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Data-Driven Decisions in Mergers & Acquisitions

Can patent information provide value for acquirers?

Master's Thesis in the Master's Programme
Entrepreneurship and Business Design

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Abstract

Rapid technology development, consolidation of industries, increased competition and changing customer needs, create new challenges for today's organisations. Faced with new requirements these organisations rapidly need to access and obtain new capabilities, and many organisations are therefore increasingly turning to mergers or acquisitions, obtaining external assets and competencies. Yet, studies show that failure rates of merger and acquisition activities are tremendous, ranging between 70-90%.

Research suggests that patent information has many applications and can assist an organisation in multiple ways. Hence, the purpose of this study was to further understand if patent information can be valuable in merger and acquisition processes. The study consisted of a literature review regarding mergers and acquisitions, patents and patent-based decision making, analysing the viability of patent data as a source for information. Furthermore, to obtain a deeper understanding of the practical feasibility, interviews were performed with individuals having IP, legal, technological, business and/or financial knowledge. In addition, a survey was constructed combining information discovered by literature and interviews, further validating the results. Finally, an analysis was conducted on gathered information to elaborate on the complexity of the usage of patent information in mergers and acquisitions.

The main findings of this study were that diverse types of patent analysis seem to be needed in different stages of a merger or acquisition, creating a requirement to view patents from various perspectives, such as a risk, support or a strategic resource. The results of this study furthermore indicate that patent information today mostly is used in the latter part of the process. However, depending on the motives and the situation, it should also be beneficial to perform patent analysis in the early stages of a merger or acquisition. Nevertheless, the choice of using patent information should be based on knowledge and awareness, and if applied, results indicate that patent information can be valuable.

Additionally, the study found that the usage of patent information in merger and acquisition activities may be impacted by other aspects such as culture, strategies, communication and the understanding of intellectual property. Something organisations may want to consider if they wish to realise the full value patents could hold for mergers and acquisitions.

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Definitions

Numbering	Word	Definition
1	Acquirer	The company that is acquiring the target
2	Acquisition	Purchases of companies, divisions and/or assets, which are taken over by the buyer.
3	M&A	Mergers and Acquisitions
4	Macro-level patent analysis	Analysis to identifying opportunities from spaces of patent activity or activity of patenting
5	Market-driven M&A	Acquisition primarily driven by acquiring a target that is primarily operating within the same, or closely related, business areas as the buyer
6	Megadeals	Deals larger than \$ 10 billion
7	Merger	Combining of entities where each entity has a relatively equal stake and role in the new entity.
8	Micro-level patent analysis	Analysis of a single patent
9	Patent	A document, granting the holder(s) the timelimited rights to prevent the invention from being created, utilized, distributed, sold or imported for commercial purposes, within given territories.
10	Patent analysis	Analysis conducted on the content of patent(s), patent relationships and studying of trends
11	Patent analytics	Analysis conducted on the content of patent(s), related patent information, patent relationships and studying of patent trends, which is used to support business decisions
12	Patent-driven M&A	Patents are the primary reason for acquisition
13	Technology-driven M&A	Acquisition primarily driven by acquiring disruptive technologies (asset/company) outside the buyers core business area
14	Target	The company or asset that is being acquired

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1. Introduction

1.1 Background

1.1.1 Mergers & Acquisitions

The global merger and acquisition (M&A) market is continuously showing record-high numbers, 2018 closing at, somewhere between, \$3-4 trillion (Baker McKenzie, 2018; J.P. Morgan, 2019; Mergermarket, 2019; PitchBook, 2019; Morgan Stanley, 2019). Yet, studies show that a lot of M&As are failing to boost shareholder return, with failure rates of M&As ranging somewhere between 50-90 %, with the majority of studies pointing to failure rates between 70-90 % (Christensen et al., 2011; Solomon, 2016; Bradt, 2015; Graebner et al., 2010).

The 2018 activity was largely driven by so-called "mega deals", defined as deals greater than \$10 billion (J.P. Morgan, 2019). Several deals did furthermore close at above this amount, as exemplified by CVS Health Corp. acquiring Aetna Inc. at around \$ 70 billion (Armstrong and Langreth, 2018).

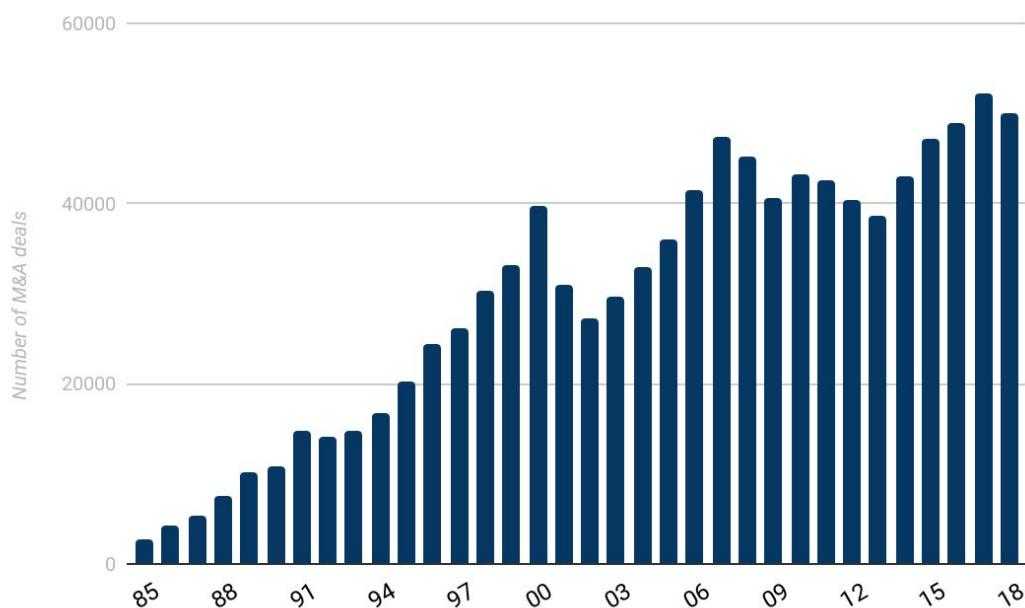


Figure 1. Number of merger and acquisition transactions worldwide from 1985 to 2018 (Statista, 2019)

Furthermore looking at the total number of deals (please view figure 1). Deals have, in waves of activity, increased from around 2600 in 1985 to above 50 000 in 2018, (IMAA, 2019; Statista, 2019) The enhanced M&A activity, in recent years, can be seen across a wide variety of industries, including energy, media, healthcare, industrials, consumer, tech, and the financial sector (Toole, 2018).

Faced with increased market volatility, intense competition, changing customer requirements and accelerating technological change, as well as changing norms, related

to environmental and social factors, a lot of companies realise that they need new capabilities (Iskanius et al., 2010; Harding & Schwedel, 2018; McKinsey Global Institute, 2019). Wanting to be become both quicker and more innovative (Fontanella-Khan & Massoudi, 2018).

In the search for innovation, high-value intellectual property and associated brand value, many companies are turning to acquisitions (MCrostie, 2015). *"Companies are focusing on acquisitions that will help them shift the scope of their business – sometimes into a new industry sector"* (ibid., p1). Trying to keep up with both the rapid development of new disruptive technologies and blurring of sector boundaries (ibid.).

Navigating in this new environment, acquirers are buying targets in even earlier stages, leading to increased resources uncertainty (Rimmer, 2018; Graebner et al., 2010). Which combined with the record high transaction values leads to even higher risks.

1.1.2 Data-Driven Decisions

To handle increased uncertainty, data analytics has become a method increasingly used by corporations. The technical development of solutions based on artificial intelligence and analytics is continuously advancing, creating new opportunities which furthermore enables more informed decision making. Generating new insights based on more objective information, which enables enhanced forecasting (McKinsey Global Institute, 2016). This is transforming how companies are operating, including how M&A deals are managed (Deloitte, 2019; Trott, 2018; KPMG, 2018)

Data is now said to be one of the most valued assets a company can hold. Existing studies show positive results, indicating that data-driven organisations make better strategic decisions, shows higher operational efficiency, improved customer satisfaction as well as robust profit and revenue levels (ibid; PWC, 2019; Brynjolfsson et al., 2011; McKinsey & Company, 2016.; McAfee and Brynjolfsson, 2012). McKinsey & Company. did already in 2014 highlight that organisations which are basing their decisions on data are 23 times more credible to acquire customers, six times more credible to retain customers, and 19 times more credible to show profitable results (Bokman et al., 2014; Gaskell 2016). Additional studies furthermore show results of 3-7 % increased productivity (Müller et al., 2018; Brynjolfsson et al, 2011; McAfee & Brynjolfsson, 2012).

Yet, there still is a lack of large-scale, reliable empirical evidence, showing the business value (Müller et al., 2018; McAfee & Brynjolfsson, 2012). Also, the value of data depends on how it is used, and by whom (McKinsey Global Institute, 2016; Müller et al., 2018). As described above, data has the potential to bring significant returns, but realising these benefits, companies need to invest in both data-analytics talent and tools (McKinsey Global Institute, 2016). It is furthermore also found that these investments often need a longer time frame to realize the full potential, meaning taking a long-term perspective, evaluating the investment (ibid.).

It is said that most companies only capture a fraction of the potential value, which could be gained from data and analytics (ibid.). As stated by Barua et al. *"In an era of*

hyper-competition where every enterprise is jockeying for position to remain competitive and profitable, investing in better data still appears to be a low-hanging fruit." (Barua et al., 2010, p.3)

One type of data, included in data analytics, is patent data (Bird, 2019). According to WIPO (2015) analysing patent data, allows for making decisions based on the largest repository of technological information. It is furthermore, publicly available information presented in a structured approach which, according to research, is useful for multiple corporate activities, such as M&As (Brietzman & Mogee, 2002; Tiwari et al, 2014; Huang et al, 2016). However, regardless of the described potential usages, according to Burn-Callander & Phillips (2017), patent information is not fully utilized in industry.

As concluded by Scott Bell, head of UK investment banking at Deutsche Bank, in an Aistemos report from 2017, *"Investing without access to IP signals, which represent three quarters of the value of a company, will seem archaic ten years from now."* (Burn-Callander & Phillips, 2017, p.25).

Although studies exist analysing the relationship between patents and M&As, there is a lack of research showing the role patents play in M&A transactions, and why patent analytics has a lack of usage. Hence, the need for developing such knowledge through research.

1.2 Purpose

The study aimed to understand if, and if so, why or why not, patent information may provide valuable insights to merger and acquisition processes. The desire was to develop knowledge regarding the potentials and limitations of its application. Intentions were to understand the topic from both a theoretical and a practical approach.

1.3 Research Questions

1.3.1 Main Research Question

There is fragmented research regarding how mergers and acquisitions can consider patent information. In addition, there is a lack of research on understanding potentials of using patent analytics in M&A processes, from a business perspective and in practice. Hence, there is a need for in-depth analysis that merges insights from previous research and adds input from industry. Therefore, the main research question is:

"Can patent information provide valuable knowledge for a buyer in a merger and acquisition process?"

1.3.2 Sub-questions

To answer the main research question, understanding of why mergers and acquisitions are initiated has to be created. Also, knowledge regarding what mergers and acquisitions

are is needed. As it more specifically assists in developing insights regarding why the activities fail. As such, the first sub-question is:

"What are motivations of merger and acquisition processes and why do they fail?"

Once an understanding of mergers and acquisitions are gained, it is furthermore necessary to understand what knowledge can be obtained from patents. Simultaneously, knowledge of how this information can be used in mergers and acquisitions is required. Hence, the merger and acquisition process also has to be understood. In addition, knowledge has to be gained regarding the current usage of patent information, in such activities, to understand if it could be used differently. Thus, the second sub-question is:

"What knowledge can be gained from patent information, relevant for mergers and acquisitions?"

Finally, understanding of factors impacting the usage of patent-based decision, making negatively and positively, is needed, Creating an understanding of the actual value that could be gained from patent information in mergers and acquisitions. The third sub-question is, therefore:

"What are factors influencing patent-based decision making in merger and acquisition processes?"

1.4 Delimitations

Mergers and acquisitions are commonly used interchangeably, however, the concepts might in practice have different impacts on strategy, finance, culture and taxation issues (Sherman & Hart, 2006). Nevertheless, as the concept is used interchangeably, the scope of the study will concern both acquisitions and mergers.

This study will be delimited to the perspective of intellectual property (IP), specifically patents, in M&As. Trademarks, domain names and branding, common assets impacting an M&A will not be analysed. Furthermore, considerations for financial, market, tax and regulations are considered to be outside of the scope of this study, although they affect processes of M&As.

In addition, the reader should be aware that the study will be centred around patent-based decision making or patent analytics, and not data analytics, which is a broader concept.

1.5 Thesis Outline

This study has the following disposition of seven chapters:

The first chapter provides an introduction to the study. It includes a background to the problem under study and provides the reader with an understanding of why this

research is needed. The chapter also includes a research purpose, research questions and the delimitations existent for the study.

Chapter two concerns the theoretical foundation, for which the study is built upon. This entails prior research on the four topics of; mergers and acquisitions, patent information, patent-based decision making and patent-based decision making in mergers and acquisitions.

In chapter three, the methodology of the study is addressed. The chapter comprises of research strategy, research design and research method. In addition, the quality of the research is analysed.

The fourth chapter presents the results of the study, developed from exploratory interviews, survey and interviews aiming to validate. It contains eight factors impacting the usage of patent information.

Chapter five, Analysis, focuses on the discussion of findings and results. Here elaboration on the implications of discovered information is analysed. Furthermore, the chapter contains a developed model to illustrate and highlight information to the discussion.

In the sixth chapter, conclusions are provided. The key insights of the study are given, shortly answering the research questions by providing a summary.

The final chapter of Discussion and Future Research outlines the practical and theoretical implications of the study. It denotes limitations and suggests potential future research within the field.

2. Theory

This section contains prior research on the topic. The chapter has the following structure; (1) Mergers & acquisitions, (2) Patents, (3) Patent-based decision making and (4) Patent-based decision making in mergers and acquisitions.

2.1 Mergers & Acquisitions

Merger and acquisition (M&A) is a consolidation process of companies, or assets (Investopedia, 2019). According to Snow (2011), mergers refers to the combining of entities where each entity has a relatively equal stake and role in the new entity. Acquisitions, on the other hand, concerns purchases of companies, divisions and/or assets, which are taken over by the buyer (ibid.). Since the net result often is similar, mergers and acquisitions are commonly used interchangeably, even if the concepts in practice varies (Sherman & Hart, 2006). Hence this study will also use the combined concept of mergers and acquisitions, even though the emphasis mainly will be on acquisitions.

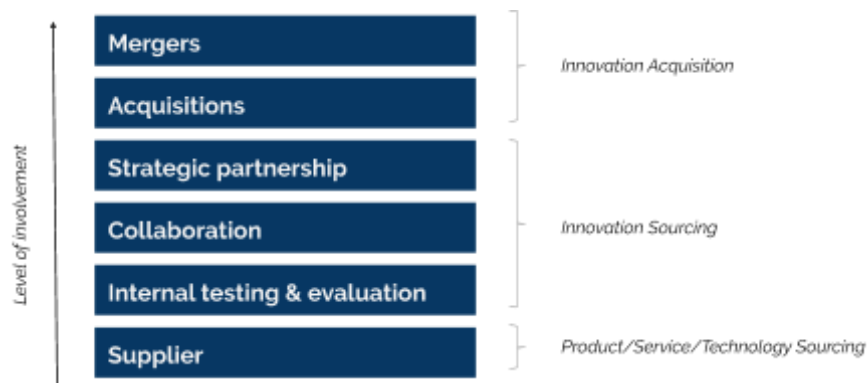


Figure 2. Level of involvement
(Modified version of a model developed by R&D manager A)

As seen in figure 2 above, both mergers and acquisitions are two concepts with a high level of involvement, used to access new resources and capabilities (Park et. al 2013). Important to remember is however that access to resources also can be granted through strategic partnership, collaborations, internal testing and evaluation as well as supplier relationships.

According to Weston et al. (2011), there are three types of theories of M&As; (1) explaining the M&A process (2) reasons for M&As and (3) analysing impacts of the activity. In this section, we will elaborate on the first two theories, process and reasons.

2.1.1 The Process of Mergers & Acquisitions

Reading M&A literature one can often see slightly different explanations of the M&A process. There are different descriptions of the number and characteristics of the

process phases, as well as different definitions of when the process should be considered started, as well as concluded (Koerner, 2014; Gomes et. al, 2012).

The process in this study will follow the framework of Koerner (2014), with compliments of the framework explained by Galpin & Herndon (2007), as the frameworks provide sufficient granularity for understanding the use of patent information in the different steps. In addition, the framework by Koerner is also built by comparing various M&A theories, making it both descriptive and credible.

As described by Koener, an M&A process goes through five stages; 1) strategy, 2) screening, 3) due diligence, 4) negotiation and 5) integration (see figure 3). Although this process is described as linear for readability, phases can, in reality, often overlap and shift in order. For example, screening can be conducted before strategy in some cases.

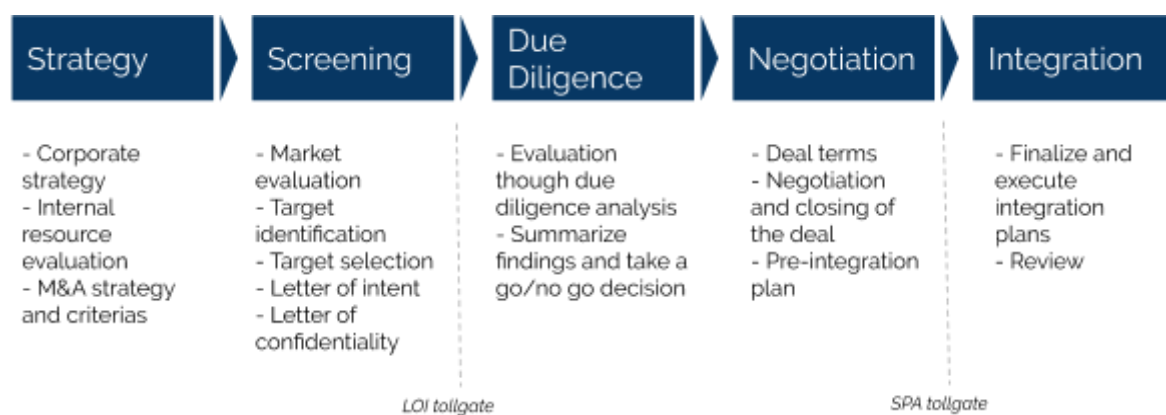


Figure 3. The process of M&As (a modified version of Koerner 2014)

2.1.1.1 Strategy

In accordance with the framework of Galpin & Herndon (2007), the initial part of the M&A process concerns tasks like aligning with the overall corporate strategy. As this corporate strategy should include a strategy for how the company should manage growth, including general M&A intentions. Furthermore, from these general intentions, that are based on the corporate vision, specific M&A directions can be taken.

Both external and internal actors can initiate M&As. One common way of initiating an M&A, from an external source, is obtaining a suggestion from an investment banker. Internal sources for initiation can range from engineers, who need technology for development, to CEOs, who identified a potential acquisition target through connections. Nevertheless, once the M&A project has been initiated a specific M&A strategy should be developed. In relation to a specific strategy, it is important to conduct a proper evaluation of internal resources, looking at what is already existent, and what is lacking. A process which should not be underestimated as it is complex, especially in large decentralised organisations.

Furthermore, to be able to formulate criteria, it is important to understand why the merger or acquisition is needed. Both long term and short term benefits should be considered in criteria construction.

2.1.1.2 Screening

The screening phase includes market evaluation, as well as identification and selection of target companies. Free places to find market information, for scanning the market, includes; search engines, statistics, free technical databases, annual reports, free market search databases, fairs, industry associations and industry reports (Cakir, 2018). In addition to these places, premium options exist, which commonly specify in providing certain types of information, like financial information. As an additional source for target identification, some companies also have internal databases, storing priory identified targets.

However, industry reports display an enhanced need for digitalization of screening processes. An Accenture report from 2018, is one example, which shows that 80% of participants considered that their business would benefit from a target screening process that was more digitized (Shacklady et al., 2018).

After developing a large set of candidates, an initial sorting is, due to feasibility, often conducted swiftly, creating a shorter list of potential targets (BCG, 2019). A more thorough analysis is then performed, on the remaining, until the final selection is done. Upon choosing which is the final target, Park et al. (2013) argue that companies primarily considers financial and managerial aspects. Variables such as company size, cash flow, market-to-book value ratio and debt-to-equity ratio, are commonly analysed (Ali-Yrkkö et al., 2005; Pasiouras & Gaganis 2007; Ragothaman et al., 2003; Reed et al., 1999; Xi-Liang et al., 2009). However, research has shown that technological perspectives are commonly less considered (Park et al., 2013).

Nevertheless, upon selecting the target, market knowledge, and believed competencies of targets are valued in relation to the internal strategy. Suggestions are brought forward to decision-makers, such as c-suite, to pass through the LOI tollgate. Meaning that once one has finally narrowed down to the most interesting target(s), the buyer contacts the target(s) and send a letter of intent. If the seller agrees a letter of confidentiality is signed. Making it possible to further evaluate the company in the next phase, due diligence.

