Understanding outsourcing strategy within the intellectual property industry – a proposed typology

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Abstract: Outsourcing has gained much importance in managerial practice and academic discussion. This paper investigates the phenomenon of outsourcing knowledge-based work, particularly of intellectual property (IP). Using data from 36 cases, the analysis reveals a distinct typology of IP outsourcers based on a cost model and the firms’ IP outsourcing strategy. Four in-depth case studies are analysed: non-outsourcer transaction cost outsourcer, expertise outsourcer, and strategic outsourcer. The differentiated analysis reveals trade-offs and both positive and negative effects of the IP outsourcing strategy. We suggest that firms need a differentiated approach based on the type of IP work (legal versus non-legal) and outsourcing breadth (number of outsourced IP services) to manage intellectual property rights (IPR) with external suppliers most efficiently. We conclude by providing practitioners five important lessons for the outsourcing of IP activities.

Keywords: intellectual property; IP; management; outsourcing; patents; IP typology.


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1 Introduction

Managing a corporation’s intellectual property (IP), and its patents in particular, has become a challenge in strategic planning, research and development, and other corporate functions related to innovation on a global scale (Gassmann and Bader, 2006). IP as a strategic and cross-functional topic creates the need for intelligent and efficient ways to manage intellectual property rights (IPR) within the organisation. Studies on the organisation of IP focus mostly on the internal organisation of IP: for example, Daizadeh (2007) proposes an IP integrated management system (IPIMS) to take advantage of the unique position of the IP department, and Carlsson et al. (2008) propose a semi-centralised organisational structure which ensures a reasonable depth of IP knowledge by creating a centralised IP team while sharing costs among divisions. However, there remains a need for research on how firms manage their IP concerning vertical integration. Outsourcing is not a new phenomenon within the IP department. The first outsourcing providers in the IP industry were established in the late 1960s. The highly specialised legal aspects of IP regulations created a niche market for external suppliers such as law firms and specialised IP service providers. Still, many firms are unsure about which IP tasks should be outsourced and which should be kept in-house. Somaya (2012) summarises the existing literature on strategic patenting and identified opportunities to address important unanswered research questions, such as those concerning the interplay between the firm’s internal resources and its externally available capabilities with suppliers, and the hiring and development of expert patent managers and attorneys. Particularly little theory exists on how firms strategically use and organise IP outsourcing (Ayerbe et al., 2014). The present study contributes to the IPR literature in three ways. First, several authors highlight the lack of recent studies on IPR management on a firm level (Ayerbe et al., 2014; Somaya, 2012; Candelin-Palmqvist et al., 2012). They point out that the majority of published studies focus on macro-level and secondary data, and encourage and call for more qualitative studies to answer the how and why questions related to IPR management. Our article fills this gap by studying the IP outsourcing phenomenon based on case studies, and by identifying the implications of outsourcing for IPR management. Secondly, we extend current theory by providing an IP outsourcing typology describing firms’ outsourcing strategies. In particular, we discuss aspects of firms’ boundary choices revealing trade-offs between costs and capabilities associated with IP outsourcing. Also other motivations, such as obtaining ideas and concepts from outside partners, or developing different conclusions and views on the same idea can play an important part. Finally, regarding content, only recently have studies with a particular focus on IP outsourcing been published. The main contributions
to be mentioned are: Reitzig and Wagner (2010) highlight the hidden cost of outsourcing, Mayer et al. (2012) study the development of various types of human capital and their impact on legal services outsourcing and Moeen et al. (2013) study the factors that influence the concentration of a firms’ supply portfolio of outsourced prosecution work. All these studies centre on the outsourcing of patent filings, patent prosecution, and the organisation of IPR using external patent law firms. The present paper fits well into the published literature but extends the work to include legal and non-legal IP work provided by law firms and other IP suppliers, such as IP service providers. The paper aims to gain a deeper understanding of why firms decide to outsource IP related work, what challenges firms face with regard to the outsourcing of IP work, what kind of outsourcing strategies they pursue, and what managerial implications these strategies have for IPR management. As transaction costs and capabilities are the main underlying theories of outsourcing (Williamson, 1987; McIvor, 2009) we develop an IP outsourcing typology based on an IP outsourcing cost framework, which we discuss based on case studies of Air Liquide, Cuboro, Siemens, and Schindler.

The paper is structured as follows: in Section 2, the theoretical framework and an IP outsourcing cost model are presented. Section 3 discusses the research methodology and describes the firm sample. In Section 4, we develop the IP outsourcing typology and discuss its characteristics based on four cases each of which relates to one ‘ideal type’ from the typology. Finally, theoretical and managerial implications are discussed, and we conclude by providing a brief overview of further research possibilities.

2 Theoretical framework

2.1 Literature review

In today’s fast moving environment, firms are facing challenges of globalisation and high cost pressure. One of the most known management strategies in response to demands for more efficient ways to address organisational competitiveness is outsourcing. Prior research suggests that firms can improve their innovative and financial performance by interacting with different suppliers (Garcia Martinez et al., 2014). Most outsourcing studies refer to the outsourcing impact as a conceptual combination of cost reduction, productivity growth, and profitability improvement approaches. Companies are concentrating on their core competencies and are thus choosing the outsourcing solution rather than the in-house one. Firms externalise a wide range of activities, ranging from product design to assembly, from research and development to marketing, distribution, and after-sales services (Ho, 2009). The main motivation for outsourcing is still cost reduction, which is achieved through economies of scale and the unique expertise that a large outsourcing supplier can deliver (Anderson and Weitz, 1986).

