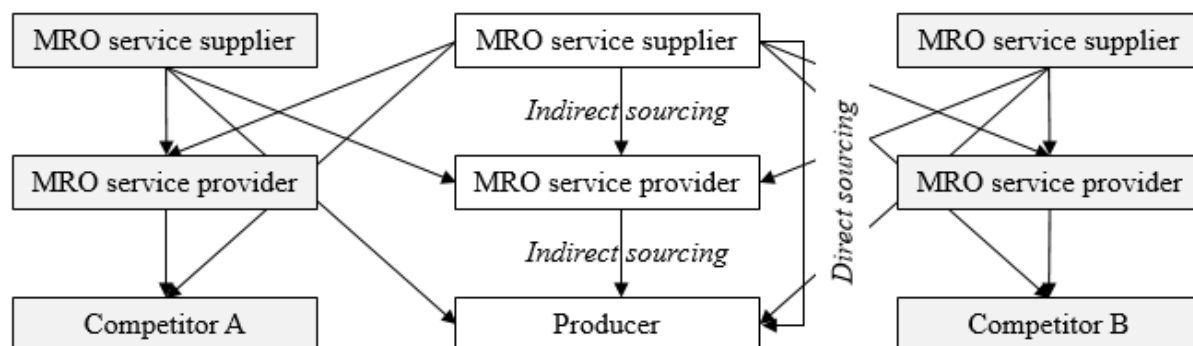


Figure 3: Direct vs. indirect sourcing in the MRO service network including competitors

Advantages for direct vs. indirect sourcing of MRO services

The interview partners indicated that they utilize both direct and indirect sourcing for purchasing MRO services. In case of the consumer goods producer, the purchaser uses 20% internal staff and service suppliers, to avoid production disruptions by accepting the fixed salaries of this staff, 10% service suppliers of the original machine manufacturer and 70% third-party service suppliers. The supplier awarding decisions and pre-tests occur on cross-functional teams, involving purchasers, technicians and other functions. Price is not the most important argument, as the comparability of service supplier offers is difficult. Hence, a service supplier might list higher hourly wage rates but require less hours in total because they are more productive. Contracts are negotiated for simple and repetitive services, such as painting work, with a duration of 1–5 years. After that period, most contracts are renewed with the same suppliers, to avoid a lack of know-how. However, this procedure gradually reduces the know-how of the producer, and switching to an alternative supplier becomes nearly impossible. Switching costs are at least as high for services as for goods (Jackson et al., 1995).

The decision in favor of direct sourcing is often made to ensure the quality and reliability of goods and services associated with high value critical equipment and high complexity. Producers prefer direct sourcing if they have enough capacity and know-how to select and contract the suppliers themselves. They select suppliers directly to profit from cost advantages and higher flexibility. Sometimes, the maintenance of a machine must inevitably be done by its original manufacturer, due to contractual obligations, as in the case of gas turbines for energy.

In contrast to the producers, the request for indirect sourcing via service providers is increasing, according to the service providers. They mentioned the following reasons: a lack of know-how and capacity for MRO purchasing among the producers, access to a higher range of service suppliers for RfQs, less effort for the tendering process and outsourcing of the responsibility of

MRO service purchasing, including conflict management with the service supplier. Moreover, the service provider must arrange specific certificates that are necessary to conduct business (e.g. maintenance services in a chemical plant). Receiving enough offers for simple goods and services is not an issue, as the producers receive many applications from service suppliers due to the polypolistic market structure. Moreover, producers often have internal lists of preferred suppliers, from supplier evaluations, for example. Some producers use supplier catalogues or platforms for service procurement, such as the FUTURA® Collaboration Platform.

To select between direct service sourcing from a service supplier and indirect sourcing via a service provider, the interview partners listed the following aspects: first, the volume of the respective service might be a decision criterion, in the sense that direct sourcing may be applied for smaller services, whereas large service packages may be outsourced and procured indirectly. Moreover, all interview partners agreed that the professionalism of service purchasing depends on the size of the company: the larger the company, the more volume bundling is possible, which helps to avoid too many service suppliers entering the company's production facility. Furthermore, the service purchasing must align with the relevant purchasing strategy for each commodity, such as multiple, local or global sourcing. In addition to an adequate decision being made between direct and indirect sourcing, the interview partners emphasized that lean processes, digitalization and supplier catalogues with fixed prices can further improve service purchasing.