2.1.1.3 Due Diligence

The M&A process furthermore includes an extensive due diligence, were the primary ambition is to identify risks (Dewey,2015). A due diligence concerns evaluating the target from several different perspectives, including financial, people/cultural, legal, environmental, operational, intellectual capital and integration potentials (Galpin & Herndon, 2007). It specifically entails considering organisational fit, strategic fit, past performance and cost-of-entry (Buono & Bowditch, 1989). According to Dewey (2015), organisational fit considers the possibility to collaborate. It includes, but is not limited to, analysis of differences and similarities of cultures, management, administrative systems and practices for decision-making (Buono & Bowditch, 1989; Datta, 1991). Whereas, strategic fit addresses evaluating if the target would advance either, overall corporate strategy, and/or a business unit strategy, from the perspective of similarity and/or

complementarity (Dewey, 2015). On the other hand, the past performance includes understanding growth potentials and centres around grasping future successful performance possibilities (ibid.). While, cost-of-entry, refers to resources required for a transaction. Not only is the finances to pay for the acquisition under evaluation, but also human resources needed for post-acquisition, in addition to prospects of future financials estimated.

The major difference compared to previously conducted analysis, in the screening phase, is that the buyer now has access to the sellers internal information. This does, for example, create potentials to understand margins, invention disclosures and other unpublished information of competitive value. According to Evans (2018), hundreds of thousands of documents are reviewed in a due diligence phase. For contracts, for example, studies have shown that around 5% of the total amount of contracts are reviewed, for M&As worth €400 million (ibid.). This is a result of time and resources constraints, due to limitations in finances, within due diligence phases. It should also be noted that not only is a large amount of efforts required by the buyer, but also by the seller, as they commonly lack the readiness to provide all requested information.

For analysis, a separate due diligence room, commonly referred to as a virtual data room, is provided. To assist in evaluation, Evans (2018) also describes that external parties, such as attorneys, almost always are contacted.

Finally, the findings of the due diligence are summarized and a decision of whether the M&A process should continue to negotiation or not is performed.

2.1.1.4 Negotiation

The fourth phase, negotiation, is where the deal terms are set, relating to both legal, structural and financial terms, including a decision on price and methods of payment. To estimate pricing, the most common methods for valuation is cost-based, income-based or market-based approaches (Investopedia, 2019). The choice for method of payment and amount to pay is based on priorly gathered information in the process.

Other aspects that need to be considered are earn-out models and securing that key talents stay within the company. This is also the phase where the deal is closed, a sales-purchase agreement is signed and a pre-integration plan, including assigning a team responsible for integration, should be developed.

2.1.1.5 Integration

Finally, the fifth process step, described by Koerner (2014), includes post-deal integration. In more detail, according to Galpin & Herndon (2007), this phase includes finalisation and execution of integration plans, including the integration of organisations, processes, people and systems. As described by Marks & Mirvis (2001), and seen in figure 4, integration can take different forms, dependent on the degree of change required, looking from a perspective of acquiring a complete company.

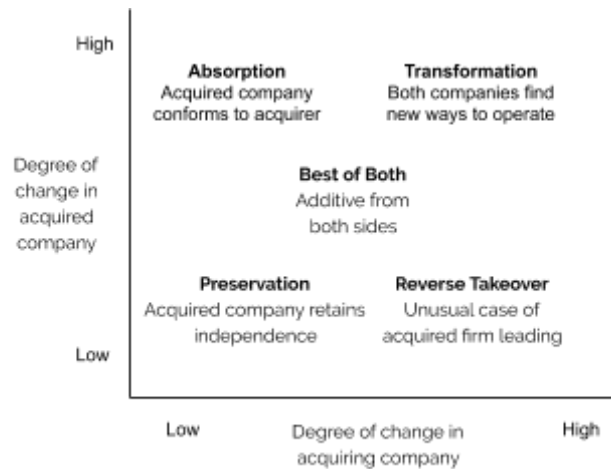


Figure 4. Defining the integration end state (Marks and Mirvis, 2001)

Ultimately, a review of the process and M&A should be conducted to analyse whether the process itself and the activity lead to intended benefits. Learnings of what could be improved should also be evaluated.

2.1.2 Drivers of Mergers & Acquisitions

It should furthermore be acknowledged that each M&A deal is unique in its nature, with different motives and characteristics. Hence, there is no single theory, relating to all possible motives behind all deals (Leepsa & Mishra, 2016).

As several ways of categorising the motives exists, this study has chosen to utilize the theory by Christensen et al. (2011), complemented with modifications. According to Christensen et al. there are two reasons to acquire a company. The first one is when you want to boost your company's current performance, by holding on to a premium position or cutting costs. The second one is moreover when your aim is to reinvent your business model and thereby fundamentally redirect your company.

The first category described by Christensen et al. is hereinafter referred to as market-driven, and the other as technology-driven. In addition, as the study is focusing on patent information, a third category of patent-driven M&As have been added. This form of M&As overlaps with the previous categories but is a special form of M&A, where the importance of patents is the main driver of the activity. A summary of the M&A categories can be found in figure 5.

	Market driven	Technology driven	Patent driven
Definition	Acquisition primarily driven by acquiring a target that is operating within the same, or closely related, business areas as the buyer	Acquisition primarily driven by obtaining disruptive technologies (asset/company) outside the buyers core business area	Patents are the primary reason for acquisition
Key Characteristics	<ul style="list-style-type: none"> - Horizontal or vertical M&As - Market shares within existing market(s) - Economies of scale and cost synergies 	<ul style="list-style-type: none"> - Transformational - Commonly digitally focused - Often young & entrepreneurial targets - Generally existence of integration dilemmas 	<ul style="list-style-type: none"> - For offensive or defensive usage - Commonly occurs when patents hold significant value - Occurs often in litigation intensive environments

Figure 5. Drivers of M&A

2.1.2.1 Market-Driven Mergers & Acquisitions

Market-driven acquisitions are in this thesis defined as acquisitions mainly driven by that the targets primarily are operating within the same, or closely related, business areas as the buyer. This type of M&As can also be described as the traditional type of M&As, accounting for the largest majority of deals (Harding & Schwedel, 2018).

Key Characteristics & Motives for Market-Driven Mergers & Acquisitions

This type of acquisitions is motivated by possibilities to increase the market share within existing business areas, boosting current performance through for example geographical expansions, cost synergies or access to an installed customers base (Galpin & Herndon, 2007; Frey & Hussinger, 2006).

Market-driven acquisitions can commonly be described as horizontal or vertical M&As, meaning that the deal either relates to M&As where competitors, suppliers or customers are combined (Bryer & Simensky, 2002). This means that the acquirer and target often have some kind of prior relationship. Acquiring such targets does furthermore mean that the acquirer commonly has extensive company, market and product knowledge.

Acquirers are often trying to find targets which possess undervalued assets (Galpin & Herndon, 2007). Targets are typically evaluated on financial performance, using traditional valuation methods like Discounted Cash Flow (DCF), and Price-Earnings Ratio (P/E Ratio) (Wohlner, 2019). Traditionally, tangible assets have been one of the main reasons for acquisitions.

2.1.2.2 Technology-Driven Mergers & Acquisitions

Technology-driven acquisitions are in this thesis, defined as acquisitions driven by obtaining disruptive technologies, assets or companies, outside the buyer's core business area.

Technology acquisitions have increased by 525 %, from \$20 billion, in 2011, to \$125 billion, in 2016 (Rimmer, 2018). Meaning that tech deals, in general, represented close to 20 % of

all M&A transactions, looking at the quantity, and high-tech deals almost 30 % of the total \$ 2,5 trillion M&A market value, 2016 (Kengelbach et al., 2017).

Industrial non-tech companies have increasingly started to acquire companies outside of their traditional technology areas. Which, according to Picker (2017), in 2016 lead to a situation where the amount of non-technology companies buying technology startups surpassed those acquired by the usual high-tech firms. Accordingly, the BCG M&A report, from 2017, states that around 70% of all technology deals are made by companies outside the tech sector (Kengelbach et al., 2017). Showing that technology acquisitions have become an increasingly important type of acquisition for all kinds of corporations (ibid.).

Key Characteristics & Motives for Technology-Driven Mergers & Acquisitions

Technology-driven M&As can be defined as transformational or conglomerate M&As. Where acquirers look for targets whom they hope will transform the acquirer's business, with new capabilities and innovation possibilities (Harding & Schwedel, 2018).

Graebner et al. (2010) moreover categories the reasons for technology acquisitions as; adding strategically valuable resources, enhancement of market power and/or achieving strategic renewals. Lemieux & Banks (2007) similarly describes the reasons for technology acquisition as filling holes in the product offering, opening new markets and/or creating new capabilities.

With targets usually being quite different from the acquiring company's core business, there are commonly difficulties in evaluating the targets' potential. Target companies are furthermore often very powerful, with a lot of potential acquirers, meaning they usually have several different options, and thereby a better negotiation possibility (Graebner et al., 2010) These type of targets are commonly acquired in early stages, meaning that there often is a lack of historical information, including financial records (Ibid; Rimmer, 2018.). Making the company evaluation even more difficult, a lot of the value is also closely related to intangible assets (WFS, 2016; Lemieux & Banks, 2007). The company capabilities are often based on tacit knowledge, partly residing in people (Harding & Schwedel, 2018)

The target companies are often small companies, which commonly are more flexible and fast-moving, compared to large organisations, which usually are acquiring (Graebner et al., 2010). They do also almost always have a different type of culture. These differences cause an increased integration dilemma, not wanting to ruin the innovation capabilities but at the same time wanting to spread the newly acquired capabilities within the organisation (Ibid.)

This type of deal is furthermore often acquisitions of emerging technologies, and many of these deals are based on digital technologies. Which now represent 24% of the total M&A market (Boote et al., 2019). Accenture (2017), furthermore, found that 69% of traditional companies say that two of their biggest challenges are identification and

targeting of digital technologies. Moreover, once identified, 62% states that they also find it difficult to properly value the targets.

2.1.2.3 Patent-Driven Mergers & Acquisitions

Dealing with patent-driven M&As, patents are often the primary reason for the acquisitions. Acquirers buy either the company or assets, here specifically a patent or a patent portfolio. An example of a patent-driven acquisition was when Vodafone acquired German Hannemann for \$1.83 billion (Bryer & Lebson, 2003). Which illustrates that if you understand the marketplace, patents can provide a profitable source of income.

Mousavi explains that with the new business environment, intellectual property *"is increasingly the heart of what is being acquired and thus, by definition, a driver for the deal"* (Mousavi, 2011, p.29). Skultetyova (2012) furthermore states that intellectual property assets often are referred to as the ultimate M&A deal-breaker. As ownership of IP, especially patents, has become a central factor influencing a company's market position, in most technology-based industries (Mousavi, 2011). However, although visualising the perceived importance of intangible assets, and acquisitions of such, certain literature also show that few have the capacity to handle intangible assets (Jarboe & Furrow, 2008). Additionally, literature foretells that other types of M&As are more common than patent-driven M&As (Deloitte, 2018).

Key Characteristics & Motives for Patent-Driven Mergers & Acquisitions

To understand what motivates a patent-driven acquisition, one has to understand what value patents create, and how they can be utilized. According to Somaya (2012) patents can be used for defensive purposes. This refers to excluding others and ensuring market access (ibid.). In addition, patents may be utilized for purposes of mitigation, to reduce costs by strategies of cross-licensing, or by preventing risks of assertions (Harrison & Davis, 2008). Patents may furthermore, be utilized offensively, by enabling exclusivity for products or services, and/or their features on the market (ibid.). The patent in itself can also be used for monetization, through licensing or sales (Somaya, 2012).

The possibility for utilizing patents, for various strategies, is dependent on the strength of the patent/patent portfolio, the patent position and the company capabilities (Harrison & Davis, 2008). Nevertheless, priorly stated options are various reasons for acquisitions of patents.

Morton & Shapiro (2014) provides another related view of the topic. The authors describe five types of patent acquisitions. Firstly, acquisitions of many unrelated patents. Secondly, patents acquired from a downstream firm. Thirdly, acquisition of patents covering existing products. Fourthly, purchase of patents covering substitute technologies and, a fifth, acquiring completely different types of patents from the acquiring firm's own patents. The first type of patent acquisition is not an acquisition where patents commonly are the driver, but instead, the M&A is market or technology-driven. The following three types are instead situations when patents regularly can be a driving force, as reasons are to enforce the patents or to protect

against enforcement. The final type of patent acquisition is most often, situations where technology, and not IP is the driving force for the M&A.

As stated by both Mousavi (2011), and Skultetyova (2012), intellectual property, and specifically patents, has traditionally often been viewed only defensively, as a risk factor, looking at it from an M&A perspective. IP has usually not been as much of a central focus and it has, therefore, according to Mousavi (2011), not been unusual to negotiate, negotiate principal deal terms and even finalise the structure of a transaction, before involving IP experts to fully consider the IP. Nevertheless, the author accounts for a change in the importance of IP driven M&As from only patent-intensive environments due to (1) the increasing percentage of companies market value of IP, (2) the increased liquidity of patent monetization, and (3) more reliable valuation methods.

It should be acknowledged that it has been central, with higher value, in some specific IP intensive industries. Not surprisingly, a report by PwC in 2018 showed that the largest initial damages award cases, between 1998-2017, primarily occurred in the pharma, computer and telecom industries (Ansell et al., 2018). Moreover, the industries with most active litigation statistics, for the same years, were consumer products, biotech/pharma, computer hardware/electronics and software (ibid.). Furthermore, threats from non-practising entities (NPE) are higher, for all high-tech companies, compared to other types of companies (Unified patents, 2018). The information technology sector has moreover been characterized by patent monetization, which has created a rise of institutions to facilitate sales and licensing of patents, heightening the importance of IP (Morton & Shapiro, 2014).

The characteristics of IP driven M&As are also changing, according to Kasznik (2017), where not only large corporations and NPEs are acquiring patents but also unicorns. The Uber and AT&T deal, in 2017, is one example, where intentions of the acquisition were to enhance the IP position, by backfilling the portfolio, pre-dating the start of the company.

2.1.3 Factors affecting Success & Failures of Mergers & Acquisitions

To understand what factors affect the success and failures of M&As, one primarily has to understand what is considered valuable and not. Below follows a discussion of how previous literature measures success and failure, for M&As. After providing this type of understanding, the section is followed by an elaboration of factors which impacts M&As, positively or negatively.

2.1.3.1 Measuring Success & Failure of Mergers & Acquisitions

The primary goal of a company is, according to shareholder value theory, to generate shareholder value. Intentions are to create long term shareholder value, and company survival, by generating finances (Denning, 2017). M&As are often measured similarly, through a financial return to shareholders (Rehm et al, 2012). However, measuring the success or failure of an M&A is not an exact science, hence any reader should be cautious of differences, which may impact results (ibid.).

Some analyses compare shareholder value before and after a deal, however, this is a short-term perspective, not measuring factors, such as impacts of the acquisition and utilization of the new possibilities (Rehm et al, 2012). Hence, to more accurately assess M&A success the analysis should include value generated over time (ibid.).

Moreover, other scholars claim that success of M&As are measured by analysing if the activity "*created significant value above the annual cost of capital*" (Gomes et al, 2012, p 19). Looking specifically at a return on investment and post-combination profitability (Marks & Mirvis, 2001). If the value generated by a combination, also named synergy, is greater than the value of the separate entities, plus the transaction cost that occur, success is obtained (Oxelman et al., 2007).

2.1.3.2 Factors influencing Mergers & Acquisitions

According to Gomes et al. (2012), great challenges has been found, when aiming to identify clear reasons for M&A success and failure, as no M&A is similar to another. Hence, there are numerous potential explanations for why the success rates of M&As are so low.

Hubbard (2013), Gomes et al. (2012) and Shilling (2018) all argues that one of the key reasons for M&A failure relates to valuation error and overpaying. As stated by Gomes et al., overpaying, means that generating an adequate return from the investment is impeded (Gomes et al, 2012). According to Alexandridis et al. (2011), especially large acquisitions tend to be overpaid, while simultaneously giving the lowest shareholder return, which often is driven by overconfidence and incentive structures. Moreover, Schilling elaborates that, hubris is not an uncommon reason for M&A failures (Schilling, 2018.).

Moreover, several studies argue that the most crucial phase, for value creation, is the post-acquisition process, managing difficulties relating to both cultural differences and system integration processes (Collan & Kinnunen, 2011; Habeck et al, 2000; Hubbard, 2013). Which strongly affect whether the acquiring company is able to realize the anticipated synergies or not (ibid.). Koerner (2014), is in accordance, stating that not understood organisational fit, is one of the determinants of M&A failures. Organisational fit concerns, the level of cooperation, which is dependent on the compatibility of the two firm's culture, management, decision-making practices and systems (Pablo et al., 1996).

Yet, Collan & Kinnunen (2011) argues, that without a proper targeting, there might not be any synergies to realize in the post-acquisition phase at all. This view is furthermore supported by Kengelbach and Roos (2011), who states that the most fundamental process step, ensuring success in the M&A process, is target selection and evaluation of strategic fit. Similarly, Hubbard (2013), argues that one of the main reasons for M&A failures is targeting the wrong companies. Christensen et al. (2011) do moreover state that few acquirers understand how to identify companies with the most positive impact for transformation. Which in combination with the common focus on financial and managerial perspectives, not considering the technological perspective, creates

heightened risks for failures of certain kinds of M&As, such as technology-driven M&As (Park et al., 2013). Moreover, as success and failure are viewed from a financial perspective, few acquirers are eager to purchase a company performing poorly, due to difficulties of enacting turnarounds (Bruton et al., 1994; Walsh & Kosnik, 1993). Instead, high performing companies, in comparison, creates lower risks and aligns with incentives to achieve financial performance levels (Pablo et al., 1996). However, such perspectives are limited as especially young startups, with emerging technologies, has other potentials not seen merely through financial figures (Park et al., 2013).

Process literature, as described by Koener (2018), does instead relate the high failure rates, with problems of the M&A process itself. Where several studies have shown inferior M&A results due to inadequate decision making and negotiations (Schilling, 2018; Cartwright & Schoenberg, 2006).

To achieve a successful M&A transaction, a Deloitte report from 2018, claims that working with some of the reasons for failures impacts success rates. As seen in figure 6, the report primarily has found that an effective integration together with correct valuing and targeting has positive effects. But the report also adds sound due diligence, economic certainty and a beneficial legal environment as factors that have positive implications.

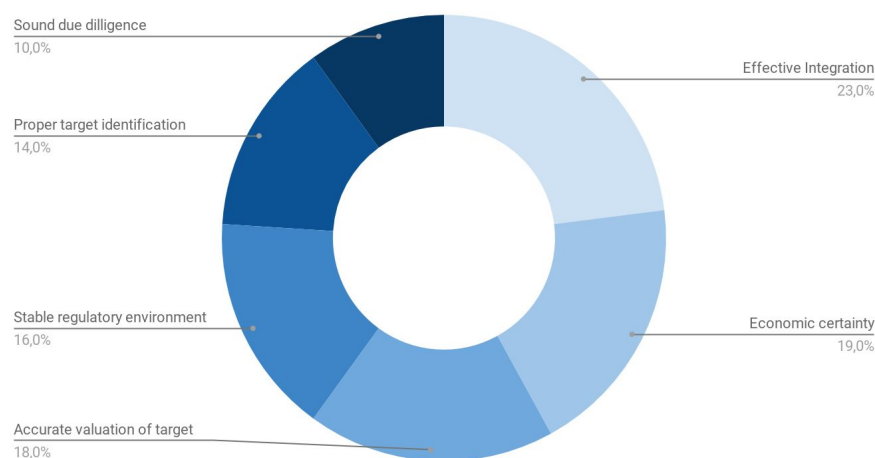


Figure 6. Most important factors in achieving a successful M&A transaction (Deloitte, 2018)

2.2 Patents

To be able to understand what insights patent analyses can provide to an M&A process, one should know what value patents create for firms, the patent system, and how patents are obtained, to further understand its potentials and limitations. In addition, understanding what information a patent contains is important, as this affects what kinds of analysis can be made. Hence, this chapter provides information regarding these areas.

2.2.1 Patents and Firm Value

Studies show that at least 40 % of the total Swedish GDP is generated from intangible assets (Government Offices of Sweden, 2017). Looking at S&P 500 companies globally, intangible assets, such as software, patents and trademarks, today represent 80% of the total enterprise value, compared to 17 % in 1975 (Mousavi, 2011; Ocean Tomo, 2017). Showing a shift in the relative value of various assets, the increasing importance of intellectual property and intangible resources (McKinsey Global Institute, 2016),

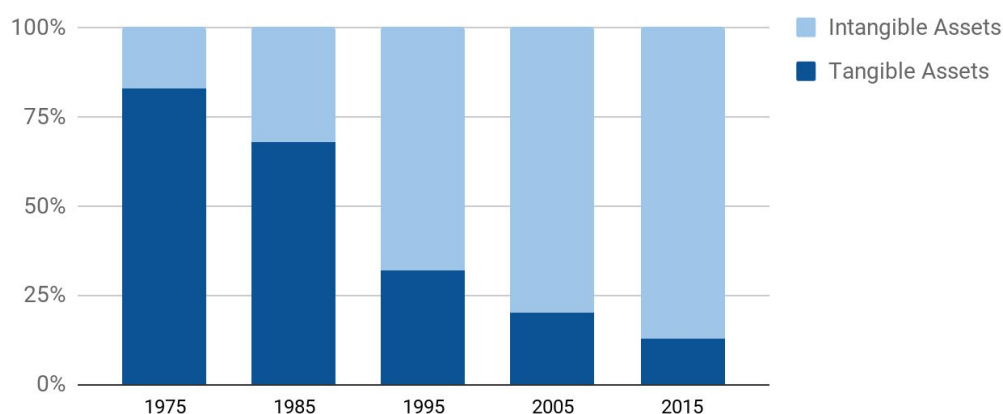


Figure 7. Components of S&P 500 market value (Ocean Tomo, 2017)

Research indicates a positive correlation between patenting and companies financial performance (Steinbusch & Vodegel, 2015; Ernst, 2003). Important patents applications have been shown to have a beneficial effect on sales, improving the company's overall financial results, with a time lag of 2-3 years, after the application first is filed (Ernst, 2001). A study by Steinbusch & Vodegel (2015) also shows that stock performance is positively impacted by the number of patents a company holds.