Today a major driver for outsourcing is specialisation. Firms contract out services with the objective of smoothing production cycles and benefiting from specialisation. Companies producing the entire value chain in-house are rather an exception. In many industries such as manufacturing or automotive, a shift towards specialised component suppliers delivering component modules and solutions is ongoing. Managing IPR requires specific capabilities: for instance, technologists focus on IP generation, while
attorneys focus on IP protection. Reitzig and Wagner (2009) empirically show that a firm’s performance in turning patent applications into patent grants increases linearly with the rate of outsourcing of patent applications to external law firms. Major specialisation advantages of the external lawyers are likely to account for this finding. The study of Moeen et al. (2013) adds further insights into the highly specific nature of IP and the challenges of managing the outsourcing of IP. They examine factors that influence the concentration of a firm’s supply portfolio for IP legal services. One finding of their study is that the concentration of the outsourcing of patent filing activities is closely linked to high firm specificity, outsourcing reliance and domain focus thus knowledge-based service outsourcing tends to reinforce itself. Another important contribution is the study of Mayer et al. (2012). These authors distinguish three types of human capital relevant for knowledge work activities: firm-specific human capital, industry-specific human capital, and occupational human capital. They conclude that firms prefer to outsource knowledge work in highly contested areas, e.g., to specialised suppliers.

Nevertheless, research on outsourcing has also presented contradictory findings, e.g., R&D outsourcing is associated with a high risk of information leakage (Ho, 2009). Also, several authors highlight that managers walk a fine line with their firm boundary choices: excessive outsourcing can ‘hollow out’ the firm’s knowledge base, and can decrease organisational learning (Mayer et al., 2012; Reitzig and Wagner, 2010). On the other hand, outsourcing is associated with increasingly geographically dispersed sources of innovation (Mahnke et al., 2008), a tendency to include a greater number of technologies per product class (Brusoni et al., 2001), and increased product development speed (Tran et al., 2011; Mahnke et al., 2005). Throughout this paper, we define IP outsourcing as a significant contribution by external IP intermediaries associated with specific IP activities and services. Our notion of IP intermediaries such as IP service providers or IP law firms is an organisation (firm) that directly offers or facilitates patent services, and functions as a service mediator between patent owners, patent offices, and other IP intermediaries such as patent law firms and attorneys. Consequently, the outsourcing of IP related activities is far more than a simple purchasing decision. Firms face within their boundary decision trade-offs particularly regarding their IP outsourcing decisions, which we conceptualise and discuss in the next section.

### 2.2 A cost model of IP outsourcing

Several theoretical arguments have been used to explain outsourcing, e.g., property rights (Coase, 1937), principal agency (Ross, 1973), transaction costs (Williamson, 1987), and more recently, the resource-based view (RBV) of the firm (Barney, 1991). These classic theories have shaped the understanding of the vertical integration of the firm and frame firms’ make-or buy-decisions. The ‘buy decision’ is preferred if the firm’s advantages from using external markets and benefits from supplier economies of scale and specialisation outweigh risks such as the loss of knowledge (Somaya, 2012). According to transaction cost economics (TCE), three critical factors determine the level of transaction costs: frequency of transactions, uncertainty, and asset specificity (Williamson, 1987). Asset specificity plays a particularly important role in managing IPR because it involves knowledge of both legal and technological nature. For instance, strategically developing a patent portfolio requires a high level of technological domain expertise, but also legal expertise to file and enforce these patents (Ernst, 2001; Lerner,
The RBV considers resource heterogeneity as the antecedent to performance and diversification. Resources that are rare, valuable, non-imitable, and not substitutable enable firms to achieve sustainable competitive advantage (Barney, 1991). It is expensive and time consuming to develop resources. Therefore, RBV arguments propose that firms should only outsource those activities which are not critical to competitive advantage (Odagiri, 2003). McIvor (2009) argues that neither TCE nor the RBV alone can fully explain the complexities of outsourcing. In line with McIvor (2009) and Ayerbe et al. (2014), we suggest a complementary approach based on capabilities to address the new ways of managing IPR via outsourcing. As organisations increasingly outsource more critical IP activities such as filing, enforcement, trading and licensing, they are seeking to leverage a greater level of value from the outsourcing partner. As mentioned, IP activities are complex in nature and therefore capabilities and prior experiences play a critical role in the outsourcing decision. Another aspect is that IP intermediaries are working for numerous firms in various industries. These experiences are of additional value to their customers and knowledge can be transferred from the IP intermediary to the client. We base our study on the combined approach developed in the analytical framework by McIvor (2009) to understand firms’ IP outsourcing strategies. This combined approach (comprising TCE and RBV) is based on transaction costs, which are centred on organisational arrangements and their modes of governance, and capability analysis of the firm’s performance based on its know-how and resources. At the same time, outsourcing shows negative effects: Risks include loss of control, declining rate of innovation, low performance, or other hidden costs including loss of key employees and relevant knowledge (Earl, 1996). The optimal degree of IP externalisation can be described in a formal cost model. We identify two basic types of cost curves, service costs (Cs) and coordination costs (Cc). Cs represents the cost curve for providing the service, and Cc represents the cost curve for coordination. There is a trade-off between the lower service costs and higher coordination costs associated with outsourcing. The service costs for IP services (Cs) are driven by factor costs, costs of achieving efficiencies, costs of gaining IP knowledge, costs of losing absorptive capacity. Factor costs (FA) are costs of labour, material, and capital. Gaining efficiencies have a positive effect on service costs. Major factors for achieving efficiencies (EF) are process and infrastructure efficiencies. Well defined and stringent processes optimised by sophisticated information systems (IN) enable maximum automation of process steps. This enables a scale-up of the service volume at the same for low additional fixed costs. Another cost driver is the costs of gaining IP knowledge (KN). Assuming learning by doing has a positive impact on service costs, a firm that outsources its IP activities may lose much of its IP knowledge over time. The erosion of the firm’s IP expertise will increase the firm’s marginal IP service costs (Cha et al., 2009). Consequently, higher outsourcing rates reduce the firm’s learning-by-doing experience. Learning by doing increases a firm’s absorptive capacity (Cohen and Levinthal, 1990). Therefore an increased outsourcing rate may lead to learning traps (March, 1991) and thus create costs associated with losing absorptive capacity (AB). However, on the other hand, there is the possibility that the firm acquires new and useful service knowledge from its highly skilled and specialised outsourcing supplier. Ketata et al. (2015) recommend for companies to follow an open culture that allows exposure to a diversity of external knowledge sources, such as a company’s suppliers who may contribute new ideas and
suggestions, which could help companies to be proactive and to prevent them from missing important opportunities in their business environment.