Conclusions and future research

High visibility adding distinct values to the purchasing of IT, logistics and MRO services

In this study, we have investigated the purchasing of IT, logistics and MRO services. High visibility adds different values to the purchasing performance in the three cases, as presented in Table 3:

Service type	IT	Logistics	MRO
Customer industry	Railway	Pharma & healthcare	Primarily chemicals
Market features	Outsourcing to IT freelancers	Outsourcing to carriers	Polypolistic market
Scope of analysis	Service supply chain	Service supply chain	Service network including competitors
Approach	Supply chain mapping	Supply chain mapping	Supply network mapping
Degree of visibility	High	Visibility barrier	High
Performance impact	Cost savings	Risk management	Competitive purchasing

Table 3: Results of service case studies

While the visibility in the examined IT and MRO cases is high, a visibility barrier was detected in the logistics case. The degree of visibility corresponds to the level of customization, indicated in Table 1: as the IT and MRO service cases display high levels of customization, visibility also tends to be high. Direct contact occurs between the IT freelancers and the service suppliers of machine maintenance and their respective end customers.

In the first business case, high visibility and the mapping of the IT service supply chain (Gardner & Cooper, 2003) lead to large cost savings for the railway company. In the second logistics case, visibility helps to mitigate the transport risk in the logistics service supply chain in the healthcare industry. Finally, our interview partners for MRO services indicate the importance of high visibility in the chemical industry, including supplier–competitor relationships for competitive purchasing. Hence, the approach and scope of analysis concentrate on the service supply chain for the IT and logistics cases, while the entire supply network and its mapping (Kappel et al., 2020) are in focus of the MRO service case.

Similarities in purchasing direct material and services contributing to PSM literature

Little but increasing research regarding service supply chains (Giannakis, 2011; van der Valk & van Weele, 2010) or the purchasing of services (van der Valk & Rozemeijer, 2009; van der Valk et al., 2005) has occurred to date. The current PSM literature still concentrates primarily on production materials and lacks appropriate service purchasing strategies. Hence, our research makes valuable theoretical contributions.

Our study investigates the challenges involved in service purchasing and provides suggestions for its improvement. In this context, we analyze the impact of visibility into the service network and determine that it may help to improve purchasing performance. Although significant differences exist between the characteristics and purchasing of production material and services (Jackson et al., 1995; van der Valk & Rozemeijer, 2009), some purchasing levers, such as direct sourcing to optimize IT and MRO service purchasing (see Figures 1 and 3) and their performance impacts, turn out to be relevant for both the production of materials and services. This result may encourage future researchers to examine not only the differences but also the similarities between the supply network and purchasing activities of direct material and services.

Presented cases helping managers improve their purchasing efficiency and performance

While the purchasing of direct materials is often already highly optimized by companies, the purchasing of indirect material and services has not been sufficiently in the focus of strategic purchasing in the past. Various studies have detected a low level of competence in service purchasing (van der Valk & Rozemeijer, 2009). In many companies, services are regarded as non-strategic and are purchased via maverick buying without the involvement of the purchasing department (Karjalainen et al., 2008; Rothkopf & Pibernik, 2016; van der Valk & Rozemeijer, 2009).

Purchasing managers can profit from the results of our case studies to better understand their service networks and improve their purchasing performance. Indirect spend is expected to be the next significant area of value enhancement for organizations (Avery, 2016; Grace, 2019;

Purchasing & Procurement Center, 2012; Tunisini & Sebastiani, 2015; Weissman, 2016). Its cost reduction potential has also become evident in our study. We have presented the advantages of direct sourcing from service suppliers versus indirect sourcing via service providers. Increasing the visibility into the service network can significantly improve cost savings performance and help service purchasers to mitigate risks and monitor their own customer statuses at suppliers to remain competitive. Systematically collecting and sharing information about the service network is thus mandatory to profit from these advantages and improve process efficiency (Drzymalski, 2012; Dubois et al., 2011), which implies that maverick buying should be avoided.

Future research may enlarge the choice of services and industries and add quantitative rigor

The limitations of our study concern the selection of service types and industries. Due to increasing digitalization, outsourcing, globalization and spend development, we chose the IT, logistics and MRO service sectors for our research. Our results are thus limited to these service types and might differ for other B2B services, such as marketing or construction. High visibility will likely be irrelevant for other service types. Moreover, the industries represented in our research are the railway, healthcare and chemical sectors, due to the existing data access and application cases. To enhance these results, it would be helpful to analyze the purchasing of services in additional industries, such as MRO services in aviation. Furthermore, more complex service networks, with more involved actors, exist beyond those introduced in this paper. We encourage future researchers to investigate the benefits that high visibility might exert on these networks.

In our study, we chose an exploratory–qualitative research design to obtain first indications that visibility into service networks indeed has a positive impact on purchasing performance. However, quantitative follow-up research is necessary to increase the generalizability of these findings gathered from single case studies and interviews.

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