Furthermore, companies that own patents do, according to a European study from 2015, on average create 26% higher revenue per employee, compared to companies which do not (Office for Harmonization in the Internal Market, 2015). This view is furthermore supported by a joint study between Carnegie Mellon University, Georgia Institute of Technology and Duke University, finding that firms that own IP, on average, earn a 50 % premium price, compared to the firms which don't (Arora et al., 2008). In addition, IP has, in recent years, empowered small and medium enterprises, enabling them to obtain high entity recognition, and capital values (Bryer & Lebson, 2003).

2.2.2 The Patent System

2.2.2.1 Rationale of the Patent System

Intentions of the patent system are two folded, creating both market protection and information disclosure.

In exchange for publicly disclosing an invention, the holder(s), inventor or assignee, is given the exclusive rights, by a sovereign state or international patent organisation, to prevent others from commercially exploiting the patented invention (WIPO, 2105). In accordance with the law, this grants the holder(s) the rights to prevent the invention from being created, utilized, distributed, sold or imported for commercial purposes, within territories where the holder(s) has the granted patent, or patent application (Trippe, 2015). The right granted, is commonly time-limited to up to 20 years from the filing date of the application (Hantos, 2009). Hence, the time-limited judicial control generates the potential to view patents, both as a tool for protection on the market and also as a possibility to generate new business and markets.

In addition, through incentivising the inventor to disclose their information, in exchange for priorly mentioned rights, public access to technical information is given (WIPO, 1994). This allows anyone to enhance and learn from the information, and furthermore, as soon as the patent has lapsed, anyone has the right to use such knowledge. Thereby enriching both the economy and innovation in society.

2.2.2.2 The Patent Application Process

To obtain a patent, a patent application process must be followed. To highlight important parts of the process, which impacts the topic of patent analytics and M&As, a generalised process may be found in figure 8. Followed by a complementary generalised description.

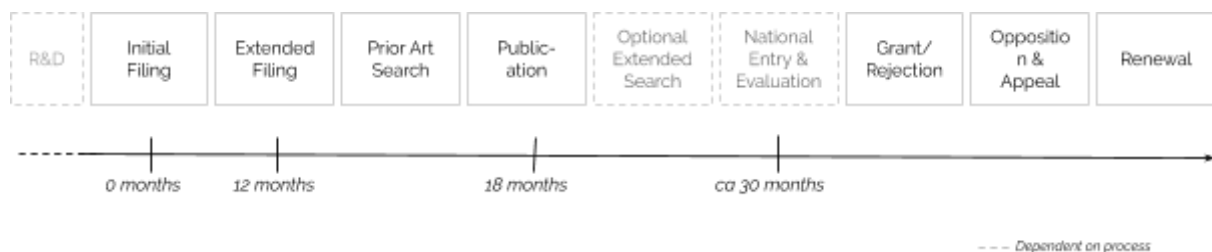


Figure 8. Generalization of the patent application process (inspired by Viksnins & McCrackin 2007).

There are three possibilities for filing a patent application (Viksnins & McCrackin, 2007). Either the application is

- (1) filed through a national patent application process,
- (2) filed through a regional patent application process,
- (3) filed through the Patent Cooperation Treaty (PCT) process [international]

Once an initial filing, named "Priority Filing", has been sent to a national, regional or international patent office, the applicant has 12 months to extend the filing to other countries or regions. This right is referred to as the priority rule (Hantos, 2009).

After 12 months the involved patent office(s) furthermore assign patent examiner(s), who evaluate the invention for patentability, based on the fulfilment of certain requirements. These requirements vary depending on the examiner and granter of the patent. However, in accordance with the World Trade Organisation (WTO) TRIPS Agreement, three criteria must be met. The initial requirement is that the invention is a solution to a technical problem, with industrial applicability (Pressman, 2016). Meaning that the invention must be replicable and repeatable. The second criterion concerns novelty, where it must contain an element of originality and newness (ibid.). Hence, the first-to-file principle is applied, meaning that the first applicant to hand in a patent application, of the same invention, can claim prior art and thereby invalidate the second parties application. The third requirement is that the invention should enclose an inventive step, where a difference must exist over the prior art (ibid.). The evaluation of the three criteria is referred to as a prior art search.

Before 18 months of the priority filing date, the application is kept a secret with the option to withdraw the application, without the risk of disclosing any information. However, after the 18 months, the application, and the invention is disclosed publicly, independent of the results of the prior art search report (WIPO, 1994). Hence, publically available patent information is at least 18 months old.

In addition, looking specifically at the PCT application process. The PCT process is a central administration process for around 150 member states, where initial evaluation is conducted but the granting of the patents are conducted in each sovereign state, hence a national entry and evaluation is needed after publication (WIPO, 1994; WIPO, 2018a). Also, an extensive search report may be requested, before such entry.

The applicant is then allowed amendments, for example, clarification, if the three patentability criteria are unfulfilled. Afterwards, the application is granted or rejected, which is followed by a period where the grant or rejection can be challenged in court or tribunal.

In addition to the payment of the application, the holder of a granted patent is forced to pay annual renewal fees to uphold the patent.

2.2.3 Patent Information

A patent is divided into sections containing information about an invention. On the written patent, and patent application, primary patent information, describing the invention, can be found. In addition, complementary patent data is also published. Both types of information are described in this section.

2.2.3.1 Primary Patent Information

In figure 9 & 10, the primary patent information is displayed. A United States patent has here been chosen as an example.

Title	United States Patent Gardner et al.	(30) Patent No.: US 6,763,791 B2 (45) Date of Patent: Jul. 20, 2004	Patent Number
Inventor(s)	(54) CAM PHASER FOR ENGINES HAVING TWO CHECK VALVES IN ROTOR BETWEEN CHAMBERS AND SPUR VALVE	5,497,738 A * 3/1996 Nissen et al. 12/09/17 5,497,725 A 8/1997 Butterfield et al. 12/09/17 6,024,961 A 7/2000 Aguilo et al. 12/09/17 6,051,338 A 4/2000 Tensfeld et al. 12/09/17 6,082,708 A 7/2000 Tensfeld et al. 12/09/17 6,162,622 B1 12/001 Gokuyasu-Schmidt et al. 12/09/17	Examiner(s)
Assignee	(75) Inventors: Marty Gardner, Ithaca, NY (US); Michael Butterfield, Madison, NY (US)	FOREIGN PATENT DOCUMENTS 10P 08/0212 A1 8/1987 08/02,344 * cited by examiner	Abstract
Application Number	(76) Assignee: BorgWarner Inc., Auburn Hills, MI (US)	Primary Examiner—Thomas Deaton Assistant Examiner—Daleton Ertan (75) Attorney, Agent, or Firm—Thomas & Michaels PC; Greg Dinsgleders	Drawings
Filing date	(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.	(57) ABSTRACT An infinitely variable camshaft timing device (phaser) has a control valve located in the rotor. Since the control valve is in the rotor, the camshaft need only provide a single passage for supplying engine oil or hydraulic fluid, and does not need multiple passageways for controlling the phaser, as in the prior art. Two check valves, an advance chamber check valve, and a retard chamber check valve, are also located in the rotor. The check valves are located in the control passages for each chamber. The main advantage of putting the check valves in the advance and retard chambers instead of having a single check valve in the supply is to reduce leakage. This design also eliminates high pressure oil flow across the spool valve and improves the response time of the check valves to the torque demands due to a shorter oil path. In addition, the power of the present invention requires less oil pressure actuated device and consumes less oil.	
Priority filing	(21) Appl. No.: 08/598,476	(58) Field of Search 125/90.13, 90.15	
IPC code	(22) Filed: Jul. 18, 2002	References Cited U.S. PATENT DOCUMENTS 5,982,025 A 3/1995 Butterfield et al. 12/09/17 5,977,094 A 4/1997 Butler et al. 12/09/17 5,772,059 A * 12/1992 Butterfield et al. 12/09/17 5,084,576 A 2/1993 Giese, Jr. et al. 12/09/17 5,361,730 A 11/1994 Butterfield et al. 12/09/17 5,367,042 A 11/1994 Butterfield et al. 12/09/17 5,368,807 A 2/1995 Ender 12/09/17	
Citations	(45) Prior Publication Data US 2003/003999 A1 Feb. 20, 2003	Related U.S. Application Data (46) Provisional application No. 60/172,245, filed on Aug. 14, 2001.	
	(51) Int. Cl. F01L 5/34	14 Claims, 6 Drawing Sheets	
	(52) U.S. Cl. 125/90.17, 125/90.15		

Figure 9. Example patent, the first page

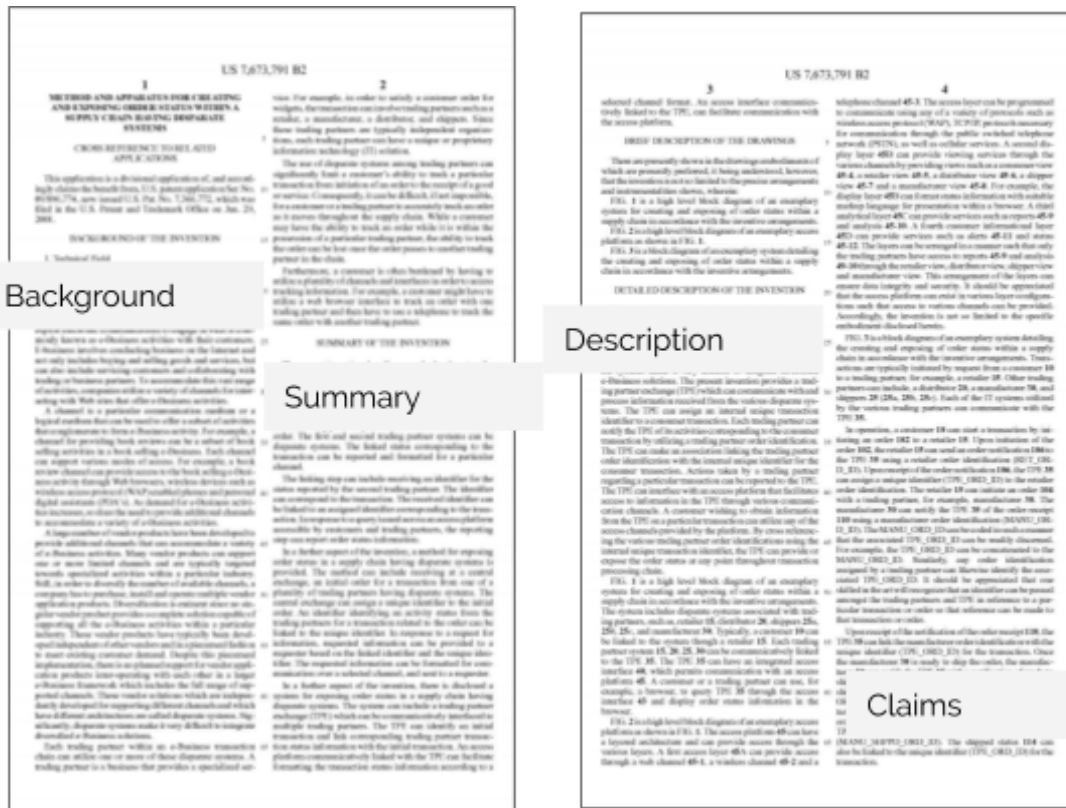


Figure 10. Example patent

As visualized in the figures, a patent is structured in different sections, such as title, inventor and background. To understand the meaning of each section, a table with descriptions is furthermore provided below.

Table 1. Description of primary patent information

Patent Information	Description
Title	One-line describing the invention
Inventor(s)	The creator(s) of the invention
Assignee	The financial owner of the patent
Filing date	Date when the patent application was filed at a patent office
Priority filing	The initial filing of the patent application, with a possibility for extension through national, regional or international filing processes under the priority rule
IPC code	Technology classification code describing the technological features of the invention according to a classification system; Section, Class, Subclass, Group
Citations	References to the prior art in the form of patents and publications also referred to as backward citations

Patent number	Identification number of the patent, containing country code and number
Examiner(s)	The individual(s) examining and evaluating approval of the invention
Abstract	A short summary of the key nature of the invention
Drawings	Illustrations of the invention, commonly with related descriptions
Background	Describes prior art, the existing gap in prior research and the defined problem
Summary	An extended summary describing the invention
Description	A detailed description of the invention, with references to drawings
Claims	The subject matter for which the patent or application covers. It is the legal protection coverage for which is sought or given by a sovereign state or intergovernmental organisation

2.2.3.2 Secondary Patent Information

Additional information provided apart from the formal patent application, and grant, which is important for M&As, can be found in the table below. This information can be found at the corresponding patent office, where the application is filed.

Table 2. Description of secondary patent information

Patent Information	Description
Legal status	Indication of if the patent or application is pending, lapsed, granted, expired, abandoned and/or alive.
Designated states	Countries which the application has been extended to, from the initial filing
Prosecution information & search reports	Reports and information provided in the evaluation process of an application
Payment information	Renewal fee and prosecution fee payment information
Litigation information	Information on legal processes of patent enforcement

2.3 Patent-based Decision Making

To understand how patent information may provide value in M&A processes, it is required to be understood how patents can be analysed, and what knowledge can be gained from such analyses.

To describe this, the study will use the concept of patent analytics, as patent analytics is "the science of analyzing patent information to discover relationships and trends" (Trippe, 2003). The concept is multidisciplinary and aims to drive valuable knowledge from patent data, and related patent information, to support business decisions (Aristodemou & Tietze, 2018). According to Moehrle et al. (2010), the concept is divided into three phases; pre-processing of patents, patent analysis and discovered knowledge utilization for strategic decision making.



Figure 11. Phases of patent analytics (inspired by Moehrle et al, 2010)

In this study, the approach of Moehrle et al. (2010) has been utilized. However, the reader should be aware that the information is provided from the perspective of using existing patent techniques, and tools, not to develop new metrics, and methods. Therefore, the focus lies on motives for conducting the analysis, and no detailed description of algorithms and metric intricacy.

2.3.1 The Phases of Patent Analytics

2.3.1.1 Pre-processing

Pre-processing primarily regards the procedure of limiting the amount of patent data to be analysed (Moehrle et al, 2010). An illustration of a general process for data limitation is provided below.

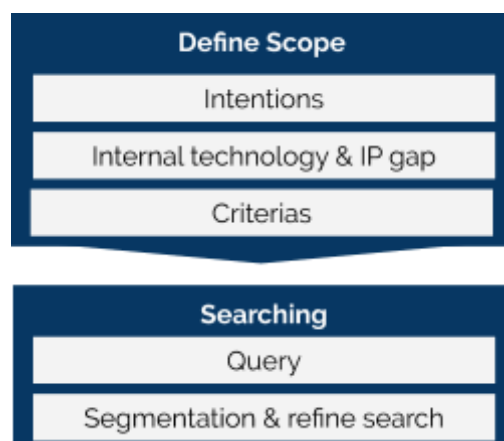


Figure 12. Data set limitation process
(inspired by the patent manager I, and the framework of Moehrle et al. (2010))

The procedure constitutes of development of a patent data set, that is relevant and complete for the upcoming analysis (Benson & Magee, 2012). To understand the relevance and completeness of the data set, the motives of the analysis is required to be understood (Tseng et al., 2007). According to Pargaonkar (2016) two analysis motives exists; "ad-hoc" and "IP competitive intelligence" patent analysis. The second analysis concerns a strategic usage of the data, whereas the former has a short-term focus, and it is more tactically project-based. The first step, found in figure 12, *Define Scope*, concerns developing this type of understanding. This means clarifying what the information is needed for. Which is required to be able to perform the correct type of analysis. Please view the next section, 2.3.1.2 *Patent Analysis*, for further elaboration on types of analysis.

Defining the scope also regards understanding the current internal capabilities. Meaning assessment of what technologies and IP exists is lacking, wanted and/or needed. Understanding these gaps and requests, various methods exist, but requirements are commonly to have an understanding of product roadmaps, IP portfolio and corporate visions (Yu & Zhang, 2013). It is, according to Yu & Zhang, when patent information is used in combination with technology roadmaps, that strategy management and intelligence analysis are possible to combine.

This step also concerns defining the characteristics and criteria for patent searching. Inspiration can here be taken from invention disclosure templates (like Neustel, 2019), which commonly include short descriptions of; (1) Problem aimed to be solved, (2) Issues encountered when trying to solve the problem, (3) Description of technology, (4) Keywords, (5) Jurisdiction of interest, and (6) Company and/or inventor names of interest.

When the scope is defined, the patent search can be performed. The main searching methods for data limitation are text segmentation (also referred to as keyword searching), and classification searching. Although several text search methods exist, examples of methods are (1) boolean searching, (2) Latent Semantic Analysis (LSA), (3) Latent Semantic Indexing (LSI) and (4) SAO-based semantic analysis (Millien, 2014). Furthermore, classification searching methods primarily refer to IPC and CPC searching (ibid.).

The search process is commonly iterative and requires a large amount of knowledge, both regarding the technology area, and patent searching (Traijtenberg et al, 1997). The searching also requires time and effort. According to Pargaonkar (2016), one has to have full-time IP employees, specifically for the "IP competitive intelligence" analysis. Hence, to facilitate the process of pre-processing, the manual methods of data limitation has recently been complemented by tools based on machine learning algorithms and artificial intelligence (Burn-Callander & Phillips, 2017). Which have been possible since patent information became digitized, through the BACON project in 1984 (Aristodemou & Tietze, 2018). The enhancement of methods, for analysing patents, have facilitated the usage of patent information for individuals with less knowledge of patents (ibid.).




2.3.1.2 The Patent Analysis

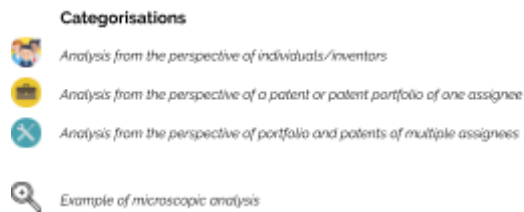
Patent analysis, the second phase of patent analytics, is the common name for several tools and methods for studying patent information, including related patent information. It refers to conducting an analysis on the content of patent(s), patent relationships and studying of trends (Moehrle et al, 2010).

Studying patent information, the information within a patent can be classified into two types, which impacts an analysis. One is structured patent data, which for example incorporates classifications, inventors and applicants (An et al, 2018). While the other concerns unstructured patent data, that consists of descriptive texts and figures, such as abstracts, descriptions and claims (ibid.). The latter, compared to the former, is more difficult to analyse, creating variations in required knowledge, time, effort and reliability/credibility, of discovered knowledge. However, for patent analysis a combination of analyses based on both structured and unstructured patent data is commonly required, to drive relevant information for decision making (ibid.).

By looking at literature (such as Millien, 2014; Bonino et al., 2010; Moehrle et al., 2005; Briezman & Thomas, 2002) and by conducting interviews, 16 key types of analyses have been identified, see table 3.

Table 3. Key patent analyses identified

Patent Analysis		Motives
	Inventor analysis	To understand who is inventive at a company
	Ownership analysis	To understand ownership, jurisdiction and legal status of patent(s)
	Consultant record analysis	To understand if IP rights were assigned to the company for which was consulted
	Claim analysis/invention analysis	To understand the technical coverage of a patent by analysing claims & prosecution history
	Completeness analysis	To understand ratio of grantings of filings
	Innovation rating analysis	To understand amount of developed inventions per yearly R&D spending
	Maintenance record analysis	To understand renewal strategies of a company and patent spending
	Portfolio analysis	To understand the technical portfolio of actor(s) and their R&D strategy
	Encumbrance analysis	To understand limitations of using a patent or technology due to contracts, agreements and legal compliance
	Patent monetization analysis	To understand revenue earned by patent licensing and sales of a companies portfolio
	Citation analysis	To understand novelty of an invention
	Patentability analysis / prior art search	To understand if claims are patentable by investigating prior art
	Validity/Invalidity analysis	To validate or invalidate a patent based on its claims
	Infringement/Litigation analysis	To understand risks of and ongoing litigations and infringements
	FTO analysis	To understand if a product/service/technology can be commercialized in a market
	Space concept analysis/ Clustering analysis	To understand technological vacuums and hotspots
	Patent filing trends/ Trend analysis	To understand patenting and technology trends in a given field To forecast technology developments in particular domains To identify emerging technologies To identify new actors To understand market entry strategies To understand customer needs



The analyses could be categorized into three areas. The initial area is focused on the individuals operating, within a technological field, and/or within a company. The second categorization focuses on the perspective of one company's/actor's patent portfolio. The final categorization concerns the market or technology landscape, incorporating more than one company's perspective. In contrast to the second category, these analyses are centred around relationships and trends of many actors operating in the same technical field. It should also be noted that several of these analyses, in all categories, have similarities in execution, however, their motives vary.

Trippe (2002) provides a related view, highlighting the differences between patent analyses. According to the author, a microscopic level analysis concerns analyses of a single patent. Primary examples exist in the second category, and includes but is not limited to, ownership analysis, consultant record analysis and claim analysis. Whilst there also exists another type of analysis, which refers to identifying opportunities from spaces of activity or activity, on a macroscopic level (Hantos, 2009). Trippe describes that macro-level patent analysis primarily concerns analysis of patents in bulk, not on a one-on-one basis. Two examples of macroscopic patent analysis, are space concept analysis and trend analysis.

2.3.1.3 Discovered Knowledge Utilization

After the patent analysis is performed, the findings need to be communicated to relevant parties (Moherle et al, 2010). Either, the raw developed information could be given to a reader, or, preceding processing could be performed to highlight important insights. Benefits of reader adaption, in contrast to providing raw data, ensures that not only individuals with an understanding of the metrics, and their implications, can use the results. Secondly, it ensures limitations in the required time to interpret the results in decision-making processes. Also, the insights could then be complemented with additional legal and technical knowledge, furthermore supporting strategic decision making.