Coordination costs for IP services (Cc) include selection and contracting, costs for infrastructure, costs for monitoring, costs for lack of relatedness, relationship, and cultural costs. Unlike service costs, these coordination costs are independent of the scale of the services. The higher the outsourcing rate, the higher coordination costs between the firm and the supplier. The selection and contracting (SE) of the outsourcing supplier plays an important role. Due diligence in the assessment of several suppliers identifies which fits best. This is particularly important if information asymmetry and knowledge gaps are large between outsourcer and vendor. Therefore, firms are faced with agency costs associated with structuring, monitoring, and enforcing the contract. Investments in infrastructure (IF) between the outsourcer and the supplier are often needed to master the challenge of system integration and harmonisation of the activities. The organisational monitoring costs (MO) for management and quality control have a high impact on coordination costs. Monitoring costs and costs for quality control increase with an increasing outsourcing rate. Equally important is the degree of relatedness between the IP outsourcer and the supplier. According to Dyer and Singh (1998), a high degree of strategic relatedness results when the focal firm and specialised firm share common or similar knowledge sharing routines. Knowledge sharing routines are defined as regular patterns of interaction that permit the transfer, assimilation, and integration of new knowledge (Park and Lee, 2014). A lack of knowledge-sharing routines (KN) increases coordination costs. For successful IP outsourcing, a deep and trusting relationship between the outsourcer and the supplier should also be established. Accordingly, relationship costs (RE) are incurred to enhance partnership quality. Partnership quality is determined by participation, joint action, communication quality, information sharing, age of the relationship, mutual dependence, top management support, and culture similarity (Lee, 2001). Cultural costs (CU) are associated with the adaptation processes employed by outsourcer and supplier to develop common organisation and work practices. Cultural similarity is determined by similarities in factors such as corporate values, organisational structure, reward and incentive systems, leadership styles, decision-making processes, corporate history, and the like (Dyer and Chu, 2000). Hence, the total costs of IP outsourcing, CT, can be summarised by the two cost aggregates: service costs CS and coordination costs CC.

\[ C_T = C_S(FA, EF, IN, KN, AB) + C_C(SEC, IF, MO, KN, RE, CU) \]

Service costs \( C_S \) decrease with increasing outsourcing rates, whereas coordination costs \( C_C \) increase with increasing outsourcing rates. The outsourcing rate \( r \) of a firm is the quantity \( q \) of IP services that the firm decides to outsource to external IP suppliers relative to the total quantity of IP services. The optimal outsourcing rate \( r^{*} \) is at the minimum \( C_{T^{*}} \) of the total cost curve \( C_T \), which is the sum of \( C_c \) and \( C_s \). Figure 1 illustrates, in simplified form, the cost curves as a function of the outsourcing rate. The mathematical formulation is only an attempt to explain the observed relation between the cost aggregates and their behaviour towards the total costs of IP outsourcing. There are limitations due to the complex nature of IP outsourcing, and impacting factors that cannot be determined exactly.
Figure 1  Minimal outsourcing cost at optimal outsourcing rate (see online version for colours)

3 Research methodology and firm overview

As we have noted, questions concerning how firms outsource IP related work have been addressed to only a small degree in the existing research. Most studies focused on analysis of outsourcing based on transaction costs and capabilities. With the exception of Ayerbe et al. (2014), outsourcing has not been studied with a particular focus on IP. Since our research goal is to understand firms’ IP outsourcing strategies, we use a qualitative research approach, employing case studies. The case study approach is an appropriate research tool when boundaries between phenomena have not yet been clearly identified (Yin, 1994). To precisely study distinct outsourcing strategies associated with IP related work, we use data from an internal patent database of an IP service provider. This service provider offers IP related services along the life cycle of a patent (e.g., filing, prosecution, renewal and other legal and non-legal services). First, we select from this database 36 companies (‘clients’) that hold European patents and are contracting out IP related tasks to third parties (IP service providers, law firms, IP software providers). Second, we use archival data gathered from the Espacenet database of the European Patent Office. This allows us to validate the service provider’s data and obtain further information, such as the firm’s total patent portfolio size. Third, we conduct 18 semi-structured interviews with managers from different areas, including CTOs, IP managers and IP experts, to deepen our understanding of how firms handle IP outsourcing. This allows us to receive information about the organisation, the IP relevant firm strategy and the IP outsourcing strategy in specific. We complete the data gathering using secondary research, analysing corporate annual reports, and company journals. Four companies are selected and analysed using standard procedures for qualitative analysis (Eisenhardt, 1989).
Table 1: Overview of companies