Below is a table provided to illustrate the potential value of performing a patent analysis. As seen in the table, patent information provides various opportunities, with both internal and external strategic importance, for technology creation, technology usage and patent usage (Ernst, 2002).

Table 4. Patent information usage for technology & IP management (inspired by Ernst (2002) & Hong (2017))

	Technology creation	Technology usage	Patent usage
<i>Internal</i>	- R&D efforts - Human resources	- Product/service/ technology protection	- IP management
<i>External</i>	- Collaboration - Competitor blocking - M&A	- Product/service/ technology in-sourcing - Cross-licensing	- Out-licensing/sales - In-licensing/purchase - Marketing - Assertion prevention

As seen in table 4, patents include information of legal, technical and business relevance. Therefore conducting patent analysis provides not only patent intelligence but also technology intelligence, market intelligence and competitive intelligence, as visualised in figure 13 below (Fossati & Motta, 2016; Tiwari et al., 2014). Hence, patent analysis can support in answering a broad range of questions.



Figure 13. Intelligence from patent data

2.3.2 Benefits & Limitations of using Patent Information

Before using patent information to support decision making, one should be aware of not only benefits but also limitations. A summary of challenges and limitations, together with benefits, are provided in the table below. Constraints and benefits of patents and the process of obtaining patents is first given. Before the key conclusions of patent analysis is provided. The table is furthermore followed by a discussion of key takeaways.

Table 5. Benefits & limitations of patent information and patent analysis (Archibugi & Planta, 1996; Asche, 2017; Ernst, 2002; Pressman, 2012; Millien, 2014; Trippe, 2015).

	Benefits	Limitations
Patent Information	Each patent contain unique information in a structured way	There exist non-patentable inventions
	Patents contain public and accessible technical information	Not all patentable inventions are patented

	May be the source for published information before products/services are launched	The 18-month publication rule exists
	Visualizes who is innovative	There exist differences in the various jurisdictional patent evaluation processes, impacting patent strength
	An objective examination of the novelty of an invention	Examiners tend to favour certain patents in citing
	Time-limited exclusive rights that later becomes public information for free usage	Patents can be difficult to understand
Patent Analysis	Analysis based on the largest repository of technical information in the world	Knowledge, resource and time consuming to perform
	Constant development of new methods	Unstructured data is difficult to analyse
	Possibility to support decision making objectively	

According to Archibugi & Planta (1996) the four foremost advantages of patents are that: (1) They are public information, (2) They exist in large numbers, (3) Patents have structured information regarding technology, and (4) Patents are a direct result of inventive activity, enabling capturing of proprietary and commercial aspects of R&D. Ernst (2002) also explains that, as patents have been examined by a patent office, they offer a more objective measure of innovativeness, compared to other published information, such as information on websites. Creating the possibility to support decision making more objectively.

To stay competitive companies need to constantly change and innovate. However, as Kline & Rosenberg said, already in 1986, *"Innovation is complex, uncertain, somewhat disorderly and subject to changes of many sorts. Innovation is also difficult to measure and demands close coordination of adequate technical knowledge and excellent market judgement in order to satisfy economic, technological and other types of constraints-all simultaneously"* (Kline & Rosenberg, 1986, p 275). Analysing patents, creates a quantifiable and concretizing indication of phenomena, such as innovation and technology development, that otherwise are difficult to measure (Grant et al., 2014). Indication is the keyword in the sentence, as analysing large quantities of patent data is particularly useful for developing an understanding of the larger picture of a technology activity (Park et al, 2013). This includes past trends, prediction of future activity and technology life cycles (ibid.).

Furthermore, many scholars argue that patent analysis holds potentials for developing an understanding of technology, as this analysis can be drawn from the largest repository of technological information (WIPO, 2015). Were, according to a publication from 1986, 80% of the published technical information, can not be discovered anywhere else (Trippe, 2015). In just 2017, over 3 million patent applications were filed, creating record high numbers in patent filings with a growth of 5,8% since the previous year (WIPO, 2018b).

However, it is important to understand that patent information, when used to support decision making, commonly needs to be complemented with additional information, such as market knowledge (PRV, 2018).

In addition, a major disadvantage is also time and resources required to perform an analysis (Trippe, 2015). Furthermore, to conduct a patent analysis, knowledge of both the technology and patents are needed, due to the requirement for a "person skilled in the art" to understand a patented invention.

Another disadvantage of using patent information, as presented in the table above, is that not all inventions are patented, but instead protected using copyright or trade secrets (Archibugi & Planta, 1996). However, according to Tseng et al. (2007), many corporations generally aim to patent their core technologies. Even startups are motivated to obtain patents as this has shown to facilitate their possibility to obtain financial investments (Graham et al, 2009; Graham & Sichelman, 2008).

Also, the time delay of 18 months can in some industries with rapid technological change provide obstacles, due to their short life cycles (Levin, 2004). Monitoring emerging technologies, through patent information, then becomes specifically challenging (An et al, 2018). Nevertheless, many businesses within such industries still often have patents, due to the control they offer (ibid.).

2.4 Patent-based Decision Making in Mergers & Acquisitions

According to Brietzman & Mogee (2002), patent information can be used to support three steps in an M&A process; target identification, target evaluation (consisting of target selection and due diligence) and valuation. Affecting, screening, due diligence and negotiation, as defined in this study (see section 2.1.1, *The Process of Mergers & Acquisitions*).

Before describing the potentials of using patent information in M&A processes, some limitations, acknowledge by literature, should be brought forward. To begin with, research shows that, around 68% of the times, business decisions related to M&As are taken with lacking IP understanding (Burn-Callander & Phillips, 2017). The research furthermore showed that 6,4% of those decisions never have sufficient understanding of IP, and the remaining percentage, only sometimes (ibid.). Additionally, comparing this

data to other processes, affected by patents, such as R&D, collaborations and litigations, M&As were found to be the process where IP knowledge is most lacking.

2.4.1 Target Identification

If a company aims to externally acquire a specific capability, it is common that one does not know where to begin looking (Brietzman & Mogee, 2002). Patent analysis is one approach to target identification, as patents contain the information of assignee (present and prior), and inventors (please see section 2.2.3.1 *Primary Patent Information*). However, it should be noted that complex corporate structures create hindrances for using this approach.

According to Park et al. (2013), target identification, through patents, entails generating a map of patents, based upon technologies within an industry, relevant for the acquiring company. This map is then analysed, whereupon a specific technology area is identified. From which companies, acting in this technology area, can be found, generating a list of potential candidates.

2.4.2 Evaluation: Target Selection & Due Diligence

To select one target to acquire, evaluation of possible candidates, as well as further evaluation of the selected intended target, is needed. To support such activities, patent information can assist in both target selection and the due diligence. Patent information can provide competitive intelligence for evaluation of, not only IP, but also, technology, and market potentials of such technology (Park et al, 2013). Moreover, studies have even shown that using artificial intelligence, containing patent information, can reduce the time required in due diligence processes, by 30-70% (Burdon, 2016).

According to Ernst (2002) looking at patent data can give an indication of R&D activity, technology share, technology attractiveness and control over inventions. These indicators create an understanding of the technological capability of a company and may signal commercial intentions (Archibugi & Planta, 1996). Scholars argue that analysing patents is a preferable approach as looking only at R&D organisational size is insufficient to understand R&D efficiency and quality (Lemieux & Banks, 2007).

It also shows indications of innovativeness and strength of R&D (Gupta and Pangannaya 2000). Examples of a patent analytics approach, which can be applied to understand innovativeness, is citation analysis. According to Harhoff et al. (1999), the economic value of patents rises with the amount of forward citations. A study by Hall et al. (2005), furthermore found a correlation between the average number of forward citations and the market value of a company. Also, even if deviating opinions exist regarding backward citations, some argue that a lack of backward citations indicates a larger degree of novelty and therefore higher value of an invention. However, others claim that the lack of backward citations might exist due to lesser extensive prior art searches. Nevertheless, using patent information, assessment of both R&D activity and strength of technology is facilitated (Park et al, 2013).

Upon due diligence, common patent metrics to assess, according to Hantos (2009), concerns; geographical scope, patent status, filing date, patent disclaimers and patent term. Additionally, assignee(s) and inventor(s), as well as patent litigations, and patent interference proceedings are investigated (*ibid.*). Allen & Overy LLP furthermore describes an investigation of limitations by contracts (Allen & Overy LLP, 2014). However, Evans (2018) describes that traditional due diligence processes commonly deal insufficiently with patent information.

By possessing priorly mentioned knowledge, about a potential target, comparison of technological capacity and patent portfolios, of the seller and buyer, can be conducted, analysing technological likeness (Brietzman & Mogee, 2002). Certain literature even describes that the existence of portfolio likeness creates heightened success rates of M&As (Graebner et al., 2010; Kapoor & Lim 2007; Ahuja & Katila, 2001). However, it should be noted that depending on intentions for integration, and usage of acquired assets, desires for portfolio likeness varies. Nevertheless, using patent information, both similarities, and dissimilarities, can be identified (Ernst, 2002).

Upon final selection, a fit of potential acquisition target should to be assessed. Using patent analytics, Park et al. (2013), argues for a possibility to consider technology fit from both the overall corporate perspective, as well as the specific M&A perspective. Answering questions, such as does this firm fulfil the specific strategic purpose of the M&A, as well as generate other corporate values. Having both considerations, creates a higher chance for M&A success, as evaluation has been more thorough, compared to when only one is considered (*ibid.*).

Also, studies have shown that a few numbers of scientists, at companies, often create a large amount of patents, and inventions (Moherle et al, 2005). Using patent analytics such individuals may be identified and ensured to be retained after the M&A.

2.4.3 Valuation

Before transferring assets in an M&A, the assets have to be valued, and thus technology, innovation and IP have to be valued. However, one common M&A problem is incorrect pricing of an acquisition target, due to the difficulties in valuing such assets. The assets are a challenge to value as they all include knowledge, which is tacit, and are highly people dependent. In addition, looking specifically at patents, no patent is the other like, nor will they commonly be used, for the same reasons (European Commission, 2013). They are contextual, and ownership value then differs. Meaning that valuation methods include assumptions and judgements by the valuer (*ibid.*). Moreover, accounting principles also varies for intangible assets. For example, patents can be placed in capital and/or operating expenses, with amortization or not, making them difficult to estimate by only looking upon finances (Morricone, 2011). Hence, the potentials of understanding patents, innovation and/or technology, are not visible through financial analysis only. In addition, methods used for valuing tangible assets, in M&As, are not well applied for intangible assets valuation (Bryer & Lebson, 2003). Furthermore, yield valuation, which is built on company prognoses, is commonly not used when valuing neither IP, technology nor innovation (*ibid.*).

According to Thomas (2000), a company can be valued based on its patent portfolio. By analysing the quality of the patent portfolio, and having data on the patent landscape of a specific technology, insights regarding the strength of a company's IP and technology position is gathered (Burn-Callander & Phillips, 2017). The method includes the possibility to understand the potentials of technology and IP usage. Neglecting such analysis can lead to hazardous over- or undervaluation, as the competitive position is incorrectly estimated. Leading to decisions of entering less profitable partnering, or unfitted target selections (Ernst, 2002). In addition, patents fully considered in M&A processes can assist in the closing of price gaps, which could have ended a deal (Inflexion Point, 2019). Furthermore, to exclude human biases from the equation, strategy consultants believe that incumbents will have to use technical indicators, such as patents, to make deliberate decisions based on probabilities (McKinsey 2016; Roland Berger, 2014). Using quantitative indicators of technological strength would add security, to the financial and economic data, used when valuing companies (Narin et al., 1987).

3. Methodology

Below is a description of the method of the study provided. Organised in accordance with the structure given by Bryman & Bell (2011); research strategy, research design and research method. Which is followed by an analysis of the quality of the research.

3.1 Research Strategy

3.1.1 The Relationship between Theory & Research

Although literature exists on M&As and patent analytics, the combination of the two research areas is a relatively unexplored field, which has generated a limitation on applicable existing theories. Also, relating to the aim of the study, the intentions are not to confirm existing theories, but rather to generate new theory and expand existing research. Therefore, the method has had an inductive tendency, even if it significantly used existing theories. However, the complexity of the field had implications on the building of theory & models, as difficulties exist, for generating empirical and credible data. Therefore, the study was predominantly an abductive study, with mostly inductive tendencies. This correlates with the thinking of Bryman & Bell (2011), who describes that a majority of studies include both inductive and deductive elements, creating an abductive study.

3.1.2 Ontological & Epistemological Considerations

To understand the nature of the research question, and applicable methods for how to answer such question, ontological and epistemological considerations have been made.

Relating to the purpose of this study, the aim was to consider patent information usage in M&As. Considering M&As ontologically, the key phenomena studied, is a concept not existent without human creation and belief. Even if the common belief of the truth of firms, and assets, are strong, and commonly known (Bryman & Bell, 2011). Also, a transaction of an object includes a valuation of an object, which is a process based on subjective interpretation. Hence, a transaction is based on the human capacity for collective intentionality, as described by Searle (1995), and perceptions of social actors. Thereby making the concept of M&As ontologically subjective.

Furthermore, looking at the concept of analysis of patents and ontological considerations. The phenomenon studied is patent analysis, which relates to patents. As patents have observer relative features, meaning it cannot exist without human communication, then the analysis of such phenomena has the same features. Meaning it can be viewed as ontologically subjective.

Considering epistemology, a theory of knowledge, and M&As, the key phenomena of the nature of transactions would not be studied but applied. The same could be argued in relation to the intended analysis of patent information usage. However, even if the

concepts in separation are epistemologically objective, this study of patent information in M&As has a nature of epistemological subjectivity, as the research of the phenomenon is questioned and not only taken for granted. Hence, the study had primarily ontologically subjective considerations as well as epistemologically subjective and objective nature.

3.1.3 Qualitative & Quantitative Considerations

Qualitative and quantitative research describes two different research strategies. The former is characterized as inductivistic, construvistic and inperativistic, while the latter emphasises quantification, and is portrayed as objectivistic and dedudistic. According to Bryman & Bell (2011), inductive approaches to studies are commonly associated with qualitative research, whilst deductive reasoning is connected with quantitative methods. The nature of this study is therefore furthermore primarily deemed to be subjective, as it is to a large extent, based on interviews. Hence, this research primarily contained qualitative research. However, a survey was also constructed, which is a quantitative approach for a gathering of qualitative information.

3.2 Research Design

The study design is deemed to be a cross-sectional design since the aim was to gather data at a single point in time and through more than one source. Intentions were to examine results to discover associative patterns, which is in accordance with the description of cross-sectional research design, by Bryman & Bell (2011). Moreover, in accordance with the authors' description of cross-sectional designs, this study gathered data through both semi-structured interviews and a survey. As the purpose of the study is to discover variations of how patent information can be used in M&A processes, a cross-sectional design is applicable. Also, according to Bryman & Bell (2011), the cross-sectional design is a commonly applied design method for qualitative research, thereby emphasizing its applicability.

3.3 Research Method

Below is the research process, and the method for data collection presented.

3.3.1 Required Information

To answer the main research question and associated subquestions, various types of information was required.

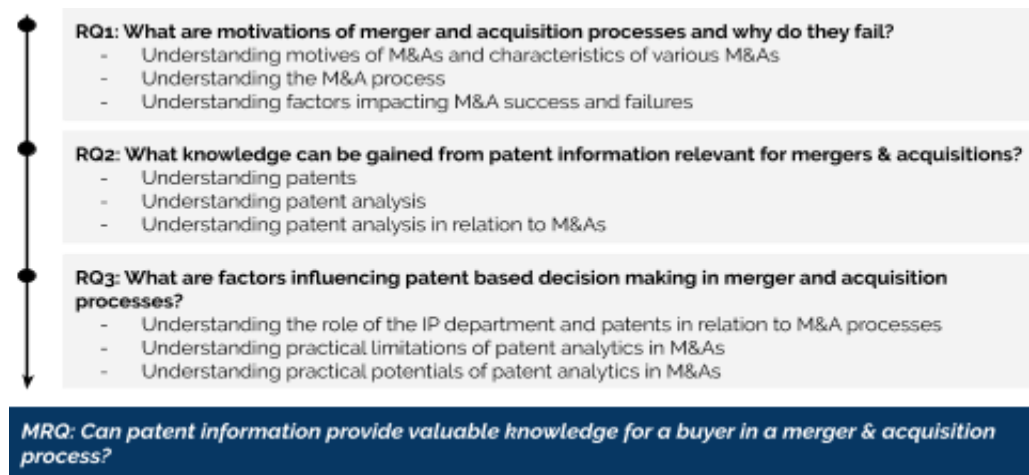


Figure 14. Required data to answer the research questions

To answer the first sub-research question, it was required to develop an understanding of different reasons for M&As, and what drives M&A activity. Further also enabling understanding of why M&As fail, and what promotes success.

To answer the second sub-research question, regarding what knowledge can be gained from patents that are relevant for M&As, data concerning patents and the patent system was firstly needed. To more exhaustively understand the topic, research was conducted on what kinds of patent analysis that can be conducted. Finally, specific literature regarding the usage of patent information in M&As was analysed.

To answer the final sub-research question, centred around patent information usage in M&A processes, from a perspective in practice. Literature and industry practices were connected, exploring limitations and potentials of having patent-based decision making in M&As. In addition, to create comprehensiveness of the question, the usage of patent information, and responsibilities of IP departments were investigated.

3.3.2 Research Process

Below is the research process presented. Figure 15 illustrates the main steps that were conducted in the study; pre-study, data collection & framework formulation, and finally ending the study with formulations of results.

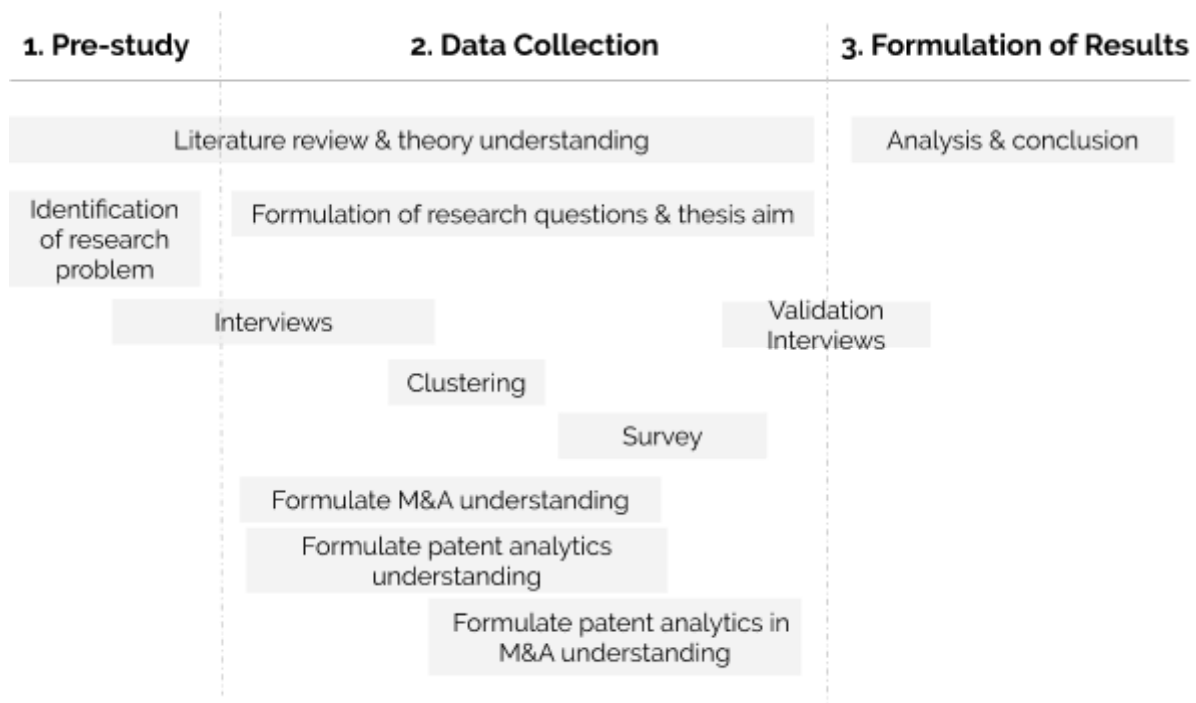


Figure 15. The research process of the study.

The initial *Pre-study* phase was concerned with identifying the problem area. Here both investigation through literature and interviews have been conducted. This step included an exploratory investigation to develop an understanding of a novel research area, and potentials to conduct such a study.

The second phase of *Data Collection* was a phase characterized by oscillation between theory and practice. The phase included gaining a deeper knowledge of M&As and patents. Information was first gathered through semi-structured interviews and literature review which was clustered into categories. This formed the basis for the survey, where discovered results from the interviews were validated. This enabled the formulation of an understanding of the topic, which later again was validated through expert interviews. The results were then used as a basis for discussions and analysis of the applicability of patent-based decision making in M&As.

Finally, the last step, *Formulation of Results*, contained analytical work of all collected data. In addition, finalization of the report and associated presentations was conducted.

3.3.3 Data Collection

Three methods were used for data collection; literature review, interviews and a survey.

3.3.3.1 Literature Review

A literature review was conducted throughout the major part of the study. Intentions were to create a theoretical foundation that supported collected information from practice, and by doing so generating a higher understanding of the intersection of practice and theory.

Chalmers University of Technology Library, Google Scholar and the Google search engine were the primary sources for information gathering. The aim was to use a diversity of literature, ranging from books and articles to industry reports, to gain various perspectives. Moreover, to obtain relevant and current information. Examples of relevant literature are the two major fields of M&As and patents, as well as their combination. In addition, the literature on patents has been analysed to understand the potentials patent information can hold for decision making in M&As.

3.3.3.2 Interviews

Interviews were also an important method for collecting data. To create situational flexibility and allow for follow up questions, within the focus fields, semi-structured interviews were considered suitable. In addition, the aim was to conduct face-to-face interviewing, to the extent possible, as the approach has been shown to allow for a generation of greater amounts of information (Opdenakker, 2006). However, due to locations and accessibility, four skype interviews were conducted.

To ensure the usefulness of developed results, and to increase the validity of the research, interviews were conducted with people, having various types of competencies, and positions, at different organisations. In total 27 interviews, were held with 26 persons, at 16 companies. However, it should be noted that one of the interviewed companies has a highly decentralised structure. The interviewees were located in different parts of this decentralised structure, which allowed for a great degree of autonomy, creating greater diversity.

To get a deeper knowledge of patent-based decision making, interviews were performed with three persons, at two patent analytics software supplying corporations. Additionally, to understand IP handling in M&As from an external perspective, interviews were held with three IP and technology experts, working at three different IP and technology strategizing consultancy firms. Also, to gain knowledge of patent management internally at firms, nine interviews were held with nine patent managers, at three large traditional industrial firms, two large high tech digital firms and one pharma company of large size. These interviews also provided opportunities for understanding the roles of IP- and patent managers in M&A processes, and the potentials, and limitations, of patent-based decision making, from various perspectives.

Two semi-structured interviews were also held with persons of technical, engineering and innovation competencies. They were conducted as patents provide control over technical inventions, and as R&D departments are common stakeholders, whom patent information holds value to.

To understand the process of M&As, five interviews were also held with four M&A managers, working internally, at two large corporations. The four M&A managers have experiences from various types of M&As, providing us with an understanding of relevant situations, of a broad range.

As M&A processes involve handling legal, financial, technical, and managerial questions, which is conducted by both internal and external workforces, interviews were also held with one lawyer, at a legal advisory firm. This was conducted to understand their perspectives on patents, and when as well as how, they are engaged in M&A processes. In addition, one financial consultant, working with M&A processes at an investment banking firm, was interviewed. One business consultant and a data analytics consultant were also questioned. These semi-structured interviews were primarily conducted with similar intentions as the interview with the lawyer. Finally, an associate professor, with knowledge about both M&As and patents, were consulted to provide an understanding of the feasibility of the study and found associative results.

3.3.3.3 Survey

A survey was used for data collection, which can be found in Appendix 9.2. The focus of the survey was to understand how patent information is used today, in industry, and why patents are used to the extent it is, in M&A processes. In addition, the survey was constructed to create a structured, and more quantitative approach, complementing the qualitative interviews, creating higher validity of the research. The survey contained ten questions, with optional elaborative subquestions. Ten questions were chosen to create a manageable survey, and limit required time for participants, ensuring a higher rate of participation. In total 12 individuals, working internally at companies, answered the survey, where the majority of participants were working with IP and/or legal. Results of the survey can be found in Appendix 9.3.

3.4 Quality of Research

To assess the quality of the study, the quality criteria of Bryman & Bell (2011), can be applied; dependability, credibility, confirmability and transferability.

3.4.1 Dependability

Since the data collection method, mainly consisted of interviews and a survey, the reliability of the study could be questioned. Because interviews and questionnaires contain subjectivity upon drafting of questions, questioning, answering and interpretation of both parties. Moreover, is the field of study a complex field, creating variations which may be situational.

However, conducting varying interviews, with persons of different competencies and positions, in combination with several interviews, limits the risk. In addition, to provide some possibility for contrasting and comparison, the interviews were semi-structured. Using a survey also facilitated comparison and enhanced the quality criteria of dependability, making the findings more likely to apply at other times.

3.4.2 Credibility

As the research was primarily qualitative, credibility, also referred to as internal validity, is affected. Since the numbers of interviews were 27, one may question the possibility to draw valid conclusions, from gathered data. In addition, as cross-sectional designs, have

no time ordering for gathered data, a causal influence problem is created. Yet, it should also be remembered, that this is a master thesis, with a limited time constraint. The results should, therefore, be seen as a first indication, which might need to be further strengthened by more studies, within the area. In addition, to complement interviews, a survey was conducted. According to Bryman & Bell (2011), using multiple approaches for data collection ensures cross-checking of findings, positively impacting the credibility of discovered results.

Moreover, as the research is of mostly qualitative nature, and dependent on semi-structured interviews, the possibility for complete replication is limited. The quality measure of replicability refers to with which capacity the study is possible to replicate (Bryman & Bell, 2011). To enable replicability, clarity should consist of how the study was performed. Hence, the chapter named Methodology describes the process. Also, to ensure a heightened possibility of replication, the interview template and survey questions can be found in Appendix 9.1 and 9.2. Furthermore, for the literature review clear referencing has been provided. Hence, measures have been taken to facilitate replication. Additionally, as described by Bryman & Bell (2011), it should not be forgotten that replication in business research is uncommon. Instead, a sufficient description is more often provided to allow for a possibility to estimate reliability and credibility, which the primary intentions are in this study.

3.4.3 Confirmability

Confirmability, furthermore, impacts the study. The values and interpretations of the authors of this study have influenced the results in both the interviewing and selection of data. To draw conclusions from gathered data, clustering was performed, an activity containing subjectivity. Hence, to heighten confirmability of the study a survey was drafted based on the clustered data, which has been shown to provide similar results as the interviews. Moreover, interviews with industry experts and scholars were conducted at the end of the study to ensure that drawn conclusions were valid.

3.4.4 Transferability

The study considered patents, patent-based decision making, and M&As. However, patent-based decision making is a constantly developing field, which only recently has become more sophisticated, and M&As are complex concepts. This impacts the transferability of the study. To ensure that the reader is aware of when the findings are applicable to other contexts theory was selected with both the most recent dates, to ensure validity, and also is clear referencing provided. In addition, an extensive literature review was conducted, selecting the theories of most holistic content, to heighten transferability.

Additionally, it should be noted that M&A processes can be company-specific, as many variations exist, which also affects the transferability of the study. To mitigate such shortcomings, interviews have been performed with individuals having various competencies, operating in different industries.

4. Results & Findings

This chapter conveys findings and results from interviews, and the survey. To facilitate reading, the chapter is structured under eight headings, which are based on the clustering of the study results; (1) *Technology*, (2) *Usage of patent information based on merger & acquisition motives*, (3) *Strategy and processes*, (4) *Merger & acquisition screening*, (5) *The understanding of intellectual property*, (6) *Offensive and defensive perspectives of intellectual property*, (7) *The culture at intellectual property departments*, and finally (8) *Resources and costs*.

4.1 Technology

Based on the literature, it was visible that methods for analysing patent data, first in recent years, have become sufficiently advanced, with qualitative information digitized and pedagogically displayed. Hence, this study investigated if this technology youth could have any impact on the usage of different kinds of patent analysis in M&As.

To further test this argumentation, the following survey question was formulated, "*The sophistication of patent data tools has only recently become sufficient and widespread. Do you believe this has impacted the use of patent intelligence in companies for M&A processes? Please add comments if you wish*".

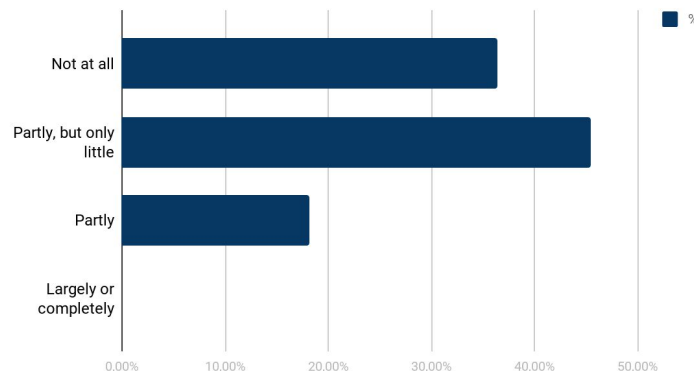


Figure 16. Results of the survey question five

As seen in figure 16, the results show that the majority of respondents believe that the sophistication of patent data tools, only have had little, if any impact, on the usage of patent intelligence in M&A processes.

On the other hand, complimentary comments stated that; (1) "*It's coming...*", (2) "*Not yet, but likely in the future*" and (3) "*In my view, 'patent intelligence' isn't intelligent enough (yet...)*". Indicating that it might not have had that much of an impact yet. However, there could be a future impact.

Before elaborating further, one has to consider the interpretation of the meaning of patent intelligence tools. It is likely that respondents, when replying, are referring to the

most advanced patent analytical tools, based on machine learning and artificial intelligence, and these tools are still today considered to contain the possibility for improvements. One example is that, through interviews, it became evident that such sophisticated tools commonly has a lack of transparency of how they are executing their algorithms. This lack of transparency impacts the reliability and credibility of a conducted analysis, according to one interviewee. Hence, due to various reasons, they are limitedly used. Whereas if interpretation had concerned recent improvements in classical databases, the replies could have been different.

One interviewee furthermore clarified that when evaluating patent data tool usage, the most important aspects to consider is the quality, and amount of data, not the dashboard or the graphics. However, another interviewee argued that the increased sophistication of patent tools now enables quicker processing. Compared to making the same analysis manually, resources are saved, even though the analysis might not always be 100% correct. Yet, knowledge of the shortcomings is necessary to apply such analysis in the right settings.

Several interviewees furthermore discussed the potential of using advanced patent intelligence tools to identify startup targets. Some interviewees argued that the 18 months delay of patent publication, makes it difficult to use this approach, especially in the more fast-moving industries. Moreover also stating that startups generally have few patents, which can be quite niched, not showing the company's full potential. Yet, other interviewees argued that many startups do file patents, due to, for example, promotion of venture capitalists. Making them possible to identify through patent information. Pinpointing that identification and evaluation are two separate tasks, so if the patents are niched have less importance for identification.

4.2 Usage of Patent Information based on Merger & Acquisition Motives

As every deal is unique, curiosity existed to understand if patent information was considered differently in various types of M&As. Hence, questions regarding the differences of patent information considerations were asked, in relation to market-driven, technology-driven and patent-driven M&As.

4.2.1 Market-driven Mergers & Acquisitions

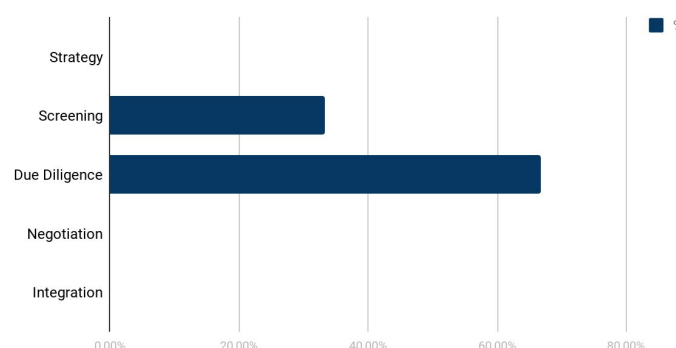


Figure 17. Results of the survey question two

Asked when the IP department commonly is contacted, to provide patent intelligence, if the motive of an M&A primarily is market-driven, to for example obtain supply chain synergies, 67% of all respondents chose the due diligence phase, while the remaining 33%, chose the screening phase, see figure 17.

Additionally, asking when it would be most valuable to enter, and why, respondents answered; (1) *"All above applicable (case by case). I set screening as my response as I think there may be most value there."*; (2) *"Screening phase is fine"* and (3) *"Screening (information to differentiate targets is easily accessible) and Negotiation (put the price down by identifying IP weaknesses = potential risks)"*.

This contrasting view, between actual entry and preferred entry, was moreover supported through interviews.

4.2.2 Technology-driven Mergers & Acquisitions

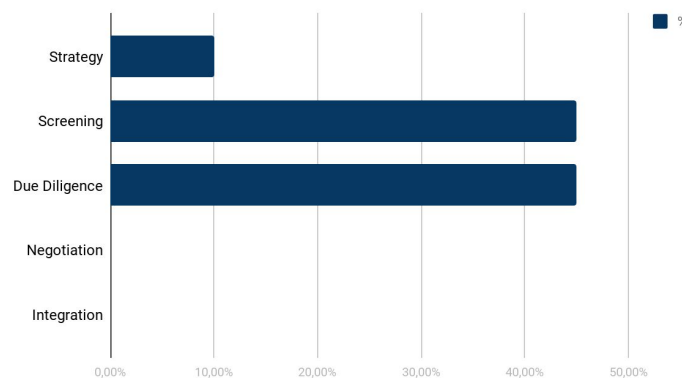


Figure 18. Results of the survey question three

Asking when the IP department commonly is contacted, if the motive of an M&A instead is primarily technology-driven, to for example obtain new emerging digital technologies, most respondents chose the screening, or due diligence phase (see figure 18). Further commenting that; (1) *"Our division very rarely do technology-driven M&A and it has been the case that we already have candidate(s) and are getting into the dd phase when the IP department is contacted. At that stage, we also get access to a lot of information. If we were looking for a specific IP it might be more logic to engage the IP department earlier in the screening /strategy phase but that has not been the case in our division so far"*.

Moreover looking at when the respondents would like to be involved most comments stated; (2) *"At the strategy stage, since IP could impact the value/price of the acquired company."*, (3) *"I would prefer to be involved earlier, at screening or strategy"*, (4) *"Strategy (IP landscaping would be a very efficient tools to establish such a strategy)"*, and (5) *"Strategy - to provide insight that will help guide our efforts on this and subsequent due diligence projects."*

These statements express a view which is in accordance with the interview discussions, indicating that most IP aspects today are evaluated firstly in the due diligence phase, while preferences primarily lie in the strategy phase.

Analysing the results, it should not be forgotten that many interviewees are IP managers, which of course consider their expertise important. However, on the other hand, individuals with such competencies, are also usually the individuals that have the best knowledge of what patent information potentially could contribute with, including knowledge of where the limitations lie. It should also be mentioned that almost all interviewees, and survey respondents, have participated in M&As, making their replies credible.

4.2.3 Patent-driven Mergers & Acquisitions

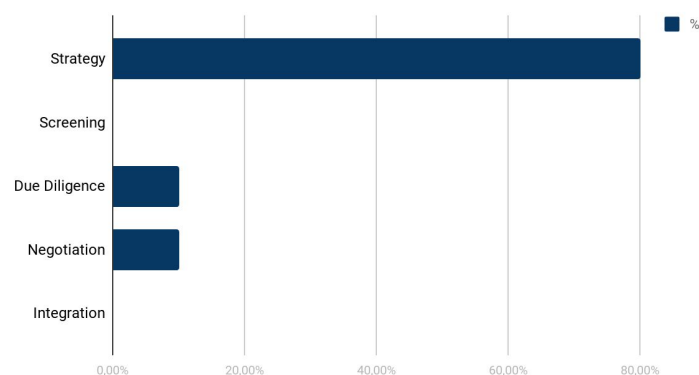


Figure 19. Results of the survey question four

Lastly, if the motive of an M&A primarily is IP-driven, to for example obtain patents for strengthening the portfolio in litigations, 90% of respondents answered that the IP department most likely would be contacted during the strategy phase. Elaboration through the comments furthermore strengthen this view, explaining that; (1) *"Strategy - as the appropriate targets cannot be identified and evaluated without IP legal input."*, (2) *"here, IP would be involved early on"*, and (3) *"Since IP department drives IP disputes it is discussed in such cases"*.

The comments do however also indicate that there are few companies actually working with IP-driven M&As; (4) *"We don't acquire companies to obtain IP"*; (5) *"Our division has not made any such acquisition and therefore my experience is that they get involved in the dd phase to investigate matters. But for a specific project in the future it could be earlier"*; (6) *"Patents have not been a driver for M&A"*, and (7) *"It has never happened so far"*.

Interpreting results it is likely that some have replied due diligence and negotiation, as they do not conduct IP-driven M&As, and have therefore chosen to reply how IP normally is considered within their company, creating the deviation in the results.

Hence, as seen from the results, the importance of patent information and IP departments for M&As seems higher for IP-driven M&As compared to market-driven or technology-driven activities.

4.2.4 Other Aspects

Through interviews, and comments from the survey, it was conveyed that IP is not always, and should not always, be everything in an M&A process. As one patent manager explained, it is a complex process to evaluate a complete company, understand if it fits, and to finally leverage a merger or acquisition.

The interviewees expressed that it is rarely that IP changes the course of an intended acquisition if the process is ongoing. Sometimes even if IP is important, and if a risk is discovered, the acquisition can still be followed through, as the risk is considered minor, in comparison to other perceived benefits.

Additional comments in the survey convey similar thinking, stating that; (1) using patent information *"...would not reliably identify candidate on the basis of market share, strategic business or customer relations."*, and (2) *"I am a believer that IP should remain a tool for business and not a business objective in itself"*.

4.3 Strategy and Processes

One of the industrial companies interviewed has traditionally acquired market shares but during the last couple of years started to conduct more technology acquisitions. The R&D manager explained that these types of acquisitions are very different, in many aspects. However, the manager does not see that strategy and processes have been altered, instead, the same thinking is applied.

In addition, another interviewee described that to make IP important, it has to be formulated in strategy and realized in processes. If IP is not part of the corporate strategy, the organisation will prioritize differently, not supporting such incentives. Although to include IP and patent in strategies, one should also understand one's own portfolio and technological capabilities. However, as simple as it sounds, many organisations have a lack of understanding of their own patent portfolio.

In addition, the data analytics consultant interviewed, described the importance of clear responsibilities. Where someone has to be responsible for conducting the analysis. There has to be clarity regarding when, where and why the analysis is performed, and also who is requesting the information. Without a clear "customer" for the information, there is limited value to perform an analysis.

Talking about the potential of using patent information, with the purpose of identifying potential target companies, one patent manager explained that they regularly do patent landscape analysis, where sometimes new companies are identified. However, this information has not been used in acquisition processes, since they do not have a formal process for transferring the knowledge to the right department/person, responsible for

target identification. This is furthermore strengthened by tech consultants, who state that there probably are many companies who already are doing some kind of patent analysis, however, they might not forward the information to the person responsible for targeting new prospects.

4.4 Merger & Acquisition Screening

Asking how an M&A process generally is initiated, interviewees said that there is no structured way to identify potential targets, especially not from a technology point of view. One R&D manager also explained that, in one of the company's latest acquisitions, it was rather by luck that their R&D team were involved in the due diligence, for technology evaluation. Even though, they were the individuals with the most knowledge in the specific technology area.

Several interviewees furthermore explained that many M&A targets are identified through product fairs or personal networks. They also conveyed that proposals for acquisitions can come from the CEO, the business department, or the M&A department. An M&A manager moreover explained that the process is commonly initiated through a bank.

According to an interviewed investment banker, banks primarily consider financial results, before they are sending the information regarding a potential acquisition to multiple potential buyers. Although they provide services regarding the financials, the interviewee described that responsibilities for technological evaluation lies on the potential buyer, or hired consultants of the buyer. One of the patent managers elaborated on the topic, describing that especially such deals, proposed by investment bankers, are the most time-pressured acquisitions, increasing the difficulty of performing a sound company evaluation.

These statements were followed up with a survey question, asking whether the respondents believed a more structured approach, using patent intelligence, would be beneficial for the success of M&A transactions.

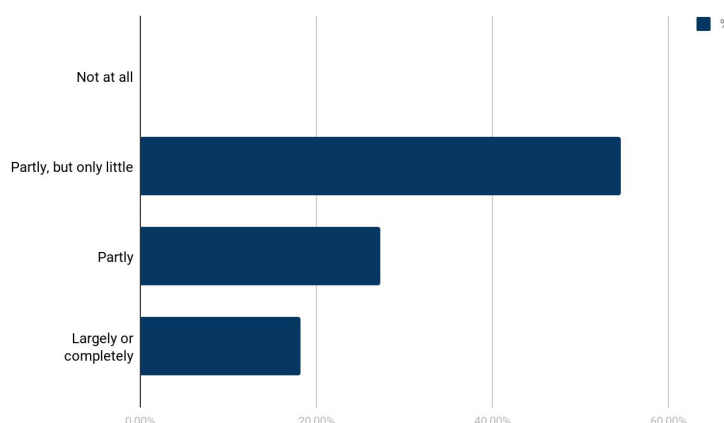


Figure 20. Results of the survey question six

As seen from the results in figure 20, all respondents answered that yes, it would have some kind of effect, ranging from "but only little" to "largely or completely".

Further elaboration in the comment field states that; (1) *"Such an approach would benefit IP-centric transactions, but would not reliably identify candidate on the basis of market share, strategic business or customer relations."*, and (2) *"We do have a structured and diligent strategy for our acquisitions, but in the selection of candidates patent intelligence don't play a role today compared to product range and market position. I don't see that change in the near future"*.

Construing the answers, consideration of how the question can be interpreted should be made. As the wording structured and unstructured have different meanings, to various individuals. In addition, such individuals are employed by various companies, that have different approaches to initiating M&As, possibly impacting opinions. Nevertheless, the results indicate that using a more structured and objective approach, to target identification, could hold value.

4.5 Understanding of Intellectual Property

As seen in section 2.4 a survey by Aistemos found that around 68% of all respondents consider decisions relating to M&As, never or only sometimes, to be made with sufficient understanding of IP. This view was moreover strengthened by several interviews. However, it should also be said that there are exceptions, related to both industry and company specifics.

One patent manager elaborated that, it should not be forgotten that there are different levels for understanding patents. Information presented to higher-level management is commonly not very detailed, only containing information regarding portfolio size, litigations and geography. Another interviewee described that some individuals understand that IP is important, but not fully why. Furthermore stating that sometimes c-suite understands IP but not the middle management. Creating heightened risks for no realizations of developed strategies.

Hence survey question seven was created, regarding whether the respondents believe there is a lack of understanding of intellectual property in organisations, and if yes, how does it impact the usage of patent intelligence in M&A processes.