<table>
<thead>
<tr>
<th>Firm size (number of employees)</th>
<th>Overall in % (absolute)</th>
<th>IP outsourcing breadth</th>
<th># patents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low (%)  Moderate (%)  High (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–100</td>
<td>22.2 (8) 35.3 (6) 12.5 (2)</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>101–1,000</td>
<td>5.55 (2) 5.9 (1) 6.3 (1)</td>
<td>1,356</td>
<td></td>
</tr>
<tr>
<td>1,001–5,000</td>
<td>13.8 (5) 11.8 (2) 6.3 (1) 67.7 (2)</td>
<td>1,589</td>
<td></td>
</tr>
<tr>
<td>&gt;5,000</td>
<td>58.3 (21) 47.1 (8) 75.0 (12) 33.3 (1)</td>
<td>93,940</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100 (36) 47.2 (17) 44.4 (16) 8.4 (3)</td>
<td>96,935</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Firm size (number of employees)</th>
<th>AT (%)</th>
<th>CH (%)</th>
<th>PH (%)</th>
<th>MA (%)</th>
<th>EL (%)</th>
<th>TC (%)</th>
<th>OTH (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–100</td>
<td>33.3 (2)</td>
<td>40.0 (2)</td>
<td>20.0 (1)</td>
<td></td>
<td></td>
<td></td>
<td>27.3 (3)</td>
</tr>
<tr>
<td>101–1,000</td>
<td></td>
<td>20.0 (1)</td>
<td></td>
<td>20.0 (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,001–5,000</td>
<td>16.7 (1)</td>
<td>20.0 (1)</td>
<td>20.0 (1)</td>
<td>50.0 (1)</td>
<td></td>
<td></td>
<td>72.7 (8)</td>
</tr>
<tr>
<td>&gt;5,000</td>
<td>100 (3)</td>
<td>50.0 (3)</td>
<td>40.0 (2)</td>
<td>60.0 (3)</td>
<td>50.0 (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8.4 (3)</td>
<td>16.7 (6)</td>
<td>13.9 (5)</td>
<td>13.9 (5)</td>
<td>5.5 (2)</td>
<td></td>
<td>30.5 (11)</td>
</tr>
</tbody>
</table>

Notes: AT: automotive; CH: chemistry; PH: pharmacy and biotech; MA: machinery; EL: electronics; TC: telecom and OTH: other. Outsourcing breadth is expressed as the number of IP related services outsourced to an external IP service provider. Low equals 1, moderate equals 2, high equals more than 3.

Cases are not chosen at random; rather we select those that would provide the most detailed information and exemplify extreme situations and polar types. As Pettigrew (1990) notes, given the limited number of cases that can usually be studied, it makes sense to choose cases such as extreme situations and polar types, in which the process of interest is ‘transparently observable’. We select the cases based on firms’ outsourcing breadth and outsourcing strategy. We define outsourcing breadth as the number of different IP services purchased from external service providers or law firms, and categorise this variable into low, medium and high (low: 1 service outsourced, moderate: 2 services outsourced; high: 3 services outsourced). Although Reitzig and Wagner (2010) use outsourcing rate (also referred to as outsourcing intensity – the number of externally drafted patent applications relative to the total number of applications filed by a firm) for their study, we suggest that outsourcing breadth provides additional insights into how firms define their outsourcing strategy in regard to vertical integration. While the outsourcing rate provides information about the degree of outsourcing within one service category, the outsourcing breadth sheds some light on strategic and management aspects of sourcing various services. Firms that outsource several services have to select, manage and steer those in an efficient way. Many firms use a set of suppliers to outsource their IP work. As previous research highlights, dealing with external IP suppliers, such as patent attorneys, law firms or other IP vendors, firms need to access the most competent suppliers in each technology area (Moeen et al., 2013; Sützeroğlu-Melchiors et al., 2017). Table 1 provides a brief overview of the size, patent portfolio, and industry of the firms in our sample. The sample is clustered by firm size expressed by number of employees (small enterprises up to 100 employees, companies from 101–1,000 employees, companies with an employee size of 1,001–5,000, and large corporations with an
employee size >5,000). To further describe the 36 companies, we position all companies in the sample within an IP outsourcing matrix, which is depicted in Figure 2. The vertical axis represents the firm’s outsourcing spending (at the time of data extraction), while the horizontal axis reflects the firm’s number of patents covered by outsourced services (granted European patents at the time of data extraction). For illustration purposes we log both axes. The positioning of the companies has been verified by five experts of an IP outsourcing vendor to cross-check the validity and appropriateness of our evaluation. We limit our analysis to the following IP services: patent renewal services, patent filing services for European patents, and IP software services. This limitation is employed because, first, we are using data from an outsourcing vendor, and second, because neither of these services requires a registered European patent attorney to represent patentees in proceedings at the EPO (see Article 133, European Patent Convention). This means that the firm’s outsourcing decision is not restricted by legal regulations or institutional requirements for such IP services. As mentioned, we extend present research by analysing firms’ outsourcing of legal and non-legal IP work and by focusing on patent breadth to gain a deeper understanding of firms’ overall IP outsourcing strategies. In our sample, patent breadth is large if all three IP services are externalised, medium if two of three IP services are externalised and small if one IP service is externalised (as illustrated by the size of the bubbles in Figure 2).