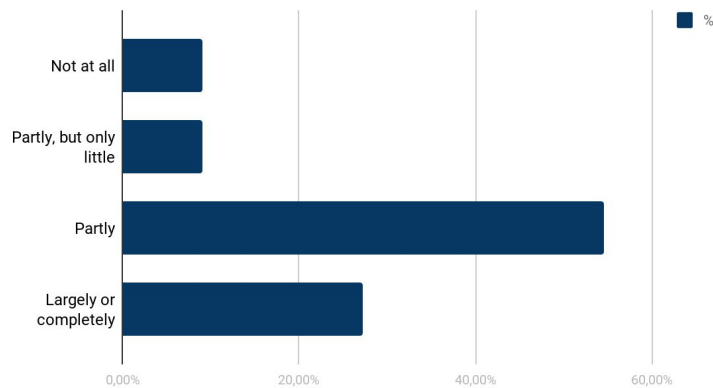


Figure 21. Results of the survey question seven

As visualized by figure 21, a majority of respondents answered that yes, there is partly or largely, a lack of understanding of IP, in today's organisations. Furthermore elaborating on how it impacts the usage of patent intelligence in M&A processes, respondents state that; (1) *"To few know how to obtain the information and even fewer how to use the information contained in the patent documents"*, and (2) *"No understanding of IP and thus it is an afterthought!"*. These replies indicate considered importance of the formulated question.

One additional reply stated that; (3) *"Since our division has an IP department I do not think there is a lack of understanding but there are of course always improvements to make"*. Raising the question of whether the need to understand IP is as large as some respondents consider. This statement furthermore hints that the common way of working with patents is to manage them in silos, which interviews furthermore conveyed. Arguments given of why such management exists is that patent information requires specific knowledge to be used.

If IP is found to be important, some interviewees claim that it has to be communicated in a business language. Which should include easily readable information and financials. Also, using graphs, and visualisation of how one can work with IP strategy, have been shown to have a positive response, highlighting the value of IP.

4.6 Offensive and Defensive Perspectives of Intellectual Property

Interviewees explained that IP and patents historically have been seen as a risk management factor, which moreover also is supported by the literature. One patent manager elaborated, saying that patents are like insurances, they cover potential future events, and it is first when you encounter a problem, that you fully read, and use the insurance. Up until then, it is difficult to motivate the value of a patent, and it is hence mostly viewed as a cost. However, as seen in, for example, section 2.1.2.3, it has, in recent years, become more common to also view patents as a source for monetization.

To further clarify if this recent change in perspectives has had any impact, survey question 8 was created, saying that *"Patents can be used both offensively or defensively. However, historically patents have been viewed primarily as a tool for defensive purposes and not as much a source for monetization. Do you believe this affects the usage of patent knowledge in M&A processes?"*

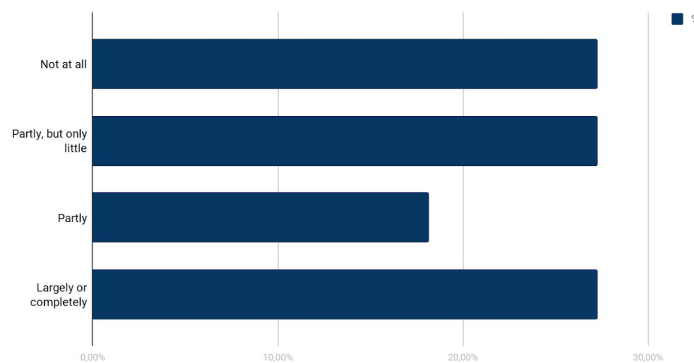


Figure 22 Results of the survey question eight

Additional comments, to the question, was; (1) *"We are a product company and are using our patents essentially to protect our products. But this is not working with future digital products & services."*, (2) *"If it would be a source for monetization the focus in the strategy phase would be different and patent knowledge more important"*, (3) *"If IP was understood -- and its monetization potential--then it would not be an afterthought in M&A"*, and (4) *"Even in circumstances where the offensive use of IP assets is not a priority, patent knowledge provides significant value (e.g., third-party IP risk, portfolio evaluation, etc.) to M&A activities"*.

Others elaborated further during interviews, saying that patents, and IP, firstly become important when you have a problematic situation, like for example a litigation issue. Another, described a situation where top management, firstly questioned the importance of IP, but that the questioning vanished when certain patents generated income, through licenses.

As seen in figure 22, the answers from the survey are quite fragmented, ranging from not at all, to largely or completely. However, additional comments and interviews assist in trying to interpret the splintered results, providing two possible reasons. Firstly, depending on, in which industry you are operating in, patents are used differently. Secondly, as of today, few companies have the capabilities, or the business models, to monetize IP. Hence, the patents are used for defensive purposes, and any potential change of views, towards offensive usage, seems to have had little implication, as it is not realized.

4.7 The Culture at Intellectual Property Departments

As stated by one IP manager, "to change the IP management or M&A process, there needs to be a change in culture". Following up this statement with a survey question we

furthermore asked whether the respondents believe that, the history of IP departments, commonly acting as support functions, affects their motivation and mentality, relating to their possibility to initiate M&As. The results of the survey showed some variation, but most participants considered that this partly has an impact (view figure 23).

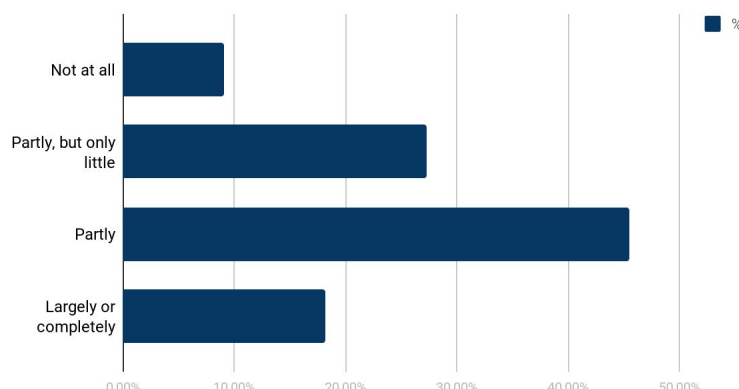


Figure 23. Results of the survey question ten

Respondents furthermore commented that; (1) *"Yes, and this is a good point which requires some reflection. However in our industry, patents have not (until yet) been a driver for acquisitions."*, and (2) *"That could actually be the case. I have not thought about it in that way. But it could clearly have an impact"*.

Hence, the results indicate that many respondents had not considered the impact of this topic. Several IP managers expanded the topic by describing that, IP managers are commonly both hired, have the educations, and mindsets of focusing on operational activity, in relation to patents. Few are used to work with patents strategically, from a business perspective, considering more than portfolio management.

4.8 Resources and Costs

Both by reading literature and through almost all interviews, it has been clear that an M&A process largely is affected by time and resource constraints. One interviewee stated that *"our way of doing M&A is not the ultimate way of doing it, however, there are usually both time and resource constraints. For example, we do currently have a case where the data room opened last Friday, and closes this Friday. Only having one week you have your limitations"*. Another interviewee furthermore explained that they, during due diligence, usually only look at the most basic measures, primarily due to time limitations.

In addition, it has been expressed that IP departments are anorectic, having too few in headcount. The largest majority of companies participating in this study have few employees in relation to their turnover and company size. Affecting the capacity to add additional tasks to their already overcrowded workdays.

One interviewee furthermore highlighted that it is important to differentiate between tools, as some are more advanced than others. Some tools are focused on patent

searches, these tools are usually less sophisticated, and do often only have the most basic metrics. It is furthermore these tools which generally are found at corporations today. The other type of tools are the more advanced analytical tools, which usually can be based on some kind of machine learning technology, and they therefore also have a different price tag. The same interviewee did furthermore state that the more advanced analytical tools can be useful if you do a lot of something, otherwise it is difficult to argue for the cost. External lawyers or financial companies might, therefore, find the tools more useful.

The survey participants were hence asked whether they would use patent intelligence early in an M&A process, meaning, the strategy and screening phases, if they had sufficient resources.

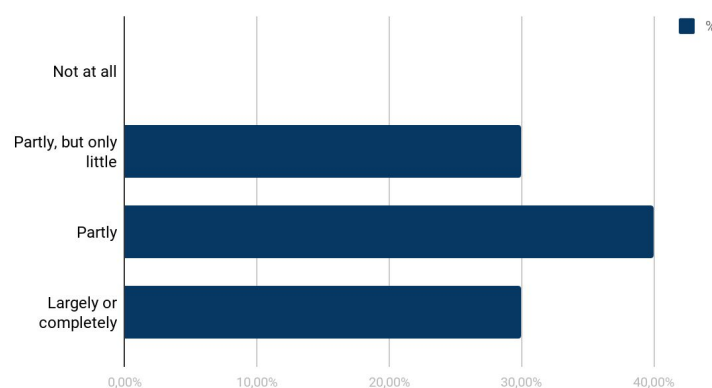


Figure 24. Results of the survey question nine

As seen in figure 24, the results show that all respondents estimate that they would use patent analytics, if they had sufficient resources. Further elaborating why, respondents stated that; (1) *"Then we should be able to work closer with the M&A team for early support and scouting"*, (2) *"If smart enough, it would save a lot of effort. But it could work the other way if not done in a clever way..."*, and (3) *"Yes, if the acquisition team can be convinced to let this be a parameter."*. Indicating that if they obtained the right resources, they see potentials in using patent information to a larger extent in M&A processes.

Other respondents furthermore explained that it is; (4) *"Very much dependent on type of acquisition. For IP-oriented acquisitions, we add right resources."*, and (5) *"Only if our focus would change and we would increase focus on IP driven M&A"*. Hinting that the need for patent analysis is correlated with the amount of analysis that has to be made. Also conveying that sometimes, on an ad hoc basis, patent information plays a larger role, and is therefore given resources in M&As.

Discussing the results related to resources and costs, it should furthermore be acknowledged that the M&A process involves a lot of sensitive information, which potentially could impact the company stock value. The whole process is therefore commonly managed with a lot of secrecy, not involving more people than necessary.

5. Analysis

This chapter contains an analysis of the topic. Here both literature and discovered results of the study are analysed to answer the main research question.

5.1 Different Types of Analyses in Mergers & Acquisitions

To understand what kind of patent information is relevant in M&As, the literature on M&A and patent analysis was combined, creating a model to illustrate discovered findings (please view figure 25).

The reader should be aware that the aim of the model aims to provide a general overview, and its applicability and credibility have furthermore been validated through interviews. Yet, as M&As are activities of great diversity, the content may vary. Meaning that the model might have to be modified, dependent on the situation. Nevertheless, as the model, found in figure 25, conveys, different kinds of analysis are needed, depending on where you are in the M&A process.

		Proactive Approach			Reactive Approach		
		NO PATENT CONSIDERATION	LOW PATENT CONSIDERATION	PATENTS AS A RISK	PATENTS AS SUPPORT	PATENTS DRIVE	
1. STRATEGY	Corporate strategy					- Understanding of corporate visions - General IP & patent strategy	
	Evaluation of internal IP					-Understanding of product/service roadmaps - Understanding of existing patent portfolio	
	Set M&A strategy & criterias					- Technology & patent need analysis - Targeted patent strategy	
2. SCREENING	Market evaluation				- Trend analysis - Space concept analysis - Consolidation of target list of active companies patenting within the technology field		
	Identify potential targets				- Portfolio analysis - Completeness analysis - Innovation rating analysis - Ownership analysis - FTO analysis - Patent/Technological fit evaluation		
	Selection of target						
3. DUE DILLIGENCE	Due Dilligence analysis			(Analysis includes unpublished applications & invention disclosures): - Ownership analysis - Detailed portfolio analysis - Maintenance record analysis - Encumbrance analysis - Patent monetization analysis - Consultant record analysis - Litigation/infringement analysis - Claim analysis - Validity/invalidity analysis			
				Based on prior findings, with potential inclusion of: - Prior-art search - Inventor analysis - Citation analysis - Participate/support negotiation process - Develop pre-integration plan with consideration of e.g. R&D strategy, IP management, IP/technology sharing, enforcement, patent monetization and cost (e.g. transfer pricing)			
4. NEGOTIATION	Set deal-terms						
	Negotiation & close the deal						
	Set pre-integration plan						
5. INTEGRATION	Execute integration plan		- IP system, process, people and organisational integration - Transfer ownership of registered IP at patent offices				
	Review		- Evaluate M&A process - Evaluate if patents, related processes and systems after integration is sufficiently leveraged				

Figure 25. Generalised patent information usage in the M&A phases

5.1.1 Usage of Patent Information in Merger & Acquisition Phases

As seen in figure 25, the model has been divided into five sections, aiming to describe how patent information is used, by relating it to the five steps of an M&A process. In the first section, *no patent consideration*, patents are not considered at all, which could be the case for certain M&As.

Secondly, if patent information only is considered after a deal is made, in the integration phase, patent-based decisions mainly concern a potential shift of ownership, where tax perspectives, operational efficiency and alignment with future intentions, should be considered. Furthermore, decisions also relate to integration in internal systems, and communication of information regarding the shift in patent portfolio ownership. In addition, possible options regarding divestments, enforcement, pruning and so on, may need to be realized. Yet, this approach would mean that no analysis of the obtained patents was conducted prior acquisition, which includes high risks, and can, therefore, be described as an approach with low patent consideration.

Furthermore, the third section relates to conducting due diligence, and negotiations. In this phase most analyses of patent data concerns ensuring ownership and encumbrance analyses. In addition, if the patents are deemed to have significant value, additional analysis on the content of the patents, can be conducted. Many of these analyses are performed by lawyers. Hence, the perspective on patents is mostly viewed from a legal lens and primarily concerns micro-level patent analysis. Patents are in this phase mainly viewed as a risk, due to the intentions of due diligence. Discovered information, is furthermore used in negotiations, to for example affect pricing.

Interestingly, upon entering the next section of the model, related to screening, a different kind of patent analysis is required. As described by literature, for screenings of the market mainly macro-level patent analysis, such as trend analysis, is needed. Furthermore, upon selection of target, if patent information is considered, a greater understanding of the content of the patents and, the innovative ability of the seller, is the interesting information to know. In addition, knowledge regarding the buyer's own portfolio, R&D and visions are needed to evaluate the fit. Compared to the previously described way of looking at patents, the differences are here to view them, not only from a legal lens but also as a source of technological and market information. Considering patents this way, the information also provides support to the process, apart from minimizing risks.

Finally, if patent information is utilized in the strategy phase, a corporate patent strategy is needed. Patents are then viewed as a strategic resource, which creates a competitive advantage. Patents are then prioritized and able to be used as a smart tool to outperform others. Although other factors, also matter, patents then play a larger role, and can even be a driver in certain situations.

5.1.2 Reactive and Proactive Approaches

Breaking down the needed patent analyses, in relation to the M&A process, it is possible to see a difference in how patent information is viewed upon and needed. The approach can be described as proactive, in the strategy and screening phases. whereas after, in due diligence, negotiation and integration, it is a more reactive approach to both patents and patent information. Creating a strategic versus operational focus. Moreover, details are extremely important for analyses in the reactive approach, where for example, a missed detail in a contract, can have large negative implications. While, analysis concerning a proactive approach, are analyses that best provides general perspectives, and are used for predictive purposes. were results with less accuracy, still could be good enough to support decision making. In addition, competencies needed for performing analysis, in the reactive approach, are IP and legal. Whereas analyses in the proactive approach, have a higher value for technicians and business people, and could potentially even be performed by such individuals. Using this approach, education on how to conduct macro-level analyses would most likely be needed.

An alternative approach would moreover be to put the responsibility with the IP department. Recommendations are then, in correlation with literature and interviews, to create a specific role, with responsibilities of not only IP strategy but also, to provide obtained knowledge through patents further out in the organisation. By forwarding discovered information to relevant parties, such as R&D, these parties would, later on, have more knowledge if they initiate an M&A activity. Such an approach might even be preferable, as although patents can act as a source for inspiration, they can also sometimes provide an overwhelming feeling of blockage, which limits your creative thinking.

Nevertheless, of either approach taken, questions then rise, who is the "customer", how is the information presented to such individuals, and when is it needed.

5.2 Importance of using Patent Information Situationally

As each M&A activity is unique, the need for having a proactive and reactive approach may vary. This correlates with thinking as provided by Hantos saying that *"The extent of research carried out will depend on the goals and nature of the buyer, licensor or investor"* (Hantos, 2009, p.188).

As results of the study indicate that if the driver of an M&A is IP oriented, there is a preference for patent-based decision making early in the process. In such situations, the IP department may either provide support or be part of the responsible team, initiating the merger or acquisition. However, M&As initiated by an IP department, have trough interviews provided to be uncommon.

Results regarding technology acquisitions portray that considerations for patent information currently is made, in either, the due diligence or screening phase. However, to obtain the most value, the respondents believe in an entry in an earlier phase.

Expressed thoughts are that both types of M&As prefer entry in earlier phases, screening or strategy, as this would allow the IP team to provide useful input, which could help direct the M&A efforts. The replies tend to indicate similar thinking, which might not be that surprising as technology and patents are interrelated, and especially as many high tech firms commonly possess patents. Although, it is most visible looking at IP driven M&As, where a clear majority of respondents answered strategy. However, it should not be forgotten that an M&A process is not linear, meaning that both strategy and screening most often are highly interrelated.

Conducting earlier analyses has the implication that some analyses, like ownership analysis, are already pre-made, before entering into due diligence. This would likely reduce the required time, and efforts, that already stressed due diligence situations have shortage off. Which especially could impact acquisitions of large patent portfolios, were both literature and interviews indicates that commonly even fewer percentage of the total portfolio is analysed, due to manageability. Hence, conducting earlier analysis could limit the risk of conducting insufficient due diligence, which has been found to be one of the reasons for M&A failures. As patents can not only be viewed to obtain information about patent risks, but also technology and market intelligence.

Additionally, by obtaining greater knowledge regarding the competitive landscape, and emerging technology trends, the value of a company can more easily be estimated. As intellectual property is an uncertain resource to value, this would allow the buyer to argue for a more accurate price, minimizing the risk of overpricing, another common reason for M&A failures. Moreover, having a larger understanding of what both you and others have, impacts the possibility to make more informed decisions for integration, another major reason for M&A failure. Not only making it possible to evaluate if one wants to acquire the asset but also how the value from it should be realised.

For market-driven M&As, due diligence was the primary entry point for considering patent information, results showed. Yet, the respondents and interviewees saw benefits of entering in an early phase of screening. However, the question of how much more value the patent information create in such situations may a rise. It is likely that other factors, such as relationships, here does, and should, outweigh the input provided from patents. Hence, although one may argue that the patent information could assist in the process, companies rarely can afford to spend resources on things that only sometimes could provide valuable. Also, as the results indicate, it is common that IP departments are understaffed, making them forced to prioritize other tasks. The need for more proactive approaches, therefore, depend on cost versus value created. Which is specifically important to consider in market-driven M&As.

The value created does not only have to do with the importance of analysis but also depends on the amount of analyses that have to be made in a specific M&A. In addition, the frequency and amount of M&As impact long term value when considering patent analysis. Moreover, it is also credible, that the size of corporations matter, as larger corporations commonly have a larger amount of resources, higher competition, drives

standards, and have a higher amount of standardized processes. Which, at least before analysis methods have become easily managed, and the cost of performance is reduced, could have an impact. Furthermore, the environment in the industry also needs to be considered, which will be elaborated in the next section.

Summarizing all the points which have been discussed above, the study indicates that, yes it could, in all three categories of M&As, sometimes be valuable to conduct patent analysis earlier. However, this does not necessarily mean that it should be done in all cases. Sometimes the cost might outweigh the benefit, and sometimes other values, like for example relationships, should be prioritised, especially in the case of market-driven M&As. Making the importance of using patent information situational.

The analysis indicates that applying the same thinking for different types of M&As is not preferable nor feasible. Instead, this puts new needs on organisations to become flexible, and use multiple approaches, depending on the situation, as companies today often conduct more than one type of M&A. Conclusively, the need for when patent information should firstly be considered may vary but above all, the choice for when it is considered should be a choice made with awareness and intention, not a choice based on lack of understanding or ignorance. There should be clear reasons why certain analyses are conducted, as well as not conducted. Including considerations of the risks of not performing them, as well as limitation of performing them.

5.3 Merging of Industries and Rising Challenges

Both literature and study results show that handling of patent information is more sophisticated and strategically used in certain industries, like for example digital and pharma. Which might not be that surprising due to high risks for litigations, threats from NPEs, and the fact that pharmaceutical products often can be covered by only a few patents. On the other hand, the results of this study indicate that traditional industrial companies are handling patent information more reactively. Commonly applying the same process independent of the type of acquisition, focusing on patents primarily in the due diligence phase.

However, as industries merge actors with proactive patent handling are entering into areas previously dominated by more traditional industrial companies. Generating heightened challenges and new requirements for all actors, but specifically for the industrial actors with more reactive thinking. Who have to respond to changes in industry norms, evolving patent landscapes and increasing demands for disruptive innovation. Furthermore also meaning that simply relying on relationships and unstructured identification methods, becomes increasingly difficult and limiting when acquiring technology outside of a company's core business.

When aiming to meet these new requirements, by acquiring new technologies, several considerations could be made. For example, only receiving suggestions from banks or looking upon financials, does not foretell of all possible opportunities, which could be vital, when aiming to transform a company through acquisitions. Rehm et al. (2012), even

claims that attention on shareholder value creates short-term focus, which is insufficient when choosing an acquisition target and measuring deal value. Similarly, Sequeira (2018), claims that measurement of M&A success and failures should be shifted from money-oriented into impact-oriented, which would heighten the importance of technology, and hence patents. Combining such literature and the finding from the interviews, this study finds that there is a need for more strategic, long-term perspectives when measuring and evaluating technology acquisitions. In relation to this, looking upon emerging economic theories and societal debates, other values, such as environmental and societal factors are rising in recognition, which furthermore could be considered when measuring M&A success.