Figure 2  IP outsourcing-matrix (see online version for colours)

4 Towards a typology of IP outsourcing

As mentioned above, we analyse 36 firms, which outsource IP work (patent annuities, patent filings, IP software and docketing services) to external suppliers. The next step involves using this empirical data and select four cases to answer fundamental questions
of this research: how do firms outsource IP work? What is their IP outsourcing strategy? What kind of typologies can be identified? Figure 2 illustrates the extent to which each company uses external IP services. For instance, Medtronic has a large patent portfolio but externalises little IP work (low outsourcing spending, high outsourcing breadth), while Boehringer Ingelheim has also a large patent portfolio but externalises extensively (high outsourcing spending and breadth). The results suggest that firms pursue dedicated IP outsourcing strategies, which we endeavour to analyse through our case studies. To understand firms’ outsourcing decisions and assess similarities and differences between the cases, we extend the IP outsourcing matrix by adding quantitative and qualitative criteria. Eisenhardt (1989) suggests that results of case study research should be compared to the framework of current theory. Therefore, we use our theory implications and qualitative findings to define and validate a typology. Firms outsource a variety of IP services; however, legal and non-legal IP services require different skills and resources. To address this issue, we identify an IP outsourcing typology which consists of two dimensions: IP complexity and IP capabilities. Both dimensions define the outsourcing typology. In line with previous studies (Somaya, 2012; Moeen et al., 2013; Li, 2011) our study highlights that firms have to develop capabilities to manage IP services with a set of external suppliers. Particularly for IPR management, a firm’s outsourcing choice is made on a portfolio or project level: for instance, firms outsource annual renewal payments for an entire portfolio and not only for a single patent. Similarly, IP recordals (when an IP right has to be reassigned or recorded, i.e., in case of mergers and acquisitions) are outsourced on a project level and not on a single transaction level. Consequently, the primary question is not how much IP work is outsourced, but rather what kind and how many IP activities are outsourced (outsourcing breadth). The firm’s outsourcing strategy is driven by IP complexity, or by the availability of IP capabilities. More precisely, we operationalise the IP complexity dimension as a function of IP task complexity and IP structural complexity. IP task complexity is defined by the number of patents, country coverage, and scope of IP tasks. We submit that IP task complexity increases with the number of patents, number of countries, and diversity of IP scope. IP structural complexity comprises size of the organisation and number of IP sites. We suggest that IP structural complexity is higher if a firm’s organisational size and number of IP sites are larger. Thus IP complexity can be formally summarised as $IPC = f(number \ of \ patents, \ country \ coverage, \ scope \ of \ IP \ tasks, \ IP \ organisation, \ number \ of \ IP \ sites)$. In addition, it requires specific capabilities to manage IP rights (Mayer et al., 2012; Ayerbe et al., 2014). In this context, Somaya (2012) refers to ‘patent management capabilities’, which require specific occupational human capital. This type of human capital is essential for projects in highly contested areas. Therefore, we use IP capabilities (resource and know-how) as second dimension which defines IP outsourcing typologies, as shown in Figure 3. The IP complexity and IP capabilities dimensions are differentiated into high and low values, and consequently, when combined, result in four classifications. Based on our exploratory research we identify four basic types of IP outsourcers:

1. transaction cost outsourcer
2. non-outsourcer
3. strategic outsourcer
4. expertise outsourcer.
Table 2 shows selected cases per type by comparing industry, size (number of European patents), and IP outsourcing strategy. Derived from our case analysis, we can identify distinct IP outsourcing strategies such as gaining scale without mass (Leavy, 2004), complementary outsourcing, knowledge-based outsourcing, or in-house handling.

Table 2  Case studies

<table>
<thead>
<tr>
<th>Case</th>
<th>Company</th>
<th>IP outsourcing strategy</th>
<th>#European patents (2013)</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Air Liquide</td>
<td>Scale without mass</td>
<td>3.288</td>
<td>Chemicals</td>
</tr>
<tr>
<td>2</td>
<td>Cuboro AG</td>
<td>In-house handling</td>
<td>6 (designs)</td>
<td>Toys</td>
</tr>
<tr>
<td>3</td>
<td>Siemens AG</td>
<td>Complementary outsourcing</td>
<td>40.413</td>
<td>Electronics</td>
</tr>
<tr>
<td>4</td>
<td>Schindler AG</td>
<td>Knowledge-based outsourcing</td>
<td>1.287</td>
<td>Machinery</td>
</tr>
</tbody>
</table>

Figure 3  IP outsourcing typologies

4.1  Transaction cost outsourcer

Low IP complexity and low IP capabilities characterise our first ideal type, the transaction cost outsourcer. Transaction cost outsourcers follow a strategy to gain scale without mass (Leavy, 2004). They use outsourcing suppliers for peripheral and non-core activities. Those highly specialised IP services like the renewal of patents are managed by outsourcing suppliers in large volumes. Transaction cost outsourcers are highly cost sensitive and take advantage of IP outsourcing suppliers’ factor costs (FA) and efficiencies (EF). The IP services sourced out are highly standardised ones, such as annual renewal payments for patents. Due to low IP complexity, the risk of losing absorptive capacity (AB) and specific IP knowledge (KN) regarding the outsourced IP work is rather low. Outsourcing providers in this quadrant usually offer automated
processes using sophisticated and specialised information systems (IN). This enables the outsourcing provider to gain economies of scale and scope. There is high price competition in this classification. IP outsourcing suppliers can only compete successfully if transaction costs are low. Examples of transaction cost outsourcers are Electrolux, Bayer and Air Liquide.