Another example when acquiring transformational technologies is dealing with technology evaluation difficulties. As these technologies often lie outside of the acquirer's core business, it is likely that the buyer's technicians, which commonly are asked to evaluate the technology, lack knowledge of the new technology area. To assist such individuals or hired consultants, in their process of evaluation, patents may provide certain value (see section 5.2).

Also, in all acquisitions, it is important to consider the need for integration. If intentions are to transform a business or to fully leverage a disruptive technology, decisions regarding whether or not to integrate such resource may have significant consequences. Considering such intentions, understanding of differences and similarities becomes even more important, as the acquirer and target commonly are different in many aspects, as in for example culture, size and decision making processes. Creating challenges in integration, which potentially can be reduced by obtaining knowledge of markets and technology trends.

5.4 Considerations Affecting Increased Usage of Patent Information

Nevertheless, even though research indicates several benefits, is it really credible that a proactive approach, would be used by all companies? Possibly, but several factors, such as IP understanding, culture, and other considerations have been indicated to matter for implementation.

5.4.1 Lack of Intellectual Property Understanding

Several studies claim that IP increasingly is becoming the most important asset a company can hold. Moreover, companies continuously brought forward as disruptive and inspirational organisations, as for example Microsoft, Google and Amazon, are organisations which often have sophisticated IP handling (Toole, 2018; Kiehne, 2017; Alphabet Inc., 2017; Anaqua, 2009). Furthermore, studies show that IP increasingly has become an area affecting several different functions within a corporation. Pointing to increased importance of IP strategies at the business level, affecting multiple processes (Reitzig, 2007). Creating a contrast, as both literature and the study results indicate, that there is a limited understanding, in organisations, of how patents and IP may be utilized.

Most corporations, even if they consider IP of importance, do not know how to realize its potential, creating gaps in strategies and processes.

Reasons for these gaps are for example, according to interviews, that IP, and specifically patents, has become an expert field, operating in silos, commonly placed either under legal or technology departments. However, as have been previously discussed, patents could not only be used to enforce legal rights, but also for gaining technology-, market-, and competitive intelligence. Hence, the need for understanding patents and IP has spread throughout the organisation.

Furthermore, all industries are not utilizing patents as a source for monetization, instead, patents are primarily used for defensive purposes. Hence, the value of patents can rarely be translated into economic growth, and instead is only the cost of drafting and maintaining the patents visible. It can also be dependent on the IP industry climate, where a lack of competitive enforcement and litigations might affect the awareness of patents value, as benefits of owning patents are not visible. Meaning that neither litigation costs nor incomes are realised, which would emphasize the value of patents. Creating the perspective that IP departments and patents are cost centres, not profit centres.

5.4.2 Raise Awareness of Intellectual Property

If intentions are to raise awareness of IP, it has to become a more prioritized field, which is given resources and capacity. Several activities, like for example employee education, or hiring of a CIPO, could raise awareness of the value and complexity of IP. However, no matter exactly how it is done, it needs to be seen as an investment and strategic resource. To fully obtain the value of IP, the knowledge have to permeate the complete organisation. Furthermore becoming an implemented part of the corporate strategy.

As raised in the survey, although little prior research has been conducted in the field, it is likely that the mindsets of IP departments, and their way of operating, impacts the understanding of IP. Operating in silos allows for autonomy, but it might also affect the general appreciation of IP, with few people actually understanding its value. Affecting the possibility to obtain allocated resources. Furthermore, having a culture where the employees at the IP department sees themselves as a support function might be beneficial in some cases. However, there is also a risk that this type of environment decreases the employee's ability of initiative, meaning that the IP department might unknowingly withhold crucial information, without forwarding it to others, as nobody has asked for it. As stated by Rick *"The culture of an organization is practically its DNA. Culture determines how everything else in the organization unfolds."* (Rick, 2015, p1). As culture includes knowledge, beliefs, morals, laws and customs, it commonly reflects the deepest values and beliefs of an organisation, which have evolved over time, and it is thereby affected by an organisations history. Making it difficult to change as it questions the core of an organisation. Hence, trying to affect the mindset of and at IP departments, is not an easy task, but one that requires effort.

Even if large investments are not viable, how IP and patent information is communicated should be considered. As all departments of an organisation, it is important to communicate the value one create to the business. However, if the individuals, with knowledge about IP, only presents information regarding IP from a legal lens, others may be impacted in their thinking. To show the value of IP, it has to be communicated in a business language. This means enhanced visualisations, presenting figures of not only portfolio size or ownership, but also working in business cases. On example could be to use the thinking of Petrusson (2016), creating a technology tree of the companies products, to visualise were strengths and weaknesses of the corporation lies by mapping out patents. Furthermore, according to an Aistemos report, to enhance the understanding of IP, the most efficient approach was to facilitate communication between commercial and IP teams (Burn-Callander & Phillips, 2017). Pinpointing the need for cross-sectional communication regarding IP.

5.4.3 Using Patent Information in Multiple Processes

As described by Brietzman & Mogee (2002) patents can provide value not only for M&As but also to support R&D management, HR processes, technology transferring and IP management. Hence, it is likely that proactive patent information usage would become more widely applied if conducted analyses would provide input to multiple activities within a company, as the value then would be increased. This correlates with the thinking of interviewed R&D managers, who claimed that it is possible to utilize the generated knowledge from patent analysis, for directing R&D efforts and finding collaboration partners. As shown in figure 26, generated knowledge could provide supporting information to innovation acquisitions, as well as innovation sourcing, and product/service/technology sourcing. Which is specifically of interest as research even have shown that the number of partnerships, and collaborations, are increasing (Harding & Schwedel, 2018).

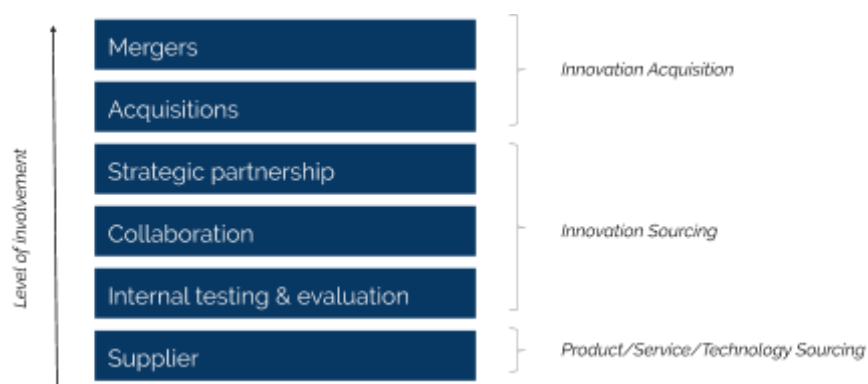


Figure 26. Level of involvement
(Modified version of a model developed by R&D manager A)

5.4.4 Data Analytics

M&As are complex processes and hence it might not be until patent analytics is put in a bigger perspective, that the true value might be realised. As described in the introduction, patent analytics can be a part of data analytics. Seeing it from this perspective means that not just patents, but also other factors, such as customer data

and trademarks, are considered. Creating a more complete understanding of the business environment, technology development and customer needs. An approach which both could mitigate certain shortcomings that patent analytics have, and enable more informed decision making. Yet, it should also be remembered that the power of data does not erase the need for visions and human insights, as data only provide support.

6. Conclusion

Chapter six revisits the research questions developed and how these have been answered, providing key conclusions of the study. To recall, the purpose of this study was to analyse patent information usage in mergers and acquisitions. Hence, the main research question was formulated accordingly: *"Can patent information provide valuable knowledge for a buyer in merger and acquisition processes?"*

To answer the main research question, three subquestions were created and answered accordingly.

(1) "What are motivations of merger and acquisition processes and why do they fail?"

The literature described multiple reasons for conducting mergers and acquisitions. One is to perform enhanced businesses within the existing core business. Traditionally, this has been the main reason for conducting mergers & acquisitions, with intentions to obtain benefits, such as economies of scale, supply chain efficiencies or geographical expansion. Another rising motive for conducting mergers & acquisitions is to transform a company. Commonly including acquisitions of new emerging technologies outside of an acquirer's core business. Finally, mergers & acquisitions can also be performed to obtain patents, for either licensing, assertion or protection in litigations. In this study, these variations of mergers & acquisitions have been referred to as market, technology and patent-driven M&As, categorised after the primary driving force of the M&A.

Furthermore looking at why statistics of failures are so high, measured from a shareholder value perspective, there exist difficulties in identifying specific causes for failures. However, the most common reasons have been found to be inaccurate targeting, errors in valuation and hurdles in integration. Moreover, insufficient handling of the process itself, fluctuations in the legal environment, as well as the financial environment, are causes given.

(2) "What knowledge can be gained from patent information, relevant for mergers and acquisitions?"

To understand what patent knowledge can be relevant for M&As, one first has to understand the M&A process. An M&A is in this study a process described through five steps; strategy, screening, due diligence, negotiation and integration. Strategy concerns alignment with the corporate strategy, and setting specific M&A strategies and criteria. Screening refers to an evaluation of the market and the selection of targets. Due diligence is a process to identify risks and evaluate the target. Negotiation includes activities of setting deal terms and closing the deal. Whereas integration concerns the execution of integration plans and review.

Patents are publicly available information of inventions, containing legal, technical and business-related information. Patent databases are the world's largest repository of technological information, making it possible to support decision making using an objective source for information. Possible analyses of patents and related patent information, range from macro-level, which concerns identifying opportunities from

patenting activity, to micro-level analysis, referring to analysis on a single patent. It is through these types of analyses possible to gather information of, for example, technological development, company inventiveness, and indications of commercial activity. Using this information and specifically looking at the M&A processes, prior research has discovered that patent information primarily can assist in target identification, evaluation and valuation of assets.

(3) *"What are factors influencing patent-based decision making in merger and acquisition processes?"*

Study results indicate a lack of IP understanding in organisations. Were specifically patents, historically have been used for primarily defensive purposes. Therefore, IP departments have been viewed as support functions, potentially creating a culture at IP departments that suppress their ability to initiative. In addition, communication regarding patents have mostly been focused around legal issues, and the IP departments have mainly been operating in silos. Meaning that all the information that patents hold is not always brought forward to others within the organisations, and as the full value of patents is not communicated, allocated resources might be impacted. Which furthermore impacts possibilities to conduct patent analysis.

Additionally, the study has found that various types of patent analysis are needed in different steps of an M&A, meaning that mainly macro-level analysis would be performed in strategy and screening phases, whilst primarily micro-level analyses would be used in the latter parts of the process. The results of this study also indicate that patent information today mostly is used in the latter part of the M&A process, commonly starting with due diligence. Yet, the study results also indicate that it in some situations can be beneficial to perform patent analysis in the earlier stages of the process, strategy or screening. However, to conduct such analysis, someone first has to request the information, but if business people lack the understanding of IPs full value, and IP departments neither have the resources, nor culture, to initiate such activity, who will then be able to drive the question?

So answering the main research question *"Can patent information provide valuable knowledge for a buyer in merger and acquisition processes?"*, the results of this study indicate that, yes it can, but it depends on the situation. Realising the full potential benefits of patent information in M&As, considerations regarding responsibilities and cost versus value, have to be made. Meaning that the usage of analyses based on patent information should be a choice made with awareness and knowledge.

7. Discussion & Further Research

This final chapter reflects on the practical and theoretical implication of the study. It addresses certain research limitations and offers suggestions for future research.

This study aimed to enhance understanding if patent information could provide value in an M&A process. Research shows that patent data currently is underutilized as a source of information, in supporting and guiding M&A activities. Hopes were therefore that the findings of this study would create enhanced awareness of research regarding patent analytics, and the potentials of utilizing patent information for decision making. Moreover, wishes were to bring forward not only the value patent information could hold to companies, but also reflect upon the topic from a realistic industry approach. Hopes were that this study would raise new questions and knowledge, that is brought forward to management meetings and strategic decision making in organisations.

As this thesis was conducted as a part of a master thesis, results and findings are limited by a number of factors. The topic of this thesis is based on and validated through, interviews and a survey, which include subjective interpretation. However, uncovered findings have not been validated through the application of specific cases, which in-depth could help evaluate the effect of patent analysis usage, in relation to M&A success and failure rates. Another limitation of the study is the complexity of operating in an intersection of two intricate fields. Both M&A activities and patent analytics are described as two extensive processes with multiple dimensions and varieties. Risks are, therefore, that the generalized overviews provided, do not foretell, or is adapted, for specific situations. The complexity of the fields of research, do furthermore also enhance causal influence problems, making it difficult to draw accurate conclusions.

Throughout the course of this study, a number of interesting topics for further research have been discovered. Firstly, using patent information proactively, as discussed in this thesis, could also be applicable for strategic partnerships and collaborations. This field holds interest for further studies, focusing more on these specific areas. Understanding what would be the similarities, and differences, compared to for M&As.

In addition, several individuals argue that the process of analysing patent information is both time and resource-intensive. Further studying the topic, it would also be interesting to analyse these statements in more detail, calculating the average cost in relation to the value it potentially could create.

Another topic for further research could be to investigate the climate and culture at IP departments. Looking at what competencies they hold. How they communicate patent information and which approaches to communication have created a positive response for others within the organisation.

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8.2 Icons



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8.3 Interviews

Internal IP managers

Interviewee A, IP manager A, Company A
Interviewee B, IP manager B, Company B
Interviewee C, IP manager C, Company B
Interviewee D, IP manager D, Company B
Interviewee E, IP manager E, Company B
Interviewee F, IP manager F, Company C
Interviewee G, IP manager G, Company D
Interviewee H, IP manager H, Company E
Interviewee I, IP manager I, Company F

Patent analytics tool consultants

Interviewee J, IP consultant A, Company G
Interviewee K, IP consultant B, Company G
Interviewee L, IP consultant C, Company H

R&D

Interviewee M, R&D manager A, Company B
Interviewee N, R&D manager B, Company B

IP and Technology consultants

Interviewee O, tech consultant A, Company I
Interviewee P, tech consultant B, Company J
Interviewee Q, tech consultant C, Company K

M&A

Interviewee R, M&A manager A, Company B
Interviewee S, M&A manager B, Company B
Interviewee T, M&A manager C, Company B
Interviewee U, M&A manager D, Company F

Lawyer

Interviewee V, lawyer A, Company L

Data analytics tool consultant

Interviewee W, data analytics consultant A, Company M

Investment banker

Interviewee X, investment banker A, Company N

Business consultant

Interviewee Y, business consultant A, Company O

Associate professor

Interviewee Z, associate professor A, Company P

9. Appendix

9.1 Interview Template

Below is the interview template used for semi-structured interviews provided. It has been separated into, basic template and an additional template to visualise which questions have been the main questions during interviews.

9.1.1 Basic Interview Template

Professional experience

- What are your previous experiences?
- What are the responsibilities of your current employment?

Organisation & industry

- How is your organisation structured?
 - How is the IP department structured?
- What are the characteristics of your industry?
- How M&A intensive is your industry and company?

Patents & patent analytics

- How important are patents in your industry and for your corporation?
- What kind of patent strategy does your company have?
 - Licensing, market exclusivity, freedom-to-operate and/or mitigation model?
- Is patent analytics used at your corporation & your industry today?
 - Why? Why not?
- What are the potentials of using patent analytics?

M&A

- Could you describe an M&A process?
 - What are the current methods used for the identification and selection of an M&A target?
- What kinds of M&As exist and what are their intentions?
 - What are the characteristics of each kind?
 - What are the differences between technology, IP and traditional market-driven M&As?
- What are the challenges of M&As?
 - What are the challenges when acquiring new kinds of technologies, that differ from the core business of the company?
- Who are the stakeholders, initiating an M&A process?
- What are the responsibilities of external consultants?
- What are the responsibilities performed by internal employees?

IP departments involvement in M&A

- When is the IP department involved in an M&A process?
 - Does the IP department initiate M&A processes?
 - What are the motives for the IP department to initiate an M&A process?
- What is the IP departments responsibility during an M&A process?

Patents & patent analytics in M&A

- When is patent information used or could be used, and how in an M&A process?
 - Is patent information used for M&A targeting; identification and selection of targets?
 - What processes exist for communicating discovered information?
- To what extent do you evaluate the internal patent portfolio, to identify potential gaps, before initiating an M&A?

9.1.2 Additional Interview Template

Investment banking

- What are the responsibilities of investment bankers?
- What is the process for M&As at investment banking corporations?
- How are potential sellers identified and evaluated for sales?
 - What are the benefits and limitations of currently used method?
- How are potential buyers identified, evaluated and selected?
 - What is considered when evaluating strategic fit?
 - What are the benefits and limitations of currently used method?

9.2 Survey Template

“10 question survey - Master thesis 2019, Patent intelligence in M&A”

Intentions

To use the information in a master thesis published at Chalmers University of Technology. Focus of the thesis is to understand patent intelligence usage in M&A processes, from an internal perspective of a buyer.

PS! Please answer subquestions (within the comment field) if possible

Definitions

Patent intelligence, is the knowledge obtained from patent(s), and related patent information, through analysis, of an invention or several inventions and their

relationships, where the knowledge is used for decision making.

M&A process:

1. STRATEGY - Setting a M&A strategy, M&A criteria and evaluating internal need of acquisitions
2. SCREENING - Understanding the market, identifying targets, selecting one target and send letter of intent
3. DUE DILIGENCE - Evaluating a firms resources and capabilities
4. NEGOTIATION - Set deal terms, negotiate and plan integration
5. INTEGRATION - Integrate and review success rate

Question 1

What area of expertise are you working in?

- ☐ IP/Legal
- ☐ Technology/R&D
- ☐ M&A/Business/Finance
- ☐ Other, please specify

Question 2

If the motive of a M&A is primarily

- (1) market/business driven, e.g. to obtain supply chain synergies

When is the IP department commonly contacted to provide patent intelligence?

- ☐ Strategy
- ☐ Screening
- ☐ Due Diligence
- ☐ Negotiation
- ☐ Integration

Answer if possible: When would you consider it to be most valuable? And why?

Question 3

If the motive of a M&A is primarily

- (2) technology-driven, e.g. to obtain new emerging digital technology

When is the IP department commonly contacted to provide patent intelligence?

- o Strategy
- o Screening
- o Due Diligence
- o Negotiation
- o Integration

Answer if possible: When would you consider it to be most valuable? And why?

Question 4

If the motive of a M&A is primarily

(3) IP driven, e.g. to obtain patents for strengthening the portfolio against litigations

When is the IP department commonly contacted to provide patent intelligence?

- o Strategy
- o Screening
- o Due Diligence
- o Negotiation
- o Integration

Answer if possible: When would you consider it to be most valuable? And why?

Question 5

The sophistication of patent data tools has only recently become sufficient and widespread. Do you believe this has impacted the use of patent intelligence in companies for M&A processes?

- o Not at all
- o Partly, but only little
- o Partly
- o Largely or completely

Please add comments if you wish

Question 6

Current methods for initiating M&As are commonly described as unstructured, e.g. someone saw a company at a fair.

Do you believe a more structured approach, using patent intelligence, would be beneficial for the success of the M&A transaction?

- o Not at all
- o Partly, but only little
- o Partly
- o Largely or completely

Please elaborate on why/why not if you can

Question 7

Do you believe that there is a lack of understanding of intellectual property in organisations?

- o Not at all
- o Partly, but only little
- o Partly
- o Largely or completely

How do you believe this lack of understanding of IP impacts the usage of patent intelligence in M&A processes?

Question 8

Patents can be used offensively

- (1) Monetization, e.g. via licensing
- (2) Create product differentiators,
- or defensively
- (3) Mitigating risk of e.g. being sued
- (4) To block others.

However, historically patents has been viewed primarily as a tool for defensive purposes and not as much a source for monetization. Do you believe this affects the usage of patent knowledge in M&A processes?

- o Not at all
- o Partly, but only little
- o Partly
- o Largely or completely

Please elaborate on how if possible

Question 9

If you had sufficient resources, would you use patent intelligence early in a M&A process (meaning, the strategy and screening phases)?

- ☐ Not at all
- ☐ Partly, but only little
- ☐ Partly
- ☐ Largely or completely

Please elaborate why/why not if possible

Question 10

IP departments have commonly been acting as support functions (as patents have been viewed from a defensive perspective). Do you believe this impacts their motivation and mentality regarding, their possibility to initiate M&As?

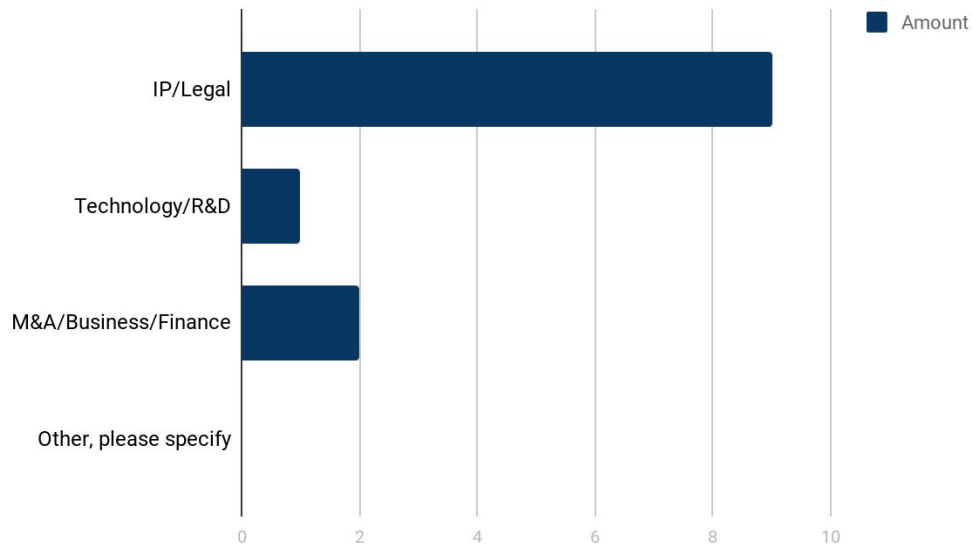
- ☐ Not at all
- ☐ Partly, but only little
- ☐ Partly
- ☐ Largely or completely

Please elaborate how and why, if so

9.3 Results of Survey

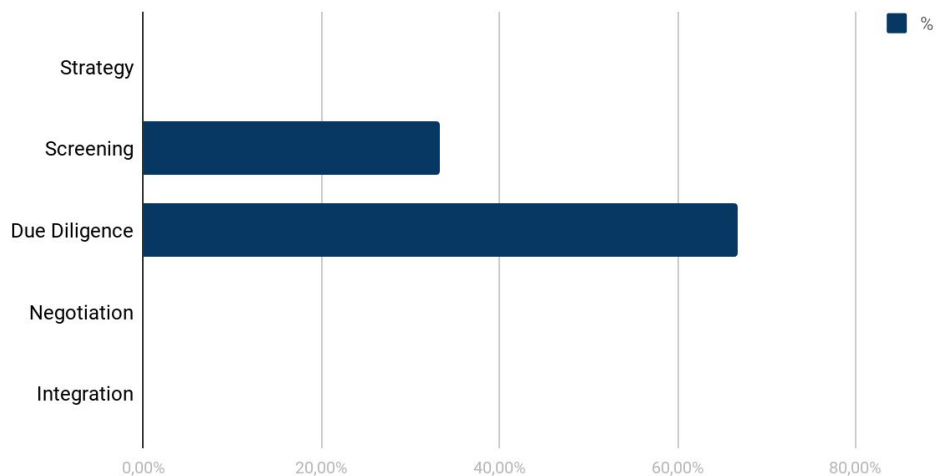
Question 1

What area of expertise are you working in?



Question 2

If the motive of a M&A is primarily
(1) market/business driven, e.g. to obtain supply chain synergies,
When is the IP department commonly contacted to provide patent intelligence?



**Sub-question: Answer if possible: When would you consider it to be most valuable?
And why?**

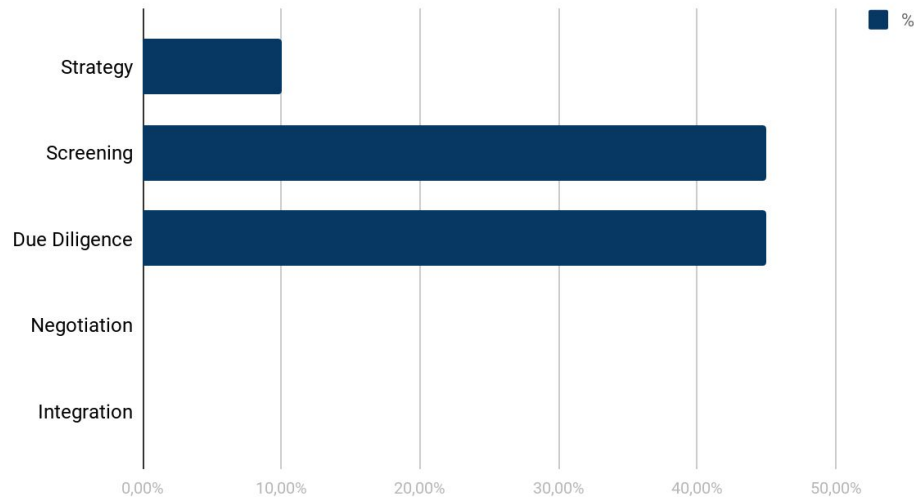
"All above applicable (case by case). I set screening as my response as I think there may be most value there."

"Screening phase is fine"

"Screening (information to differentiate targets is easily accessible) and Negotiation (put the price down by identifying IP weaknesses = potential risks)"

Question 3

If the motive of a M&A is primarily, (2) technology driven, e.g. to obtain new emerging digital technology, When is the IP department commonly contacted to provide patent intelligence?



Sub-question: Answer if possible: When would you consider it to be most valuable?

And why?

"Our division very rarely do technology-driven M&A and it has been the case that we already have candidate(s) and are getting into the dd phase when the IP department is contacted. At that stage we also get access to a lot of information. If we were looking for a specific IP it might be more logic to engage the IP department earlier in the screening /strategy phase but that has not been the case in our division so far"

"At the strategy stage, since IP could impact the value/price of the acquired company."

"Strategy"

"I would prefer to be involved earlier, at screening or strategy"

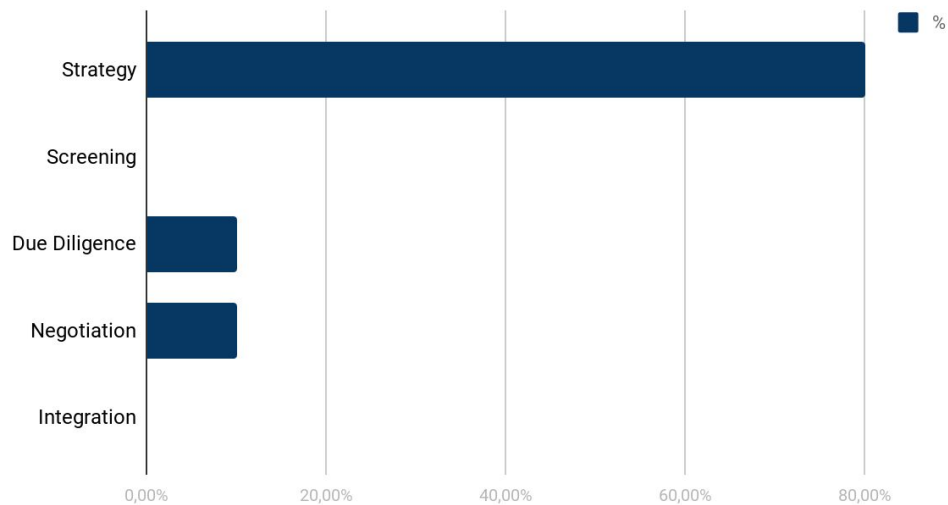
"Strategy phase would be better"

"Strategy (IP landscaping would be a very efficient tools to establish such a strategy)"

"Strategy - to provide insight that will help guide our efforts on this and subsequent due diligence projects."

Question 4

If the motive of a M&A is primarily, (3) IP driven, e.g. to obtain patents for strengthening the portfolio against litigations,
When is the IP department commonly contacted to provide patent intelligence?



Sub-question: Answer if possible: When would you consider it to be most valuable?

And why?

"here, IP would be involved early on"

"Our division has not made any such acquisition and therefore my experience is that they get involved in the dd phase to investigate matters. But for a specific project in the future it could be earlier"

"We don't acquire companies to obtain IP"

"Makes sense to do it early."

"Since IP department drives IP disputes it is discussed in such cases"

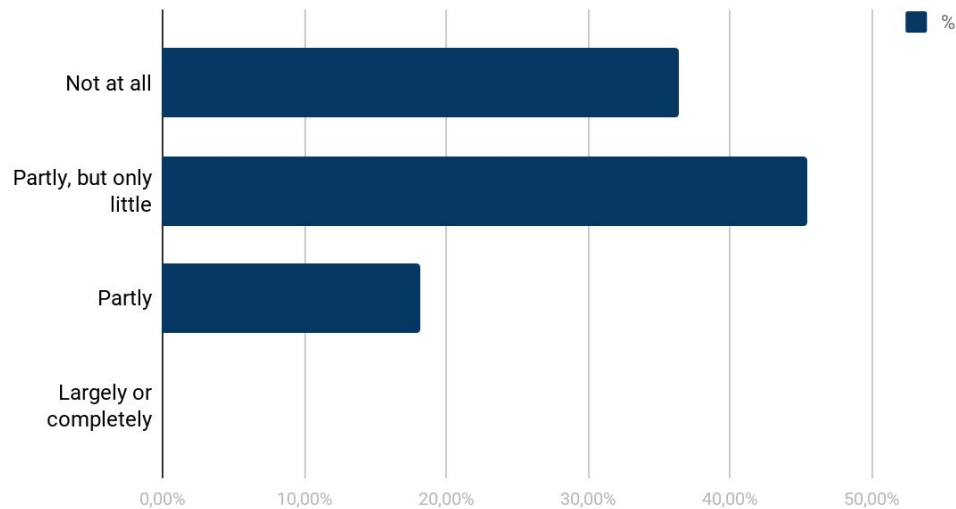
"Patents have not been a driver for M&A"

"It has never happened so far"

"Strategy - as the appropriate targets cannot be identified and evaluated without IP legal input."

Question 5

The sophistication of patent data tools has only recently become sufficient and widespread. Do you believe this has impacted the use of patent intelligence in companies for M&A processes?



Sub-question: Please add comments if you wish

"It's coming..."

"Not yet, but likely in the future"

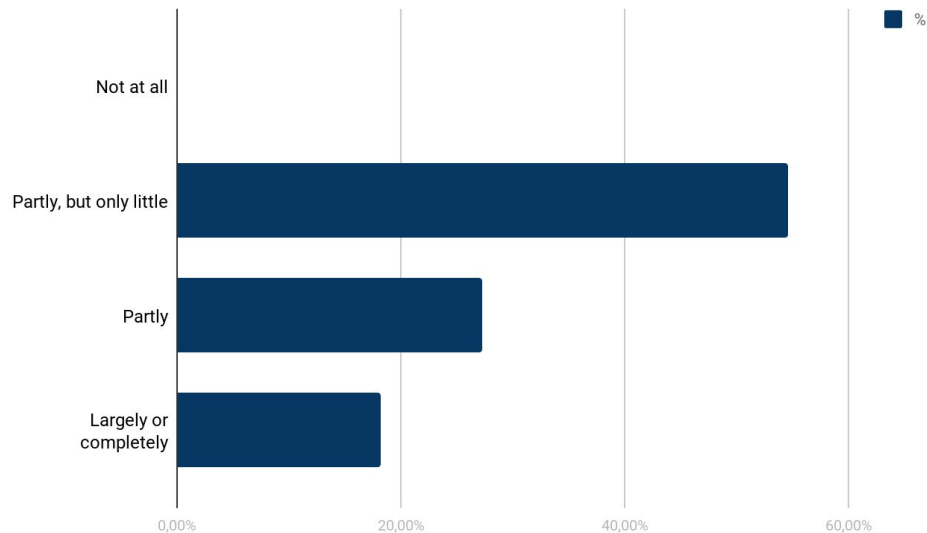
"In my view, "patent intelligence" isn't intelligent enough (yet...)"

"It is not the data which is missing, but the basic knowledge IP rights (many false ideas)"

"While more data and variety of analytics are available their value is still being evaluated."

Question 6

Current methods for initiating M&As are commonly described as unstructured, e.g. someone saw a company at a fair. Do you believe a more structured approach, using patent intelligence, would be beneficial for the success of the M&A transaction?



Sub-question: Please elaborate on why/why not if you can

"I think it would, but only if your focus is IP driven M&A, which is very seldom the case for our division"

"Our acquisitions will not be driven by patents."

"Oftentimes IP is not a significant driver or reason for the deal."

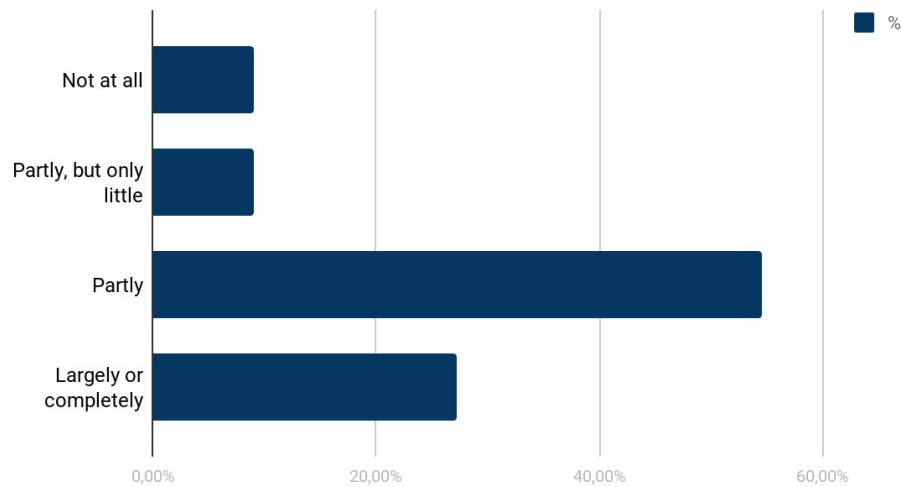
"We do have a structured and diligent strategy for our acquisitions, but in the selection of candidates patent intelligence don't play a role today compared to product range and market position. I don't see that change in the near future"

"Patents are only a tools to support our business = not the core of it".

"Such an approach would benefit IP-centric transactions, but would not reliably identify candidate on the basis of market share, strategic business or customer relations."

Question 7

Do you believe that there is a lack of understanding of intellectual property in organisations?



Sub-question: How do you believe this lack of understanding of IP impacts the usage of patent intelligence in M&A processes?

"No understanding of IP and thus it is an afterthought!"

"Easy to underestimate freedom to operate issues"

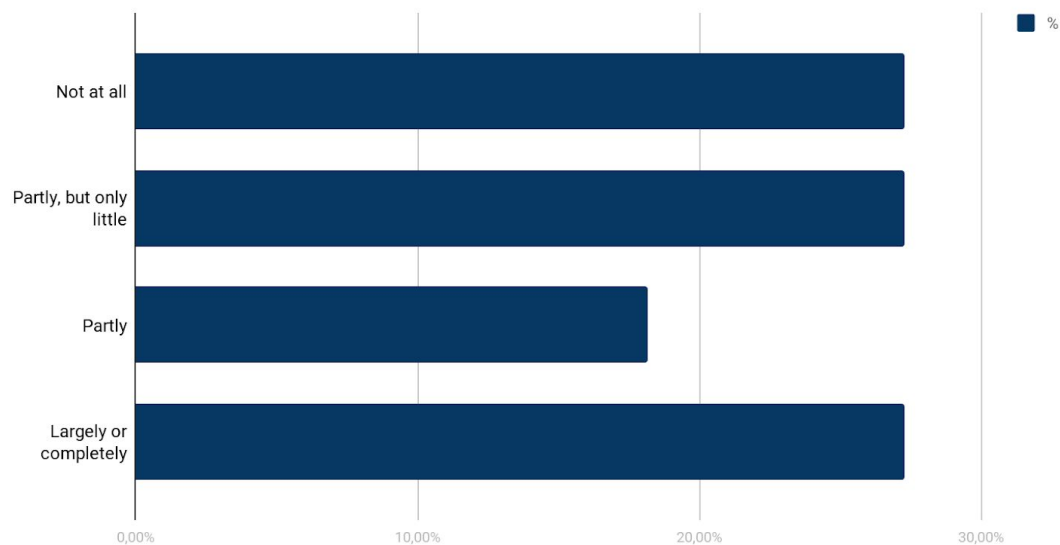
"Since our division has an IP department I do not think there is a lack of understanding but there are of course always improvements to make"

"To few know how to obtain the information and even fewer how to use the information contained in the patent documents"

"The lack of understanding and the resources to combat the same are highly dependent on the specific organisation. Even where such sophistication is lacking, solid education and training by legal counsel can bridge the gap."

Question 8

Patents can be used offensively (1) Monetization, e.g. via licensing, (2) Create product differentiators, or defensively (3) Mitigating risk of e.g. being sued, (4) To block others. However, historically patents has been viewed primarily as a tool for defensive purposes and not as much a source for monetization. Do you believe this affects the usage of patent knowledge in M&A processes?



Sub-question: Please elaborate on how if possible

"If it would be a source for monetization the focus in the strategy phase would be different and patent knowledge more important"

"M&A is not driven by patents."

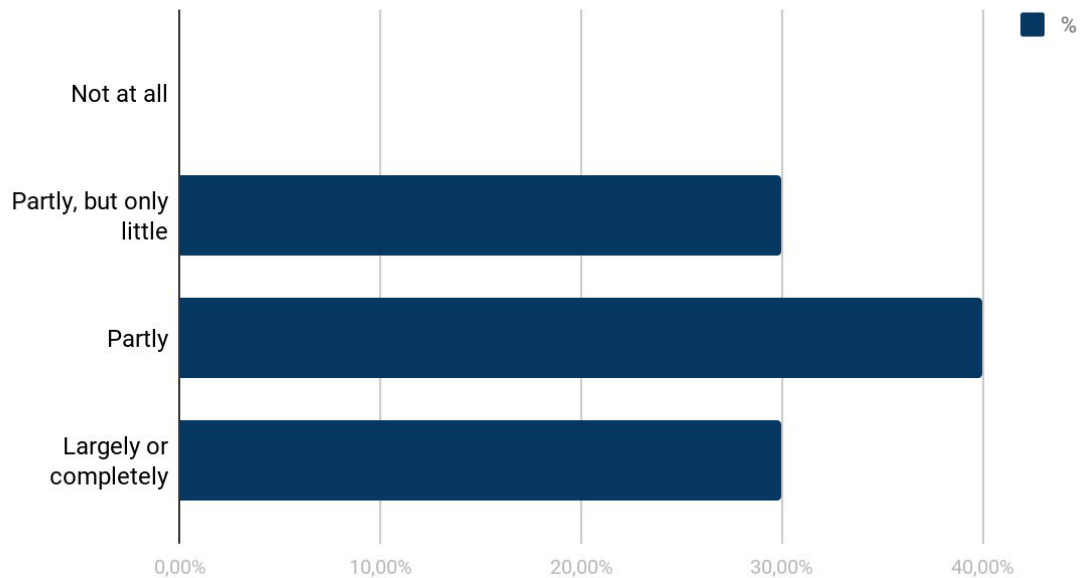
"If IP was understood -- and its monetization potential--then it would not be an afterthought in M&A"

"We are a product company and are using our patents essentially to protect our products. But this is not working with future digital products & services."

"Even in circumstances where the offensive use of IP assets is not a priority, patent knowledge provides significant value (e.g., third-party IP risk, portfolio evaluation, etc.) to M&A activities".

Question 9

If you had sufficient resources, would you use patent intelligence early in a M&A process (meaning, the strategy and screening phases)?



Sub-question: Please elaborate why/why not if possible

"Very much dependent on type of acquisition. For IP-oriented acquisitions, we add right resources."

"If smart enough, it would save a lot of effort. But it could work the other way if not done in a clever way..."

"Only if our focus would change and we would increase focus on IP driven M&A"

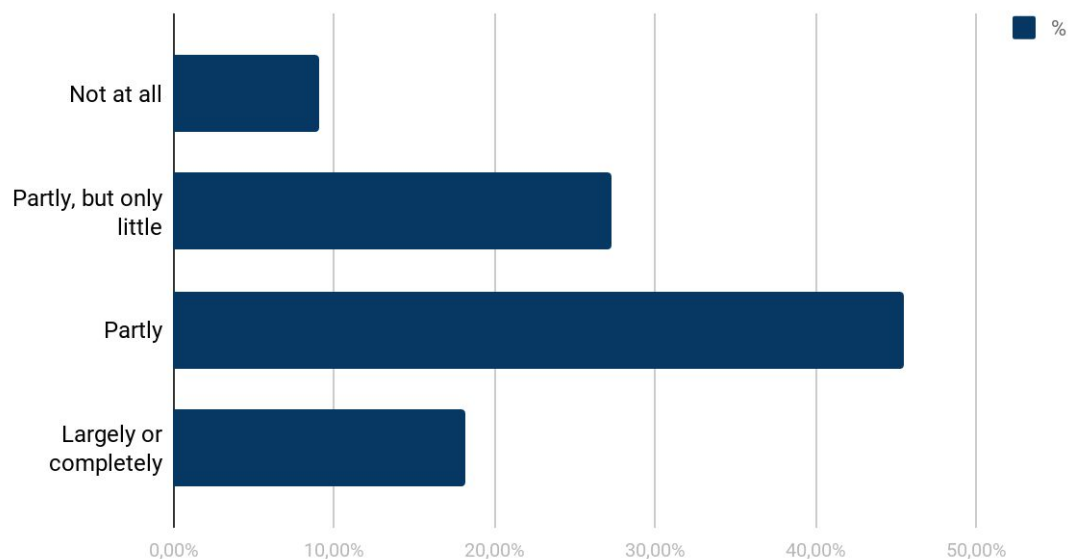
"Yes, if the acquisition team can be convinced to let this be a parameter."

"Then we should be able to work closer with the M&A team for early support and scouting"

"Use of such intelligence for transactions specifically focused on IP acquisition would be helpful at the strategy stage and thereafter. Use in the screening phase may be an additional point of reference by which to compare candidate targets. However, such intelligence likely will not outweigh, but instead supplement, the information related to revenues, customer relations, product/technology fit, personnel, etc."

Question 10

IP departments have commonly been acting as support functions (as patents have been viewed from a defensive perspective). Do you believe this impacts their motivation and mentality regarding, their possibility to initiate M&As?



Sub-question: Please elaborate how and why, if so

"That could actually be the case. I have not thought about it in that way. But it could clearly have an impact".

"Yes, and this is a good point which requires some reflection. However in our industry, patents have not (until yet) been a driver for acquisitions."

"Not in our case. Our problem is that we are anorectic, have too few heads."

"I am a believer that IP should remain a tool for business and not a business objective in itself"

"In reality, it is a small minority of operating companies that successfully monetize their portfolios. Moreover, it is the rare operating entity that is acquiring patents for the specific purpose of assertion. As such, there remain many opportunities to add significant value to the M&A process."