Air Liquide is the world leader in gases for industry, health and the environment. The firm produces and sells gases (e.g., oxygen, nitrogen, argon, rare gases). Air Liquide is headquartered in Paris, with major sites in Japan, Germany and the USA. The company’s core strategy is to focus on R&D and inventions within ten research and technology centres worldwide. Thus, patents play a very important role in the firm’s strategy. Their patenting strategy is to extensively monitor all potential patents at the early stage. However, Air Liquide is highly selective in the choice of patents to be registered and/or maintained subsequently. Patents are used to protect and defend the company’s position as a world leader, but also to reinforce its position through innovation (Castle, 2009). Air Liquide filed 330 patents in 2019. Most of the legal IP activities are handled in-house. Internal legal experts are in charge of all IP matters, such as writing contracts, filings, oppositions, and the like. Air Liquide institutionalised a ‘patents committee’. All decisions to apply for, and to maintain or abandon a patent, are made by the patents committee, which also makes decisions regarding the exploitation of patents, and whether to do so internally or externally. Furthermore, the patent portfolio is reviewed on a regular basis, and decisions are taken whether to exploit, stand-by or abandon the patent. Air Liquide is a typical transaction cost outsourcer. Major IP activities are performed in-house by in-house counsels and experts, while external providers are used to perform tasks that have low impact, but are time consuming. Air Liquide aims with its outsourcing strategy to decrease transaction costs by outsourcing peripheral tasks to external IP providers.

4.2 Non-outsourcer

The second type, characterised by a low IP complexity but high IP capabilities, is the non-outsourcer. The non-outsourcer handles all IP related tasks in-house. Typically, these firms are smaller in size, act in local markets, and manage only few IPRs. Outsourcing options are either not known, or not chosen. Many start-up companies and single inventors, instead of externalising IP related tasks, choose to invest time (FA) in order to acquire needed know-how (KN) concerning, for example, how to file, how to oppose, or how to renew patents. BGW and Cuboro are examples of non-outsourcers. Cuboro is a producer of wooden toys. The company is located in Switzerland, and has five employees, including the general manager, who is also responsible for IP management. Currently, Cuboro sells four different products:

1  Cuboro: a marble run for the entire family
2  Cugolino: a marble run for children
3  Babel: a three-dimensional puzzle
4  Alhambra: a didactical puzzle.
Cuboro’s IP strategy is aimed at ensuring freedom to operate. In addition, Cuboro is increasingly aware of the financial impact of a legally protected invention. Cuboro is a typical non-outsourcer. The company has a small number of IPRs, and related IP activities (e.g., filing, renewal and general management) are performed completely in-house. Cuboro is well informed about its possibilities to protect its products. Furthermore, Cuboro is able to defend its products in case of infringement. So far, Cuboro had never chosen to abandon an IPR for its products, mainly because it has never withdrawn a game from the market. It is faced with growth rather than decline of demand. Patent and trademark attorneys play a minor role for Cuboro.

4.3 Strategic outsourcer

The strategic outsourcer is characterised by high IP complexity and high IP capabilities. Typically, these firms manage a large number of IPRs and use one or more outsourcing suppliers while also running a large in-house IP department. They follow a strategy of complementary outsourcing. The strategic outsourcer has a well-defined IP outsourcing strategy and uses external providers and law firms to complement its own capabilities and resources. IP outsourcing is an important element of its overall IP and sourcing strategy. These firms develop enhanced ways of service collaboration with their IP suppliers, and continuously improve ways to develop knowledge sharing routines (KN) to cooperate with their external partners. Companies in this quadrant face high monitoring costs (MO), because they are highly demanding regarding handling procedures, quality management, monitoring, and pricing. Outsourcing suppliers in this quadrant are large players in the market, and use advanced technologies to efficiently manage the large volume of IPRs in their databases. Nevertheless, these firms face costs for installing an infrastructure (IN) and knowledge sharing routes (KN) to exchange very specific IP work. Trust and knowledge transfer are key elements within this relationship, which is reflected in high relationship costs (RE) and cultural costs (CU). Strategic outsourcers can often be found among large corporations. Examples include Total Petrochemicals, Borealis, ABB, and Siemens. Siemens is one of the leading global corporations worldwide. It operates in seven six sectors:

1 digital industries
2 smart infrastructure
3 gas and power
4 mobility
5 Siemens Healthineers
6 Siemens Gamesa Renewable Energy.

The corporation is headquartered in Munich, Germany, with locations worldwide. Around 27,800 researchers and developers within the company develop products and solutions. In 2008 the company launched an open innovation (OI) project worldwide, with more than 35,000 employees participating in nine internal OI pilot projects, and the company’s external efforts have mobilised more than 1,750 external developers on 17 projects.
Siemens was the fifth biggest patent applicant at the European Patent Office (2014) with 2,619 filings. Thus, Siemens has a very large portfolio of patents for IP protection against competitors and to serve as a valuable form of currency for licensing exchange contracts, company takeovers, and sell-offs. Siemens reformulates its patent portfolio every five to six years. IP projects are initiated within the Siemens Group to raise the quality of patents and improve their usage. Patents are evaluated and categorised, with key patents referred to as called ‘golden nuggets’. Siemens is a typical strategic outsourcer. The company uses several IP providers. All IPRs are managed within IP docketing and management software. Interfaces enable simultaneous synchronisation of all IP matters, whether updated in-house or externally. Close communication with IP service providers, as well as monitoring and controlling, ensures that this large IP portfolio is exploited internally and externally to an optimal extent.

### 4.4 Expertise outsourcer

High IP complexity and low IP capabilities characterise the expertise outsourcer. Such firms follow a knowledge-based outsourcing strategy. They decide to use external providers mainly for tasks that need special know-how and expertise. Firms in this quadrant often do not have or desire in-house legal capabilities, especially if the patent will be protected on a global scale. To deal with the application and opposition phases, infringements, or counterfeiting activities, a local lawyer is often required. Major cost drivers are service costs due to high asset specificity and specific IP knowledge (KN). Typical providers are IP law firms that charge premium prices for very specialised IP legal services. Firms using these premium priced services conduct most tasks in-house, but use external providers for very specialised IP activities, such as legal work. For these firms, the benefits of receiving specific legal services in a highly contested area outweigh the risks of losing absorptive capacity (AB) and IP knowledge (KN). Examples for expertise outsourcers are Pieris, Medtronic, and Schindler.

Schindler is a worldwide leading producer of elevators and escalators, headquartered in Ebikon, Switzerland. Schindler employs over 48,000 employees, 430 of whom are in research and development, which in turn accounts for approximately 20 of the total organisational budget. In 2013, the US business magazine ‘Forbes’ included Schindler on its list of the world’s 100 most innovative companies for the third year in succession. Schindler’s IP activities are managed within a centralised entity called Inventio AG. This entity holds all IP rights, defines IP strategies, make-or-buy decisions and means of exploitation for patents. Inventio cooperates closely with operations and R&D. The main goals of Schindlers’ IP strategy are to protect innovation against competitors and ensure freedom-to-operate. Inventio has developed an in-house invention and patent database which efficiently scouts, monitors, and evaluates innovations and patents. Despite having established its own IP unit, Schindler uses external outsourcing providers and law firms for IP work when it does not possess the relevant capabilities itself. External IP providers are consulted if special know-how and experience is required, such as for legal matters. Schindler/Inventio is a typical expertise outsourcer, which uses external expertise as required, and if internal resources are not available or capable.
5 Discussion and managerial implications

Our study extends current research in several important ways. First, we use case studies to understand firms’ decisions concerning outsourcing, and theoretical and managerial implications of these decisions.

Particularly, based on four case studies we provide insights into what kinds of legal and non-legal IP work are outsourced, and how firms’ outsourcing decisions are influenced by cost and capability aspects. Second, comparing our results to previous work in innovation management, we find that firms’ outsourcing strategies are more diverse than is commonly addressed within the general framework for outsourcing. Specifically, firms’ outsourcing strategies differ based not only on the volume of outsourced IP work (outsourcing rate), but also on the number of outsourced IP services (i.e., outsourcing breadth). The latter point suggests that firms face challenges associated with identifying the most competent suppliers, and managing a set of suppliers. Third, we find that cost considerations and access to capabilities as motivations to outsource IP work differ between the outsourcer types. For instance, transaction cost outsourcers are mainly driven by costs considerations, while capability reasons are seen as less salient. Costs can be reduced further by increasing experience between contract partners and through learning-by-doing. Interestingly, this contradicts the sourcing practice of many corporations, which switch outsourcing vendors regularly to obtain cost savings. Our research implies that a sustainable relationship between outsourcer and supplier leads to profitability in the long run. In contrast, we find that capabilities play an important role for strategic and expertise outsourcers. A widely known infringement case is Apple versus Samsung Electronics. Both companies have been engaged in numerous patent infringement suits since 2011 regarding the design and technology of smartphones and tablet computers. Both companies claim millions of dollars in damages and spend enormous amounts on IP experts and IP lawyers. This example shows clearly that these firms’ outsourcing strategies focus on capabilities rather than costs aspects. A further focus of the strategic outsourcer is to complement internal resources with external capabilities. Overall, firms should carefully consider costs, IP complexity and IP capabilities when defining their IP outsourcing strategy. Our research underscores prior findings that outsourcing can decrease organisational learning (Mayer et al., 2012; Reitzig and Wagner, 2010) and firms should be aware that outsourcing of IP, particularly legal work, is highly contested, and that cost saving aspects carry a trade-off with hidden costs such as knowledge loss and loss of absorptive capacity. We suggest that IP managers use a holistic approach, and weigh these trade-offs to establish a successful IP outsourcing strategy. It is important, especially in uncertain times, to assess the firm’s core competencies on a regular basis. Keeping core competencies in-house will avoid dependencies on outsourcing suppliers. Benefits of outsourcing such as leveraging external experience should outweigh risks, such as loss of internal IP know-how, or even IP rights.

Based on our findings and the experiences of interviewed IP managers, we want to emphasise five important suggestions for managers with regard to their outsourcing decision:
1. Identify the optimal outsourcing strategy
2. Access best in class capabilities by selecting and managing a set of IP suppliers
3. Focus on total outsourcing cost
4. Leverage IT and standardisation to create potentials
5. Ensure service quality through tight quality control and monitoring

5.1 Identify the IP outsourcing strategy

It is useful to assess the IP organisation’s strengths and weaknesses prior to initiating IP outsourcing. Use of an IP organisation that is high in structural complexity requires the use of intense and effective communication mechanisms, (e.g., a large IP organisation with many IP sites), and thus fits best with strategic outsourcing or expertise outsourcing strategies. The IP task complexity impacts the outsourcing breadth and outsourcing rate. Administrative tasks, such as filing of applications and oppositions, performing searches, monitoring third party filing activities, recording changes or assignments, paying annual renewal fees, or docketing of IP files are typical tasks suitable for transaction cost outsourcing or strategic outsourcing, while sophisticated legal tasks, such as prosecution, litigation, and combating counterfeiting are non-standard activities and thus best match expertise outsourcing. Assessing the firm’s own capabilities, strengths and weaknesses will help to choose the optimal IP outsourcing strategy.

5.2 Access the most capable IP suppliers

Management of IPRs requires specific capabilities depending on the outsourced work. Firms should identify which kind of IP work to keep in-house and which to outsource based on their outsourcing strategy.

Thus, vendor selection and contracting are essential to identify the correct partner and define responsibilities and deliverables. The outsourcing supplier should be capable of rendering services worldwide, offering qualified personnel, using IP software which docket and handles IP, and providing an infrastructure which is capable to integrate workflows in a flexible way. A service level agreement (SLA) including a detailed description of the scope of services, task description(s), roles and responsibilities, and escalation paths should be addressed within a legally binding contract. A detailed SLA enables a smooth transition and the avoidance of agency problems, as moral hazard can be limited. The outsourcing supplier should be able to offer diverse pricing concepts (e.g., fixed fees by unit or period) and settlement periods. Standard prices and flat fees allow easy monitoring and controlling, and thus save time. Finally, risk management considerations should be covered by the contract. Even the worst-case scenario of ‘losing the crown jewels’ with resulting liability and consequential obligations should be captured within the contract.

5.3 Focus on total outsourcing cost

Outsourcing should lead to value enhancement, which is difficult to measure, and reflected only through indirect costs savings. Cost saving considerations must be traded off against hidden costs, such as loss of knowledge and/or absorptive capacity. In order to
evaluate cost saving potentials firms need to focus on total costs, including costs for implementation and transition (e.g., data transfer, servers, IP docketing software, training costs). Firms should anticipate unforeseen extra costs, such as cleansing and scanning of IP files or loss of key personnel (Earl, 1996). Firms should keep in mind that the outsourcing suppliers’ costs are only one element of the total cost. The IP business requires the engagement of local counsels for numerous legal activities that depend on the local legislation. A breakdown of the total costs should always include subcontractor or third party costs. IP providers can offer better rates for subcontractor fees due to high transaction volumes and vendor consolidation. Often this price differs by a factor of two or more compared to the firm’s standard prices. Therefore, either the outsourcing supplier or the client firm should negotiate prices with local IP service firms. It is not unusual for local representatives to use subcontractors for legal work; therefore an overview of the value chain participants including their cost impacts should be assessed. Finally, additional and unforeseen costs or hidden costs should be included with an estimate of the overall total cost of ownership calculation (Ellram and Siferd, 1998).

5.4 Enable high degree of IT and standardisation

An IP portfolio is often a large set of data that needs to be stored and maintained. Automated data interfaces, instruction procedures, e-billing interfaces, or web-based portals will reduce the manual effort required, and result in efficiencies on both sides. Equally important are questions of hosting the data and confidentiality. Often outsourcing suppliers are serving direct competitors; thus internal procedures and IP related data needs to be handled with strict confidentiality, and, if needed, with data storage on separated servers.

5.5 Ensure quality control and monitoring

Although costs are a major driver for IP outsourcing, quality of the services also plays a critical role. Handling IP requires accuracy. Even administrative and formal errors can lead to the lapse of IP rights. Therefore, service quality, continuous process improvements, or change management should have an equal weight to costs (Holcomb and Hitt, 2007). The IP outsourcing supplier should work as an intermediary between patent offices and local counsels (subcontractors) on the one hand and the client on the other to ensure that all relevant information is provided in a format that meets the client’s requirements. Proper reporting and key performance indicators should be easy to trace and should serve as an early warning system. Bayer, for example, ensures service quality through regular IP vendor audits and continuous reviews of improvement measures. As Somaya (2012) highlights, managers play an important role in controlling and coordinating activities when the firm outsources patent work and relies on external IP suppliers.

6 Conclusions

Our main objective in this paper is to contribute to the understanding of IP outsourcing. We have presented cost- and capability related factors that influence firms’ IP
outsourcing strategies, and described how firms outsource legal and non-legal IP work. Our findings suggest that four IP outsourcing types can be identified based on the dimensions of IP complexity and IP capabilities: non-outsourcer, transaction cost outsourcer, expertise outsourcer, and strategic outsourcer. Each type impacts the management of IPRs within the IP department. We have discussed the most significant drivers of the outsourcing decision based on an IP outsourcing cost model in-depth. This model includes conflicting cost factors, and thus takes a total cost perspective. The managerial implications include breaking down best practices to reduce the complexity of IP outsourcing and enable successful IP outsourcing projects. Further research is needed on developing a framework to identify optimal IP outsourcing decisions and determine how to optimally design the outsourcing organisation. This optimal outsourcing strategy should minimise total costs and maximise benefits of IP outsourcing. More research is needed regarding the exact effects of different cost variables and their impact on the benefits and profitability of IP outsourcing. We used data from only one IP service provider that consequently risks being to some extent biased or skewed and is therefore a limitation to the overall validity of our findings. The IP outsourcing types and IP outsourcing cost model are limited, and can be further extended by employing a learning perspective. The cost model also does not include weightings of cost factors, and lacks any consideration of tacit or unmeasurable costs. According to Mol and Kotabe (2011), one major risk is that an organisation may suffer from outsourcing inertia, which refers to the organisation’s inability to change when its environmental circumstances change through slow adaptation processes. To deepen this perspective, more research is also needed regarding the risks of IP outsourcing, including loss of control, reduced rates of innovation, low performance, or other hidden costs, including loss of key employees and relevant knowledge.

References
Understanding outsourcing strategy within the intellectual property industry


